THE HISTORY OF ASTHMA

An Essay

by

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"The Truth of Science has ever had not merely the task of evolving herself from the dull and uniform mist of ignorance, but also that of repressing and dissolving the phantoms of the imagination."

Michael Faraday.
**INTRODUCTION.**

Every writer when confronted with the inadequacies of a finished manuscript must wonder what vain impulse prompted his effort. The imperfections are reflected as by a mirror.

Yet, in dealing with a subject so novel, so confused, so challenging as the history of asthma one can dare hope for a slight achievement of originality. Such historical allusions as one finds are incompletechronologies. The obvious need was for an analytical summation of ideas and theories without disregard of historical continuity. I have endeavoured to find the genesis of these thoughts and speculations and to trace their course and eventual fate.

At the same time, I have endeavoured by dint of historical research, to push the knowledge of asthma back to more remote antecedents and to uncover new sources. I must thank the National Library of Scotland for access to Egyptian papyri. Some of the Greek and Roman sources have possibly not been noted before, and the Syrian manuscript of the first three centuries A.D., the Arabian "Paradise of Wisdom" of 750 A.D., the 'Rosa Anglica' of the Middle Ages, and a number of other writings have not within the writer's knowledge been alluded to prior to this time. To Dr Richard Bell, gentleman and scholar, I extend my thanks for his translations of the "Paradise of Wisdom" from the original Arabic. The account of the Research Council is based largely on contemporaneous reports which appeared in the Times.

To orientate the subject in the light of modern knowledge, as well as to give a glimpse of modern thought, I have included classifications framed by some of the more recent writers. In fact I have endeavoured to blend the historical, the scientific and the literary aspects of the subject.

I must beg the reader's indulgence, aware as I am of the shortcomings of the essay.

Hubert Winston Smith
Edinburgh, March, 1938.
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In 1860, Mrs B. was startled by a sudden clap of thunder. Immediately she was seized by a severe paroxysm of asthma. The attack lasted two days.

In 1910, Master S's. cricket ball crashed through the study window. His father started to reprimand him. "Don't scold me," Master S. pleaded, "for if you do I shall have an attack of asthma." Heedless, the father continued his severe lecture to his son. The following morning as Master S. predicted, the paroxysms of asthma were upon him.

In about 1920 Mr J.R. moved from Berkley Square to Russell Square in London. In the latter he suffered from the miseries of asthmatic attacks. Upon returning to Berkley Square he received complete relief. Although the two squares are just a few blocks apart in the same city, life was unbearable for Mr J.R. in one and he was a free and healthy man in the other.

If young L. ate anything after two o'clock in the afternoon, he was seized with attacks of asthma before three o'clock the next morning.

In 1820 M.C. of Paris slept peacefully in his room. A candle burned at his bedside. A gust of wind suddenly came through the window and extinguished the small flame. M.C. immediately suffered a severe attack of asthma. This invariably happened to him when he tried to sleep without a light in his room.

In 1937 Miss M. went into a fashionable shop to purchase a mink coat. When the first "creation" was placed around her shoulders she began gasping and sneezing in one of the worst
attacks of asthma which she had ever suffered. "This is rabbit fur", Miss M. managed to utter, "Take it away!"

In 1925 when little J. was vaccinated for smallpox she suffered severely with an asthma attack.

In 1926 Miss P. changed her perfume from violet scent to rose and thereupon almost killed her gentleman escort who suffered intensely from asthma whenever he was in the vicinity of roses.

In 1810 Emperor N. was at the Opera. He lost his breath in a paroxysm of asthma when a large grey cat wandered across the footlights of the stage near his box.

In none of these places was there one physician who could proffer a real and universal cure for asthma.
3.

CHAPTER II.

ASTHMA DEFINED.

For an authoritative description of the physical signs during an attack of asthma, we could hardly excel the picture given by Dr Matthew Walzer in his treatise Asthma.

"When the patient is in an acute paroxysm a detailed physical examination is hardly needed to make the diagnosis of bronchial asthma. The characteristic posture, type of breathing, and wheezy respirations audible at a distance, are so typical of this condition that one recognizes it almost at a glance.

The skin is pale and even ashen in color. In the acute attack and in the chronically emphysematous patient, a slight to marked degree of cyanosis may be present. The skin usually feels cold and moist with perspiration. The superficial veins of the chest and neck are visibly distended.

The eyelids may be slightly bloated and the conjunctivae injected. If an inhalant precipitated the paroxysm, there may be a generous flow of serous secretion from the nose and the nares may be red and irritated. The nasal mucous membranes in these cases present the typical pale and swollen appearance of a vasomotor rhinitis and are bathed in a colorless watery secretion. When an upper respiratory infection precipitated the paroxysm, the mucous membranes are red and congested as in an ordinary 'cold'. In paroxysms of long duration the nose may be dry rather than moist and the turbinates may be covered with crusty secretions. In asthma of long standing, polypi and the usual signs of sinus disease or of an atrophic rhinitis may be present.

The mouth is usually open to facilitate breathing. The oral mucous membranes ordinarily present no characteristic findings.

The chest presents a startling picture. The back is hunched and the sternum is bulging. The shoulders are elevated to their highest limits forming between them a hollow into which the head with the chin slightly elevated is sunk.

Every accessory respiratory muscle is strain- ing to the utmost with each inspiration. The sternocleido-mastoids are strikingly prominent and tense while other muscles, such as the trapezius, scalenes, and pectorals which normally are scarcely visible, stand out in bold relief. With each inspiration the prominences of the bones and muscles of the neck and chest are made even more conspicuous by the sinking in of the unsupported spaces between them.
In spite of the violent respiratory effort there is only a slight excursion of the chest wall. Judging from the positions of the skeletal and muscular systems the lungs seem distended to the limit of their capacity and even though the patient seems to be breathing forcefully and audibly the expansion and contraction of the chest are comparatively limited.

The normal respiratory rate and rhythm are completely altered. Only in infants and young children may the breathing become more rapid during an attack, otherwise it usually slackens considerably. The individual respiratory cycle is lengthened, the additional time being consumed by a decided prolongation of the expiratory phase. Moreover, there seems to be an absence of the pauses which normally follows expiration.

Percussion of the chest in an attack elicits a markedly hyperresonant note throughout. The lung borders percuss well beyond the normal limits. The area of cardiac dullness is considerably diminished.

Auscultation corroborates the findings already noted. The prolonged expiration, the relatively shortened inspiration, and the absence of the post expiratory pause are conspicuous features. The normal vesicular murmur may be diminished or inaudible because of the harsh wheezy respiratory sounds. The sibilant and sonorous rales and rhonchi, which may be sufficiently loud to be heard without a stethoscope may drown out all other sounds by their intensity. They are scattered diffusely throughout the chest, being momentarily most prominent at one spot and then another. Moist rales which are occasionally present in prolonged attacks or in chronic cases also vary their position on repeated examinations. Even the nature of the breath sounds may vary from minute to minute in the same area."
CHAPTER III.

ASTHMA IN ANCIENT TIMES.

From the misty years of antiquity, man has been made breathless by this malady "dramatic in symptoms", "elusive in pathology", "cloaked in mystery"; sometimes termed "the epilepsy of the lungs". But valiantly, with characteristic obstinacy, he has refused to accept this added affliction as a thing inescapable. From one generation to another he has sought and fought and theorised in an effort to conquer the disease which has been a cruel master of many. True, he has been discomfited and exasperated by his ignorance, but the history of man's search for relief and cure presents another example of his power to achieve wisdom by the snail-like process of accretion.

It is customary to attribute the first medical recognition of the disease to Hippocrates (460 B.C.) and writers to have hitherto intimated that knowledge of the ailment was not only hazy in these times but remained static and vague for some fifteen hundred years following the time of Galen. I shall endeavour to dispel both these notions and to show that which much/appears altogether recent and new was actually well apprehended by the ancients.

That asthma exists among the Chinese is a well known fact; for it they use acupuncture (a sort of scratching of the skin), a remedy known to be as old as the race. It has recently stimulated discussion in countries of the occident and experiments involving its use. We know, too, that ephedrine, so much used by physicians today in treating asthma and hay fever, is obtained from a Chinese herb, which under the name of Ma Huang (Ephedra Vulgaris), has been used by Chinese physicians for some 5000 years in the treatment of
of disorders of the respiratory system. Our knowledge of ancient India is but slowly unfolding yet we know definitely that asthma is indigenous to the natives. General Gent found the natives smoking datura stramonium for relief, and first introduced this treatment into Britain in 1802. Eventually, the translation of rare manuscripts should enable us to identify asthma in very remote times in India. Even now we can affirm definitely that early Indian physicians knew of asthma and treated it by smoking stramonium. They were also aware of the neurotic and psychological aspects of the disease. According to Amman and Zacchia, since fear can provoke asthma, the asthmatics were absolved from criminal enquiry.

Asthma is excited by such an unbelievable multiplicity of causes that one form or another is apt to occur in almost any country. Consequently, it is more than probable that the knowledge of the Greeks pertaining to asthma was a part of their medical heritage from the Egyptians. Under penalty of law, every physician was proscribed from treating more than one type of disease. Thus we find even the modern practice of specialisation springing from roots planted deep in the soil of antiquity. Indeed, Homer remarked (repeated later by Herodotus,) that in traversing the land of Egypt, so great was the multitude of the healing Tribe, every man to be met with was a physician. The Medical Scriptures of Thoth (Hermes) were six in number and though the manuscripts have not survived they are known through secondary sources to have consisted of six subjects: I. of the structure of the body, or Anatomy; II. of Diseases; III. of Instruments; IV. of Pharmacy, or the Materia Medica; V. of Disorders of the Eyes; VI. of the Distempers of Women. The treatise is attributed to the time of King Osiris but is believed to have been the joint production of the whole body of Egyptian priesthood during a long succession of ages prior to the rise of Greek culture.
When we consider that 5000-4500 B.C. marks the dawn of the Sumerian, Egyptian and Minoan Civilisations, that 2900-2630 B.C. was the age of the pyramid builders and that in 2500 B.C. surgical operations were depicted upon the tomb of Pharoahs at Saqqarah, we are compelled to suspect that a part of our medical knowledge is but 'old wine in new casks'. Homer refers to the skill of Egyptian physicians in compounding drugs and we may recall the word 'chemistry' itself is derived from chem (the 'Black Land'), the ancient name of Egypt. The Egyptians told Solon that his people were "mere children, talkative and vain, knowing nothing of the past".

The writer has made special searches into Egyptian medicine for possible allusions to asthma. Recourse has been had both to indirect Greek sources, and the direct evidence of recently discovered papyri. Greek writings contain many allusions to Egyptian medicine and show that the learning of Hippocrates and his fellow physicians was largely derived from these predecessors. For instance, in the writings of Herodotus and Diodorus Siculus we are given a rather complete account of Egyptian medicine as it existed in the fifth century B.C.

In recent years this indirect knowledge has been supplemented by discoveries of medical manuscripts or papyri. Among them are the Edwin Smith Papyrus (approximately 1650 B.C.), the Ebers Papyrus (c. 1550 B.C.), and the Berlin Papyrus (Papyrus Brugsch - c. 1300 B.C.). In addition, there are six or seven fragments of others which vary in date and perfection the most noteworthy being: The British Museum Papyrus, formerly the property of the Royal Institution, the Papyrus VI. of Boulaq, the Magical Papyri of Turin and Paris, the Coptic Medical Manuscript in the Borgia Library, the Greek Papyri 383 and 384 of
Leyden, and Griffith's Medical Papyri (XIIth dynasty, 2466 B.C.) The fragments are of greater literary than Medical interest. The Edwin Smith Papyrus deals mostly with the healing of wounds and with surgery and makes no reference to asthma. Also bare of allusion to asthma is the Berlin papyrus, which is something of a miscellany.

A recently found papyrus describes a case of emphysema, a disorder of the lungs very often associated with asthma and causing dyspnoea. Here we are but a step removed from the certainty that asthma was known to the Egyptians and treated by them centuries before Hippocrates. The step is obliterated by certain passages to be found in the Ebers Papyrus (discovered in Egypt in 1872 in the hands of a native who had extracted it from an ancient tomb at El Assassi). Here we find direct mention of asthma and its treatment:

"When thou examinest the obstruction in his abdomen and thou findest that he is not in condition to leap the Nile, his stomach is swollen and his chest asthmatic, then say thou to him: 'It is the blood that has got itself fixed and does not circulate'. Do thou cause an emptying by means of a medicinal remedy. Make him therefore:

- wormwood...\(\frac{1}{3}\)
- elderberries...\(\frac{1}{16}\)
- sebesten...\(\frac{1}{3}\)
- sasa-chips...\(\frac{1}{3}\)

Cook in beer - that - has - been - brewed - from - many - ingredients, strain into one, thoroughly, and let the patient drink.

This remedy drives out blood through his mouth and rectum which resembles Hog's blood when-it-is-cooked. Either make him a poultice to cool him in front, or thou dost not prepare him this remedy, but makest for him the following really excellent ointment composed of:

- Cxfat
- Saffron seeds
- Coriander
- Myrrh
- Ager-tree.

Crush and apply as a poultice."

So far as available literature shows, there is no reference to be found to asthma in the medicine of ancient Persia.
The Greek, Hippocrates, "Father of Medicine" (460-370 B.C.) referred frequently to asthma, saying:
"Those who have passed their youth are subject to asthma, pleurisies, and inflammations of the lungs. The word "asthma" from the Greek "o2oμα" means "panting" and is to be found in much earlier Greek literature in its signification of "breathlessness." From the writings of Hippocrates one infers that he regarded as a single affection those ailments which resulted in dyspnoea. But we must grant to him priority in recognising that the particular climate or place may predispose to asthma, an idea much stressed in modern therapy. In "Airs, Waters, Places" he says:

"A city that lies exposed to the hot winds - these are those between the winter rising of the sun and the winter setting - when subject to these and sheltered from the north winds the waters here are plentiful and brackish and must be near the surface, hot in summer, cold in winter. The heads of the inhabitants are moist and full of phlegm, and their digestive organs are frequently deranged from the phlegm that runs down into them from the head. Most of them have rather flabby physique and they are poor eaters and poor drinkers. Children are liable to convulsions and asthma, and to what they think causes the disease of childhood and to be a sacred disease." (Sacred disease = Epilepsy).

Here, too, is the germ of the idea that phlegm coming from the head is a condition concurrent with asthma. Later Greek physicians hastened to draw a causal connection and therein we find a main root of the modern congestion, or exudate theory that the panting in asthma results from blocking of the lungs. The idea was pushed to other conclusions.

Where did the phlegm originate? Galen later said with the adherence of succeeding generations "from the brain"; the medievalists with unswerving faith in Galen but a propensity of their own for new nomenclature, declared that the portion of the brain at fault, the hypophysis cerebri, must accordingly be renamed the pituitary body (from the old English for mucous producing membrane). Thus the pre-occupation of both ancient
and mediaeval physicians with the 'state of the brain in cases of asthma is partially explained.

Galen, the great Greek founder of experimental medicine (131-201 A.D.) makes asthma depend on two causes, each distinguished by a material producing irritation, namely:

thick and pituitous humours and a crude tubercle in the lungs. Such analysis goes beyond superficial observation and implies dissection or post-mortem examination.

The practical heights attained by the Greek School of Medicine in the study of asthma will be further revealed in the next chapter where the writer seeks to relate to the history of asthma certain hitherto unconsidered manuscripts.

At this juncture, it is convenient to pass to the Romans. We can be sure that this doughty race did not escape the affliction of their predecessors. The Roman philosopher Seneca (A.D. 3-66) suffered from asthma and a picture of his attacks is given to us in his writings. They indicate that he suffered from cardiac rather than bronchial asthma.

The Romans discovered empirically that gaseous vapours from certain springs were efficacious in the alleviation and cure of asthma. Near Auvergne, in France, is Mont Dore, a resort which has been a by-word to the French down through the centuries, and called by them "le providence des asthmatiques" yet practically unknown to the world at large. The Romans discovered its virtues over 2,000 years ago when Caesar conquered Gaul. The Gauls had swimming baths there and doubtless knew of the curative powers of the springs. The Romans built baths on a magnificent scale of which ruins and debris still remain. They called it, "The place where diseases of the chest are cured". To this day one may see there the bust of a Roman depicted as a victim in the throes of an asthma paroxysm with shrugged shoulders, distended chest and staring eyes. In his right hand he holds a sphere reputed to be the
emblem of recovered strength. Hurst says that Sidonius Appolinaris, in the fifth century A.D. was the first of all writers to give an account of the use of the waters in respiratory disorders. But surely this must be a typographical error. Sidonius Appolinaris lived in the fifteenth century and his allusions to the baths were contained in letters to his son Appert, under the name of 'Calentes Baiae.' Without much doubt the writings of the Romans made reference to it. (Michael Bertrand in 1810 introduced the modern therapeutic procedure still largely followed there). The visits of Yeo (1879) and Hurst (1925), the latter, Senior Physician to Guy's Hospital in London, a chronic asthmatic himself, and a leader in asthma research, led to chemical analyses. The vapours were found to contain in some cases as high as 99% carbonic acid gas, traces of hydrochloric and sulphuric acid, arsenic and certain alkaline salts with a pH of about 6.4. The findings led Hurst to foster production of individual apparatus for using CO₂ in the home. Thus the Romans, quite innocent of the science of their ways, but happy with the results obtained, drank of the springs and breathed its vapours in strict adherence to tenets recently propounded by our eminent physicians, bio-chemists and physiologists, that:

(1) CO₂ is an active stimulant to enhanced respiration;

(2) The bronchial muscle is sensitive to very slight changes in the hydrogen-ion concentration of a perfusing fluid. It is dilated by acid and constricted by alkali within physiological range (Thornton and Gillespie bronchi experiments, 1930.)

(3) The bronchial muscle is likewise affected by changes in the calcium potassium ratio in the blood: a constriction is produced by a very slight increase in calcium, or a diminution of potassium. (D'Silva- blood experiments, 1933.)
Acid Therapy is very helpful, including breathing of acid vapours, injection and administration by mouth of dilute acids, and acid diet (Floyer (1698) and Salter (1860), followed by a succession of noteworthy experimental confirmations to be considered hereafter.)

CO₂ perhaps effects a part of its favourable action on the mucous membrane of the nose and "asthmogénic" point or focus in many cases. (Hurst, 1925)

Aretæus, the Cappadocian, lived under Domitian or Hadrian (second to third century A.D.). He described asthmatics as follows:-

They breathe standing as if desiring to draw in all the air which they can possibly inhale; and in their want of air they also open the mouth as if thus to enjoy the more of it: pale of countenance except the cheeks which are ruddy; sweat about the forehead and clavicles; cough incessant and laborious; expectoration small, thin, cold, resembling the efforescence of foam; neck swells with the inflation of the breathe (pneuma); the precordia retracted; pulse, dense, compressed, legs slender; and if the symptoms increase, they sometimes produce suffocation after the form of epilepsy.

But if it takes a favourable turn, cough more protracted and rarer; a more copious expectoration of more fluid matters; discharges from the bowels plentiful and watery; secretion of urine copious, although unattended with sediment; voice louder; sleep sufficient; relaxation of the precordia; sometimes a pain across comes into the back during the remission; panting rare, soft, hoarse. Thus they escape a fatal termination. But during the remissions, although they may walk about erect, they bear traces of the affection.

Aretæus thus gives us not only a graphic description of the symptomology and clinical signs but makes three other observations which must be accepted as precursors of modern writers:

1. He alludes to the fact that asthmatics find an upright or standing position more favourable to breathing than a reclining one;

2. The asthmatic paroxysm may result in death, though usually the attack passes over;
(3) Even between paroxysms, the disease of asthma is still present in the patient.

Celsus, the great Roman medical authority who lived during the reign of Tiberius Caesar, in his De Re Medicina regarded dyspnoea, orthopnoea, and asthma as simply variations of the same malady differing from each other in degrees.

"Each consists in difficulty of breathing. When this difficulty is more moderate and unsuffocative, it is called dyspnoea; when it is more vehement so that the breathing is sonorous and wheezing, it constitutes asthma; and when it can only take place in an erect position, it is denominated orthopnoea. The first is usually a chronic affection, the latter two, acute."

Celsus asserts that the chief symptom of the latter two conditions is that breath is emitted as a "sibilus noise" because of "constriction of the respiratory passage."

Here then we see materialising, though still in nebulous form, the fundamentals of the theory today favoured above all others, that the mechanical cause of dyspnoea in asthma is interference with the passage of air through the breathing apparatus. We are present at the birth of an idea. Here lies the genesis of all those later theories which deal in a refined way with the CAUSE BEHIND THE CAUSE, namely, the hypothesis of vascular constriction, congestion by mucous exudations, by swelling of the bronchial mucosa, by constriction of the broncholes through muscular spasm. Indeed, the whole history of asthma research has been a seeking for the ULTIMATE CAUSE OR CAUSES of the inescapable phenomenon of "constriction of the respiratory passage".

We must remember that humanity is more interested in CURES than arm-chair speculation, and give the credit to the ancients for such effectual therapy as they used, whatever their
ignorance of the exact property or action of the remedy. We must further remember that our own great strides, with all the scientific facilities at our disposal, have been largely in the realm of practical therapy without discovery of the CAUSA CAUSANS. There is no agreement even today as to the essential mechanism involved. We have merely reached half-way houses on the road to truth, and what are CAUSES today will be classified tomorrow as mere results or EFFECTS of yet more obscure, primary causes.

Aurelianus, Caelius definitely describes bronchial asthma as a separate disease. This celebrated Roman physician who lived in the fourth or fifth century A.D., was a native of Sicca Veneria in Numidia. A follower of the great physician Soranus, it is not unlikely that he translated some of the latter's works into Latin. In his writings, Aurelianus, in reference to pleurisy says that by listening to the affected part of the chest a hissing noise can be heard. Thus it is certain that he practised auscultation of the chest, in this respect being the precursor of Laennec. In his treatise De Morbis Acutis et chronicis he says:

"Asthma occurs oftener in men than in women, in middle age than in children or old men, and in the delicate rather than in the strong. More in winter than in summer and more at night than by day. In some it begins after disease, whereas in others it begins without obvious cause.... The patient has a feeling of suffocation, heaviness and burning heat in the chest, and a feeling of spasm in the bowels. It begins with violent suffering, wheezing and hissing in the chest and the voice is weak, the neck and face stretched and red, the expression anxious.... There are tears.... and the pulse is weak. Asthma is distinct from other diseases, where there is difficult breathing, as well as from pneumonia, orthopnoea...etc." 19

The treatment recommended by Aurelianus includes laxatives, poultices, a simple clyster, fomentation, sponging, cupping of the chest with scarifications as well as steam, rubbing of the arms, and during the paroxysm itself, venesection,
if strength permits. As a regimen to be followed between paroxysms he prescribes walking, vocal exercises, change of scene, sea air, light, warmth, heliotherapy, massage of the chest, maintenance of good spirits, moderation in food, medicinal baths, and accustoming oneself to cold baths. Consider the harmony of these view with many of the suggestions of modern therapy, among them:

(1) Walking as a tonic for the chest muscles;

(2) Vocal exercises, instrument blowing, and practiced breathing particularly with reference to expiration; Von Staubing 1906; Galscheider (1907); Treupel (1908); Kirschberg (1908); Saenger (1909) - all Germans, this theory of controlling the cough and character of breathing by training being a German contribution.

(3) Dr Hyde Salter's celebrated dictum (1860) p. 261 "7. ... It is impossible to predict what will be the effect of any given air, but probably the most opposite to that in which the asthma seems worst, will cure." "8. That possibly there is no case of asthma that might not be cured if the right air could only be found."

(4) "......late meals, heavy meals, bulky diets or mixed cooking are frequent forerunners of severe attacks; ...... take small, easily digested, simply compounded meals; the principal meal being at noon and the supper light. No manner of food or beverage should be taken by an asthmatic after going to bed." (Bray: 1937)

(5) Starvation has a beneficial effect on allergic diseases including asthma because of the acidosis that supervenes. (Beckman (1930))

(6) During sea voyages acidosis is brought about, demonstrable clinically, and this probably explains the loss of allergic symptoms at such times. (Oriel 1929)

Paulus Aegineta, who lived in the seventh century A.D., says:

Those who breathe thick without fever, like those who have run fast, are said to be asthmatic, that is to say, to pant for breath; and from their being obliged to keep the chest erect for fear of being suffocated they are called orthopneic. The affection arises from thick and viscid humours becoming infarcted in the bronchial cells of the lungs. Dyspnoea is a common symptom which accompanies these and many other complaints. The indication of cure in asthmatic complaints is to consume the viscid and thick humour by attenuant and retergent medicines."
Obviously, the word asthma has by now attained a pathological connotation. Attention has become focussed on the congestion, and a mode of treatment introduced which as late as 1871 brought Abercrombie commendation from "consulting chemists", testimonials from clergymen, and a flood of letters from grateful sufferers for the benefits gained through the use of his two "solvent mixtures" for dissolving the mucus from the bronchioles. Even today it is a mode of treatment not to be ignored.

The writer has no desire to detract from the brilliance of prior writers, but in his researches on the history of asthma he has been compelled to differ with Stolkind's assertion that "there was no medical literature pertaining to asthma, to speak of until the seventeenth century" and Walzer's conclusion that "the history of asthma in the light of such a clinical impression (i.e. a differentiated disease with clearly characterised symptoms) is limited to the last two or three centuries." In the foregoing chapter the writer has sought to maintain a contrary position by showing the accuracy of diagnostic description, the germination of profound ideas in their influence on later thought; methods of treatment closely correlated with modern procedure and effectual in practice though not scientifically explained. Certainly we must not say that the ancients envisaged and anticipated all that has been done since, for theirs were but inklings of mysteries too deep for their science to plomb. Theirs was admittedly an empirical art. We cannot read into chance phrases meanings unintended, nor permit the utterer of a bare speculation to take credit for the harvest of laborious scientific demonstration. But there is equal danger of dismissing too quickly or weighing too lightly the real contributions of the past. In this spirit, then, the writer will survey in the next chapter manuscripts heretofore unconsidered in the history of asthma (so far as he can determine) and present further evidence of the considerable knowledge of the malady to which the ancients had attained.
CHAPTER IV.

"THE SYRIAN "BOOK OF MEDICINE" AND THE ARABIAN "PARADISE OF WISDOM."

In the early centuries of the Christian era there flourished great medical schools at Edessa (Urfa) and Amid (Dearbekir) and Misis where medical lectures were delivered in Greek. The Syrian "Book of Medicines" is a collection of the lectures translated from Greek into Syriac by a Syrian physician who was probably a Nestorian. He was undoubtedly well acquainted with Greek and Syriac and may well have been attached to one of the medical schools in question. Thus much of the medical knowledge of the age has been preserved to us in the form of a rare old manuscript, translated a few years since by E.A. Wallis Budge of the British Museum, where it is now lodged. Because of the great interest they have for investigators into the history of asthma, liberal portions of the manuscripts - some immediately, others remotely pertinent, are herewith reproduced.

P. 70
(Page 16. Fol. 32a)

"Of Cold in the head and of the rheum which runneth down therefrom upon the Cheek."

"Now the cause of a cold, that is to say the rheum which runneth down the nostrils, and of that also which runneth down into the mouth, is the brain. But in cold, and in heat, like a body the parts of which are homogeneous the brain suffereth when it undergoeth a change in its composition, and like an organic member it becometh full--- But we only call 'rheum' that superfluity which floweth down from the brain and cometh in the mouth, whilst to that which descendeth from the brain into the nostrils we give the name 'catarrh'.

Ibid - page 133.
(p.123 Fol.60a)

Of Disease of the marrow which is in the spinal column.

And behold we can shew straightway when the first vertebrae are diseased that there arises correspondingly the disease which is called 'suffocation' (Angina), this happeneth more to children than to grown men. Now it is well known that the upper portions of the spinal column are much more important than the lower, but a disease of this kind happeneth
were caused by much by means we ribs also fifth vertebrae, and we of the injury which ariseth from when we have need to take a deep breath, just as that upper muscle which is by the neck also helpeth when we have great need of breath. Now we do not help ourselves by means of those muscles when we need deep and violent respiration only, but also for other causes.

Ibid - Page 207 page 187 Of difficulty of breathing, and shortness of breath, and asthma.

And in a general way, inasmuch as ye have a good memory ye are well acquainted with all the muscles of the chest and also with all the nerves which come thereto. When therefore ye go into the presence of one who is suffering from shortness of breath, look ye first of all and see if the muscles of the chest be in motion and those between the ribs as well as the upper muscles, and the organs of digestion, and the muscles between the ribs. If ye see that they are all in motion then ye must know that one of the upper muscles of which I have spoken is primarily the cause of motion of this kind, and afterwards ye must try to determine which is the cause in the place. If, however, they are not all in motion then it is right for you to arrive at quite other decisions. If, for example, we take the case of a sick man, all of whose muscles are in motion in such a way that his chest expandeth obviously and his shoulders move, this man, I say, must be suffering from one of the three following causes: enfeebled power, or constriction of the passages of the organs of respiration or excess of heat in his heart or lungs. It is possible that two of these causes may be in operation at the same time, but there may perhaps be one only, or there may be all three operating at the same time.

Ibid page 210 (Fol. Page 189.)

Now when heat and oppression of the chest both happen to take place together in the organs of respiration as, for example, in those sicknesses caused by inflamed abscesses of the lungs, not even that great, frequent and rapid breathing is sufficient for them, and the sufferers therefore hold themselves upright (or, straighten their bodies), and sit up, because they feel that in this position the whole chest can be more easily inflated. When they lie down the chest falleth on itself, because the upper portions of the chest come down upon the other portions of it which are close to the spinal column. When the spinal column itself is stretched out (or, extended) in an upright direction, the breast also standeth in an upright position with it, and doth not rest easily upon it.

In a similar manner also taketh place the breathing of those who have the oesophagus of their lungs filled by the copious discharge of rheum that cometh down from the head, or from one of the places that are round about the lungs and they are different in one matter only, namely, (their chests) are not inflated and they do not inspire in heated manner. In like manner also is it in the case of those in whom copious pus is collected between the chest and lungs, now such
suffers the physicians call 'purulent', and they inflate the whole of their chests \* but they do not breath in a heated manner, moreover they do not gasp. On the other hand, if it happen that they have burning fever, they are straightway choked by the pain and insasmuch as their power is enfeebled, they, in any case would choke through the excess of pus. Now when the rheum cometh to the lungs or when there is in the lungs the inflamed abscess which is called 'inflammation of the throat (lungs?) ' or when there is asthma, the strength of the patient does not become necessarily enfeebled, for the exact opposite is the case and his power is firm and strong; moreover, the pains of asthma, which arise from the thick and viscous chymes, become joined to the lungs. And when also, because of something which is difficult to dissolve (or set free) there is pain therein it happeneth on such an occasion, although it doth not draw in a large quantity of air, and therefore patients feel difficulty in breathing regularly, except as regards drawing in the breath, and this is the sure symptom of excessive heat (or, inflammation).-----And ye must understand that the things of which I here remind you it is absolutely necessary for you to know (in connection with) this treatise.------In those in whom the air essence that is drawn into the chest is great, and in those who have some kind of abscess, or difficulty in the organs of respiration, besides a burning fever, the motion of the chest from outside is great. Now the air that is drawn in doth not become less through the measure of the inflation of the chest, but is reduced in no small degree by the drawing of the breath.

Ibid P. 259. Of the healing of ailments of the lungs and of all the members of the chest.

And the fluid, which descendeth from the head to the throat and to the oesophagi of the lungs is accompanied by constant coughing, and change of voice, and difficulty of breathing and asthma and sometimes also by running of nostrils; and sneezing, and ulcers in the lobes of the ears.-------And thus also is it in the case of the organs of respiration for since these are all placed inside the chest, it followeth of necessity that every possible relief (or, assistance) must be applied to the chest either internally or externally. Only in the case of bringing up of blood, or pus, which taketh place through that fluid that descendeth from the head to the lungs and throat, both the head participate in the helps (given), i.e. in the form of plasters which give warmth and which are applied to the head and the bathing with aromatic compounds, and the fomentations. Sometimes we use the medicines that impart warmth slightly, and produce dryness, and strengthen the head, and sometimes those that are pungent (or, acid) such as nitre, and mustard and euphorblum, and Thapaia Asclepium, and aromatic herbs, and spices which produce exceeding dryness. Now, in the other diseases, besides taking due care of the head, it is meet that all remedies (or helps) should be applied to the chest and if there be disease in the lungs or in the diaphragm (we must effect healing) by means of draughts and pills that are to be placed under the tongue, and plasters, and by the foods that are beneficial. And the compound medicines that are good for coughing and bringing up pus are these:

A medicine which is called Deyakoda (that is Syrup of Poppies) and which is good for coughs and for the runnings which flow down the head to the chest, etc. etc.
The disease of the "Strangles".

Now all these disease cause some difficulty in respiration.

Breathlessness. Asthma described.

Now ye have also learned that pains are often associated with constitutions that are unequal, and with the inflation of the chest with a superabundance of breath, sometimes when it distendeth the region which is shut up, and sometimes when the breath escapeth forcibly. Similarly also when a superabundance of hot, acid chyme, or cold and viscous chyme is imprisoned in that region or when it distendeth it, or when it escapeth forcibly, there cling to them pains more abundantly than when they are imprisoned in the members that are diseased, even though they are not in motion; when they are in motion pains are present in a small degree.

Breathlessness. Asthma described.

Now inasmuch as we have already made mention of asthma, together with shortness of breath, we will describe what asthma is. We call 'astmatic' those who though having no fever, draw their breaths in gasps as do those who run and such people because they draw their breaths in this manner physicians are in the habit of calling 'astmatic'. These, however, so far as facts are concerned would be more clearly described if they were called, "those who draw their breath in an upright position," because they are compelled at all times to keep their chests in an upright position owing to their fear of being choked, and they always cause the parts of their beds against which they support their backs to be in an upright position, so that they may not be choked whilst they sleep. Now the air which they draw in when they breathe inwardly causeth less pain than when they breatheth out, and from this fact it is known that in the interior of their chests there is some unnatural oppression, even as do feel those who suffer from the disease of asthma.

Let us now collect the causes which we have described above through which shortness of breath, and difficulty of breathing and asthma take place and as we may say shortly those by which the various kinds of cure may be distinguished. Now asthma and shortness of breath are caused by moisture which is confined between the lungs and the chest, when patients cough and bring up pus after the manner of those who are called '(spitters up of) pus', or there is an inflamed abscess in the lungs or in some region of the chest, as in the case of those who suffer with hard, red sores or pustules, or weakness of the nerves, or of the muscles that work the chest and throat and have their course either in the marrow of the spinal column or in the marrow of the head (i.e. brain); or when these nerves and muscles are attacked by some sort of abscess; or when irregular changes in the conditions of the body take place in the chest and lungs. Or asthma is caused by some inflammation of wind that cannot escape, or when the mouth of the lungs or of the oesophagus is filled with thick and sticky fluid. These things are, stated briefly, the causes that produce shortness of breath and asthma.

Of the cure of Asthma and Shortness of Breath.

Now that fluid which is confined between the lungs and the chest and which hath been saith to produce shortness of breath, is removed by coughing; and the medicines that have been described in connection with the diseases of the lungs and chest are good for those who cough and bring up pus, and for those who are called 'spitters up of pus'. For cases of the difficulty of breathing that ariseth through an inflamed abscess,
or through a pustule, or through ulceration of the lungs, medic-
cines; and (certain kinds of) foods, and plasters which cool
and relieve the pain of the abscesses are good. For the
difficulty of breathing that taketh place through the weak-
ness of the nerves or of the muscles those medicines and
plasters and unguents that are prescribed in the Chapter on
the diseases of the nerves are good. Similarly, even though
an abscess be present, the plasters (or medicaments) that are
prescribed therein are beneficial to them, and bathings, and
fomentations, and wet bandages applied to the spinal column,
and to the nerves and muscles, when they are laid on the places
in which the injury is situated. The irregular mixtures which
take place in the lungs and chest, and through which asthma
ariseth are cured by mixtures of an opposite kind. And more-
over, if there be any wind which causeth inflation we cure it
by means of agencies which relieve (the pain) and open the
pores, and which are applied externally to the chest, and have
an effect inwardly. Now the asthma that ariseth through a
thick and sticky fluid which filleth the mouth of the lungs or
oesophagus, and is caused by a discharge of rheum from the
head, or which descendeth into the lungs from another place,
we heal by means of medicines which cleanse and cut the fluid
(phlegm?) that appeareth through coughing; these medicines
are those that are set down in this chapter.

(P. 216.)

(1) Another medicine which is good for the aforementioned
pains:—

<table>
<thead>
<tr>
<th>Medicine</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artemisia abrotanum</td>
<td>4 drachms</td>
</tr>
<tr>
<td>The tops of branches</td>
<td>4 &quot;</td>
</tr>
<tr>
<td>of absinthium</td>
<td></td>
</tr>
<tr>
<td>Aristolochia (birthwort?</td>
<td>2 &quot;</td>
</tr>
<tr>
<td>rhubarb?)</td>
<td></td>
</tr>
</tbody>
</table>

Crush and work up in vinegar and use in the manner
of the preceding, or in honey water or in warm oxymel.

(2) Another medicine for the pain:—

<table>
<thead>
<tr>
<th>Medicine</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artemisia abrotanum</td>
<td>2 parts</td>
</tr>
<tr>
<td>Fleshy dried grapes</td>
<td>4 &quot;</td>
</tr>
<tr>
<td>Branches of rue</td>
<td>1 part</td>
</tr>
<tr>
<td>Rain water</td>
<td>3 Rests</td>
</tr>
</tbody>
</table>

Boil until 2/3 have been evaporated, and pour into
what remaineth 3 oz. of honey; then boil again until the
mixture becometh thick, and administer as a draught when warm
three measures from time to time.

(3) Another:— Take fresh extract of squills, pour on it a like
quantity of honey, put on the fire and boil till it becometh
thick. Take one spoonful (tarwada) of it and administer to
the patient, before and after meals.

(4) Another — Throw two measures of the insects that collect
under the water jars and are called "millepedes" into a
potter's vessel, heat them over a fire, and when they are white
rub them down and mix the powder with boiled honey, and admin-
ister in the form of a linctus one spoonful (tarwada) (to the
patient when) fasting.

(5) Another which is good for asthma of long standing:—

<table>
<thead>
<tr>
<th>Medicine</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opopanax</td>
<td>2 drachms</td>
</tr>
<tr>
<td>Insides of colocynth berries</td>
<td>1 &quot;</td>
</tr>
</tbody>
</table>

Crush and administer 1 drachm in hot water.
(6) Another:— Take the lungs of a fox, dry and pound them, and administer in the form of a draught with wine. It is beneficial.

(7) Another:— Catch a tortoise from the river and kill it, and pour some of its blood into a clay vessel: then cut open the body, take out its inside, roast it in the fire, mix a few peppercorns with it, and work up with honey, and use as a linctus morning and evening.

(8) Another (ascribed to) Dioscorides, which is good for coughs and asthma.

Take mint, origanum, warrior’s hair (Venus’s hair?) horehound, iris, licorice root, in equal quantities, soak in water until hath evaporated, mix with honey and administer in the form of a draught.

All the above medicines are good for difficulty of breathing and for the kind of asthma that arietha from the thick and sticky fluid that is confined (in the mouth) of the lungs, and that I have described above—and since this kind of asthma demandeth that the fluid that causeth pain be reduced and cut, medicines and suitable foods are necessary. Now the medicines that are beneficial in cases of abscess are finer and drier than those that possess aromatic odours, and the medicines that are good for breathing in an upright position and for asthma are those that cut (the phlegm) and cause no pain. For this reason those that give relief especially are the vinegar that is called 'askil' (squills), that is to say, the essence of squills and oxymel that is compounded of vinegar of this kind. The medicines that cause great pain are not good for this ailment.

Ingredients used in Syrian Prescriptions as described and defined in Modern Standard Reference Works and Medical Dictionaries.

Opopanax — is a resinous substance of strong smell obtained from opopanax chironium, a plant of Turkey. It was formerly used as an antispasmodic in nervous complaints.

Colocynth berries — bitter apple is a fruit of a species of cucumber, citrullus colocynthis, growing on the Mediterranean shores. The dried white pulp is a powerful and much used purgative.

Squill — is the sliced bulb of scilla maritima, a plant from the shores of the Mediterranean. It contains several substances which exert an irritating or, in small doses, a stimulating effect upon the kidneys and the mucous membrane of the bronchial tubes.

Rue — is the name of an herb, Ruta graveolens, from which a volatile oil with irritating properties is produced.

Mint — aromatic herb often used for coughs.

origanum or marjoram: another very fragrant species of mint.

Horehound is the name for the dried leaves and tops of Marrubium vulgares which is used for coughs either mixed with sugar or as a fluid extract.

Iris — The astringent rhizome has diuretic, purgative and emetic properties.
Licorice is the root of glycyrrhiza glabra of Europe and Southern Asia. It is a mild laxative but is often used to cover the disagreeable taste of drugs.

Honey is used in medicine mixed with water for a gargle to relieve dryness of the mouth and throat.

Vinegar is simply mild acetic acid.

That asthma must have been a wide-spread rather than obscure ailment of the times, is attested by the space given to the disease in the series of medical lectures.

Let me now indulge a quick analysis of the passages quoted:

(1) Rheum and phlegm are supposed to be produced by the brain. (This perpetuates former assumptions.)

(2) It is observed that interference with breathing resulting even in suffocation, may follow upon injuries to the nerves, particularly those of the upper part of the spinal cord.

(3) The main nerves and a respectable amount of anatomy are known through actual dissection.

(4) In cases involving difficulty of breathing the clinical procedure is to inspect first the various muscles of respiration to see whether some of them might be paralysed.

(5) Three causes of difficult breathing are recognised:
   (a) Enfeebled power (of the respiratory muscles);
   (b) Constriction of the passages of the organs of respiration;
   (c) Excess of heat (blood) in heart or lungs or possibly inflammation.

Only one, or two or all three of these causes may operate concurrently. (One cannot escape being impressed by the logic of their analysis.)

(6) The first explanation is given for the upright position naturally adopted by the asthmatic in breathing; it is logical, though not entirely correct.

(7) The rheum which fills oesophagus of the lung (bronchecoles or internal cavity of lung) "cometh down from the head, or from one of the places that are round about the lungs." (A conjecture has arisen as to whether the secretions might not come from a source nearer the lungs.)

(8) Various respiratory diseases are differentiated by symptoms.

(9) Asthmatic attacks do not necessarily enfeeble.

(10) Respiration is laboured and the motion of the chest great in asthma.

(11) Though the lungs remain distended and do not lose in volume in asthma, the air taken in on inspiration is reduced.
(In accordance with modern spirometer studies.)

(12) The clogging of lungs from the viscous chymes causes pain and impedes breathing; but regular breathing in inspiration is not so much hampered.

(13) "Running of nostrils and sneezing" in some cases accompanying difficult breathing seems probably the first mention of "hay fever" in medical history.

(14) Both internal and external medicaments are advised; attention is given to the head (and nose); inhalants being used such as nitre (a much discussed modern remedy and also aromatics. Plasters and other relief measures are prescribed for the chest, and medicines for the cough. In modern therapy the cough as an excitor and aggravator of the asthma paroxysm is greatly stressed and measures followed to keep it under control.

(15) Syrup of poppies: (opiates) recommended; this coincides with medical practice up to and after the time of Dr Hyde Salter (1860).

(16) Pain may come either from over distention of the lungs on inspiration or forcible escape of the breath in expiration. It is recognised that the great difficulty in respiration is not so much in the inspiratory as in the expiratory phase.

(17) Asthma is not associated with presence of fever.

(18) Asthma may result from nervous causes: -
   (a) Injuries or lesions to nerves;
   (b) Weakness of nerves;
   (c) Affection of either spinal or brain (cranial) nerves by abscess etc.

(19) Impairment of muscles which work chest and throat may cause asthma.

(20) "When irregular changes in the conditions of the body take place in the chest and lungs...." (Here we have an idea that changing, inconstant factors in the body may have an effect on the mechanisms of chest and lungs.)

See Interference of Intrinsic Pulmonary Mechanisms as Potential Cause of Asthma - (I de Burgh Daly)


pp. 139-144, 135-136; in Edin. M.J. Sept. '36.

(21) "The irregular mixtures which take place in the lungs and chest, and through which asthma ariseth are cured by mixtures of an opposite kind." (Here we see reflections of early Greek dogma: Hippocrates and the pneumatists.)

(22) Therapy involving physical applications to spinal column are used. (More than one modern school of thought advocates physical therapy of spinal cord by electricity etc.)

(23) Agencies are applied externally to chest which have an effect inwardly.
(24) In conjunction with (23), where the mouths of the lungs (broncheoles) are filled with exudations, medicines are used to cut the fluid.

(25) Analysis of prescriptions:
   a. Some ingredients are definite anti-spasmodics. (Accepted treatment today.)
   b. Some ingredients are recognised purgatives to overcome constipation. (Accepted treatment today.)
   c. Squill (Accepted today.)
   d. Squill in vinegar. (In strict harmony with latest laboratory findings on acid therapy showing that alkaline condition favours asthma and allergic manifestations while acidic conditions minimises both.)
   e. Honey mixed with squill and vinegar. (In conformity with recent laboratory findings that sugar is low during asthmatic attacks.)
   f. Prescriptions (4), (6), (7) and (8) might be considered "non-specific protein" infusions administered orally as allergic counteractants.

(26) Some of the passages are apparently from slightly earlier or contemporaneous Greek writers; still others seem to be verbatim from Hippocrates, while a great part seems to originate with the Syriac schools themselves. There is a residual heritage from remote antiquity.

(27) In other parts of the treatise it is made clear that extensive dissection was carried on in the school: on human bodies (those slain in battle, in contests etc.) and on animals (apes and birds particularly.)

Let us turn now to another manuscript heretofore un-related to the history of asthma, the Arabian "Paradise of Wisdom."

The history of Arabian medicine can only be studied in connection with the general history of Islam which first began to assume political significance in A.D. 622 the date which marks the beginning of the Mohammedan era. It is the date of the hijra. The Golden Age of Arabian learning culminated in the century 750-850 A.D., and this century succeeded the establishment of the Abbasid Caliphate with its metropolis at Baghdad. Of the ten Caliphs who reigned during this period the second, al-Mansur, and the seventh, al-Mamun (whose mother and wife were both Persian) were conspicuous for their love and generous patronage of learning. In about 850 A.D., Ali ibn Rabban of Tabaristan, the Persian province south of the Caspian Sea, completed for the Caliph one of Arabia's greatest contributions to Medicine and Natural Philosophy which he entitled, "Firdawsul'Hikmat" or "Paradise of Wisdom." Rabban, as Ali ibn Rabban explains in the
beginning of his book, is the title and not the name of his father. Rabban being interpreted signifies "our Master" and "our Teacher." Al-Qifti, who gives a short description of him, declares that the father was a Christian named Sahl and that the son only made a profession of Islam after he entered the service of Caliph al-Mutawakkil. It was during the third year of the Caliph's reign, that Ali ibn Rabban completed the "Paradise of Wisdom." Not much more of importance is known about him than that he was one of the teachers of the great physician al-Razi or Rhazes. As far as is known there exist only two manuscripts of "Paradise", one fine old copy (Arundel, Or. 41) in the British Museum and another (Landberg 266) at Berlin.

It is a book containing nearly 550 pages and is divided into 7 parts (Naw), 30 discourses (Magala), and 360 chapters. The author mentions as his principal sources Hippocrates, Aristotle, Galen, Yuhanna ibn Masawayh (Messues) and Hunayn "the Interpreter", i.e. Hunayn ibn Ishaq, the mediaeval Johannitus. The Part VII. "Treats of climate, waters and seasons in their relation to health, outlines of cosmography and astronomy, and the utility of the science of medicine: and concludes with a summary of Indian Medicine in 36 chapters. In this "Part,"

"Discourse 5" consisting of 7 chapters, is on "diseases of the throat, chest and vocal organs including asthma."

28

Through the generous efforts of Dr Richard Bell, distinguished Arabic scholar of Edinburgh University, I am enabled to present the first English translation of "Paradise of Wisdom" as it relates to asthma.29

§ 6

"On Difficulty of Breathing and Asthma."

"To the apparatus of breathing belong the lungs, the windpipe and the membrane which separates the chest from the abdomen, which is called the diaphragm. It is connected with the brain and the womb, so that they share in its weakness as is shown by the confusion of the mind in pleurisy. For when this membrane is affected, the pain ascends to the neck and then to the brain and the mind therefore becomes confused. Difficulty of breathing is of various
kinds, what is called short, and consecutive and straight, strong, weak and difficult. As for that which is short in sound, the reason of it is the enunciation and weakness of the muscles which move it. The consecutive, short, panting breathing is due to a burning tumour (inflammation?) in the membrane; or to violent heat for it excites the muscles and urges them to bring in cold air to the body: that is a symptom of one who has asthma also.

As for uprightness of breathing, it is due to tenderness and weakness of the muscles, their flabbiness and tendency to fall. The breath is therefore taken in an erect or straight position, because when he sits straight up the muscle clings to its place. Therefore the breathing is erect so that when he lies on his side the upper muscle falls upon the lower and constricts the breath.

Strong breathing is caused by the blazing of the heat (inflammation?). Weak breathing is due to the cold; hard breathing is due to the importation of a coarse substance which impedes the flow of breath; or to a coarse wind retained in the breast of the side. Weakness of breathing may arise from pain in the brain, or in the vertebrae of the neck or from wind in the womb. The breath may be cut off as if it were cut off altogether, and the patient only breathes from the roots of his hair as the worms breathe in winter under the ground.

Possibly the breathing may be affected by Qabb (a wind) which comes from the chest and the lungs. As for the cause of asthma, it is due to an overflow which is conveyed to the lungs, from which arises an inflammation. The breath may become suddenly constricted by a catarrh which descends from the head to the lung.


If the difficulty of breathing arises from a fine moisture which is conveyed to the lung, it is treated by anything which dries up that and clears it away; such as hyssop — which is a tried remedy, useful for cough and asthma and throbbing if the inflammation along with it is not severe, nor the looseness of the belly. Mix with it jujube and sabiston; about a handful of each, of anise half a handful and ten figs. Bring all that together and pour over it a jugful of water and half cook it; then clarify and drink about a saucierful.

If the panting breath arises from an inflamed tumour in the lung or chest it is benefited by something moderate and pleasant in temperature which will dissolve the swelling; like barley-water or fennel-water, or ground-water with sugar-candy; or let him eat sweet pomegranates, sugar cane and such like.
For pain in the side it is beneficial that the place be bandaged with barley-flour; Indian trefoil and quince; or let him drink some gentiana with cold water. Or if that arises from a stoppage let him drink seed of Khandagagi, the weight of a dirham (dirham = 2.97 grammes), in hot water.

In levelness of breathing and flabbiness of the muscles and sinews it is beneficial to oil with some good soothing; emollient oil like oil of limes and oil of narcissus and oil of grapes; and a poultice, compounded thus: rose leaves 4 parts; lavender 1 part; camomile 5 parts; white wax 5 parts. Melt the wax with the oil, pound the medicaments to powder and sprinkle over it and let it be whipped until it becomes a poultice; and let it be placed upon the chest, side and vertebrae of the back. For erectness of breathing it is beneficial to take two dirham's weight of Jawashir (the leaves of a low-growing plant, something like fig leaves), and one dirham weight of pulp of colocynth, pound it down and filter it together, and give one dirham weight of the thick part of it to drink in lukewarm water. In the case of wind pent up in the chest it is beneficial to take equal parts of Jawashir and Hammoniacum and pound them down. The draught is the weight of a dirham in water and honey. If the cause be dryness, let it be fomented with warm water and smeared with duck-fat and wax and oil of vinegar. If that arises from heat it will be benefited by drinking indive-water and water of foeniculum and sugar-candy, and syrup of grapes and barley-water and sugar. Or put upon the breast a piece of cotton moistened with cold water and oil of roses. Or cook a saucer of fresh milk with the same quantity of water until the water boils away; sprinkle over a little fanid (some kind of sweet) and drink.

If it arises from cold and the asthma is severe, it is beneficial to drink sijzaniya. Or pound down costus and moisten it with water and smear the chest and sides with it. Then if the asthma arises from moisture drink some hot water containing juice of fresh ruta (herb) with a spoonful of honey. And if the cause of it is a rough wind in the chest, it is treated with what opens the obstruction and the chest should be anointed with a warm emollient ointment like oil of costus or oil of spikenard. And one should drink some sijzaniya or amirusiya, a mitthgal (65.5 grains or 4.25 grammes) with a little oxymel.

Tried Remedy for Asthma and Hard Breathing.

Let him take a handful of raisins and the same quantity of femigreek washed; rub with about a jugful of water and mash well up; purify and give every morning four istsors (Greek = c. 0.62 drams to drink hot.)
Or let him take some of the long worms that are for the most part under water, and put them in an earthenware jug, and set it on the fire until the worms become white, then let it be pounded down and mixed with honey; and let him take a spoonful of it every morning.

Or, let him take some of the lung of a fox, and burn it and pound it down; and drink a mithqal of it in lukewarm water.

Or, let him take every morning a spoonful of the insides of river tortoises burnt and pounded down and kneaded with a little pepper and honey."

It is not necessary to repeat the findings of modern research which corroborate wisdom displayed in the foregoing passages. We see in the manuscript the continuity of medical tradition in the repetition of remedies dating back to the Syniacs, the Greeks and even the remoter Egyptians. The almost verbatim similarity of certain of the foregoing remedies to those recommended by the Syrians gives a clue to the highway by which much of the Greek culture passed to the Arabs. Though some of was transmitted directly, other parts were derived secondarily through the Syrians and the latter left their imprint upon it.
CHAPTER V.

THE STREAM OF PROGRESS RUNS SLOWLY.

(Period 800 A.D. to 1698.)

It is both convenient and logical to consider with the Middle Ages proper, a short era immediately following it during which the inherited ideas of the past continued to dominate thinking. As an introduction to the scientific renaissance to come, it is fitting that the quickening of thought be carried to the time of John Floyer, who in 1698 published the first book in the English language to be devoted exclusively to asthma.

Avicenna (Ibn Sina) prince of physicians (980-1036), eminently successful physician and vizier to different caliphs, does not have much to add to the wisdom of Galen and his other predecessors on the subject of asthma. As causes he includes changes in composition of the air, water and food. Of an importance not to be overlooked is his mention of the influence of nerves (medulla spinalis) and the brain on respiration.25 We are thus made aware that the ancients from whom Avicenna takes his observations, appreciated the possible part of the nervous system in the mechanism of the asthma syndrome.

The Middle Ages, so properly called the 'Dark Ages', found medical knowledge stagnating: the thread of progress seemed suddenly to snap and the ends were lost. The scientific tradition which had been growing, suddenly vanished from men's minds. But they were never the less glad to avail themselves of the fruits of that earlier culture so that medieval medicine became a curious compound of allusions to Greek authorities, of remedies going back even to the Egyptians and a generous amount of current superstition.

Tenth century medicine is well illustrated by the "Historia" of Richer of Rheims in which medicine is combined with a narrative of the times, but no allusion is made to asthma.33
Among the Moslems medical traditions were partially preserved and continued. Moses Maimonides (1135-1204) the Jewish philosopher, talmudist, and physician to Sultan Al-Malik-Al-Afdal of Cairo found that his royal patient suffered from constipation, melancholia and asthma. He wrote for the Sultan a treatise on asthma and other medical works dealing with dietetics and hygiene which surpassed any other works of the thirteenth century.

In the treatise he described asthma cases in which the paroxysms had a suffocating effect. He was opposed to strong remedies such as drastic purgatives, blood-letting, and extreme fasting. His opinion was that such extreme measures were warranted only on the advice of an absolutely perfect doctor, and not on the advice of a common one, or even several in consultation. Maimonides suggested instead, moderation in food, drink, habits, and sexual life, country life as opposed to town dwelling, with stress on fresh air and sunlight, which he said destroyed the miasms of the air. He recognised that all treatment had to be individual due to idiosyncrasies, and that thus one patient might be relieved by drinking cold water, while the same treatment might cause another's death. This variation of response he said was true of food, cold baths and like matters.

It was not until a date between 1150 and 1250 that the Greek heritage fell into the hands of the medievalists through the arrival in the West of the Arabian learning, largely a version of the Greek science which had dwelt in the Moslem world in translated form. A Scholastic age set in during which physicians with exaggerated respect for authority, assiduously compiled and arranged the medical tradition which suddenly swam into their horizon. The "Rosa Anglica" of John of Gaddesden, written probably in 1314, is fascinating not only for its intrinsic style and insight into the times, but as a standard of mediaeval medical practice, a compendium of all the general experience of mediaeval physicians.
John of Gaddesden was probably born on the borders of Hertfordshire and Buckinghamshire about 1280. He studied at Merton College, Oxford and after obtaining various degrees in arts and theology decided to take up the study of medicine. Oxford was doing, then, little towards the study of medicine except at Merton.

The French School of Montpellier was regarded as the best of the time. Two of John's predecessors, Gilbertus Anglicus and Bernard of Gordon were closely connected with Montpellier, the last as a professor. From them he inherited the Montpellier tradition. Gordon's *Lilium Medicinae*, one of the best known medical textbooks of the Middle Ages, was used extensively by John in compiling the *Rosa Anglica*.

At Oxford, besides his general practice, John acquired a number of degrees, Master of Arts, Doctor of Medicine and Bachelor in Theology. Although he was probably never ordained as a priest, he held many ecclesiastical benefices. The one to which he was eventually appointed was the plebend of Wildland which had the eighth stall on the left side of the choir in St Paul's, London. He was appointed court physician to Edward II. and died in 1361.

There was a difference of opinion as to John's merit as a physician. Leland praised him highly, but Guy de Chauliac regarded him as did many, as more or less of a charlatan.

In his own day and circle John was very prominent, and his character appears to have made a deep impression on his contemporaries. He is mentioned by name in the Prologue to the *Canterbury Tales*.

"With us ther was a Doctour of Phisyk
Well knew he th' olde Esculapius
And Deiscrides, and eek Rufus
Old Ypocras, Haly and Galien;
Serapion, Razis and Avicen;
Averrois, Damascien, and Constantyn
Bernard and Gatesden, and Gilbertyn."
It may be that Chaucer knew him, for Geddesden died in 1361 and Chaucer was supposed to have been born in 1340.

At the end of Geddesden's preface he gives the reason for his choosing the name Rosa Anglica.

"But before these matters are treated in the first chapter, I wish to give a name to the book, namely the *Rosa Medicinae*, and I have so called it because of five appendages which belong to the rose, as it were five fingers holding it, concerning which it is written: Three are bearded and two are not.

That is to say, three of the parts surrounding the rose are hairy and two are smooth, and the same is the case with the five parts of my book. The first three are bearded with long beard, for they treat of many things and about general diseases and for a discussion of what constitutes a general or common disease; look in the introduction to the second book. The two following books treat of particular diseases, together with some matters omitted in the preceding books, and they are as without a beard (shorter).

And as the rose overtops all flowers, so this book overtops all treatises on the practice of medicine, and it is written for both poor and rich surgeons and physicians, so that there shall be no need for them to be running to consult other books, for here they will find plenty about all curable diseases, both from the special and the general point of view."

In the treatise, reference to respiratory disorders and their causation are scattered, demarcation of kindred ailments is deficient, and the amalgamation of historical ideas has led to some confusion, as the following excerpts show.

A postema est. etc. p. 162.

A. p. 161 (27) "These are the symptoms of imposthumes on the lungs, undulating pulse, heat between the shoulders, redness of the cheeks, puffiness of the eyes, very high fever, and difficulty in drawing breath, as though he were being suffocated."

B. p. 163; (1) "Galen says an imposthume is the same as a swelling according to the ancients...."

p. 167 (8) "These are the causes of imposthume: Firstly, matter flowing or being sent from one member to another. Secondly, excess of nourishment collecting in the same member."

C. p. 169 (10) "The cause of imposthumes formed from excess of
nutriment gathering in a member, is the
want of nutritive force in the member,
that cannot digest perfectly the food
that comes to it; and the excess matter
grows gradually until it fills the member."

D. p. 169 (11) "This is how an imposthume grows in a member
when it comes from malice of complexion
therein, or through excess that is sent to
it from another member, stronger than it-
self; and it cannot expel or digest in
itself; the excess remains (in the member)
and forms an imposthume in the following
manner: if sanguine humour or any other
humour is drawn to the member
in such
quantity that it fills the veins entirely,
then the veins are stout and full, like a
vessel, and some of it flows from the pores
to the space in the member surrounding it,
which it fills, and separates the parts,
forming the swelling there that is called
an imposthume."

(E influenced largely by Avicenna).

E. p. 177 (23) "If the imposthume comes from matter poured
from member to member; it comes suddenly....."

F. p. 187 (34) "Let us now speak of the urine, that is, of
the urine of those who have this disease,
i.e. imposthumes. Note, if there be two
colours on the urine, the colour of camel
wool on top, and the lower part of the col-
our of inopus, that is the sign of an im-
posthume."

Hectic Fever. Hectica 68.

G. p. 61 "Etica or Hectica is a non-material sickness.
It is moreover a wasting fever...

p. 71 ....."It comes also through the fault of the heart,
the lungs, and the chest, as are pthisis, and
apostema, and their like.

p. 107..... Nevertheless an ointment may be made and
rubbed on the chest and joints of marrow
of deer and calves, mixed with unsalted
butter, fresh pigs' lard, and that of hens;
and add a little wax and gum arabic. This
is very good, if hectic fever come from the
midriff.

"These are the symptoms thereof, delirium (want
of sense) and shortness of breath; for in the
delirium that is caused by the midriff, the
breathing is short and quick, and in that
that comes from the brain there is no great
harm to the breathing; but rather to the eyes
and nose, and drops of blood drip from the
them. Galen says, if this fever come from
the midriff, the breathing is now too short,
now too long, and now too slow, and sometimes
when he breathes in the air, he has to draw
in twice and do the same to expel it."
I shall not trace the pedigree of each of these ideas: some come from Galen, and some from Avicenna. The author shares the ancient belief that matter passes from nobler to inferior members. Yet we observe with interest:

(1) The persistence of the idea (in A and B) that swellings in lungs lead to a congestion which interferes with the respiration, and leads to "difficulty in drawing breath", (this congestion is an antecedent of the modern theory that congestion arises from swelling of the bronchial mucosa or from clogging by exudations or swellings due to organic diseases.)

(2) Apparently the mechanism of circulation was quite unknown (until Harvey) but note carefully the observations in B, D and E in connection with the modern theories that:

(a) The congesting medium is an exudation from the bronchial mucosa secreted into the bronchialles; or a turgescence caused by accumulation of blood in the pulmonary vascular system occasioned by temporary paralysis of the vaso-motor nerves.

(b) The vessels become very full, (as the heart is stronger and expels blood to them), but the excess remains (Occasioning overwork and hypertrophy of the right heart).

(c) Possibly the congestion is enhanced by participation of the lymphatic system.

(3) The relation of observations in B, C and D to the new theory of food allergy which suggests that "allergic" asthma may arise from presence of "undigested proteins" or "an excess of free foods" in the blood serum may be the causal factor.

(4) The attempt to use urine analysis as a diagnostic procedure, this of course coming down from very early times.

(5) The possible reference to hay fever in A ("puffiness of eyes" etc.) and G ("harm to eyes and nose" etc.)

With no pretence at exhaustiveness, but safe in the assertion that no great theoretical or practical advances were made during this period, I pass to the year 1551. At this time...
occurred an individual case of asthma against which the shrewdest medical wisdom of the day was opposed, the case of John Hamilton, Archbishop of St Andrews. Mary Queen of Scots at this time was nine years of age; the Archbishop's brother, James Hamilton, Earl of Arran, was next heir to the throne and Regent of Scotland. In consequence of a series of events, including the putting to death of Cardinal Beaton (leader of the opposition faction which favoured an alliance with France rather than England) in 1546, John Hamilton after that year had to manage the difficult affairs of Scotland in addition to his ecclesiastical duties. By 1551, just after he had finished his noted "Catechism," he had become a chronic asthmatic, suffering attacks every eight days which lasted for twenty-four hours and threatened his very life. His physician in Edinburgh was William Cassanate, a Spaniard who had been trained at Besancon in Burgundy. The latter counseled Hamilton to associate in the case Jerome Cardan, the celebrated physician of Milan. Cardan at last agreed to come to Edinburgh upon receiving a sixteen page epistle from Hamilton concluding: "Farewell, most learned Cardanus, and visit our Lares to find us not so much of Scythians as you perhaps suppose - Edinburgh, Feb. 4, 1552" and, incidentally, enclosing 300 gold crowns for travelling expenses. Cassanate met Cardan at Lyons and the two proceeded to Paris where they dined with the famous physicians of the French King so that they might discuss the Archbishop's case. Thus they conversed with Jean Fernel, first physician to the King, and Jacques de la Boe (Sylvius), the Parisian professor of anatomy. Cardan slyly refrained from committing himself, declining to speak until the King's physicians had voiced their views, and then abstaining from any expression on the ground that he had not yet seen the patient. Cassanate and the esteemed guests, traced the affection to a cold brain; later Cardan let it be known that he attributed it to a hot brain. Having arrived in Edinburgh, Cardan studied his patient for forty
days and then delivered himself of a written opinion, smacking strongly of Galen.

"He did not believe with Cassanate that the matter finally expectorated had collected in His Grace's brain during the intervals between attacks; for if so, the operation of the intellect must have been impeded and the matter so collected would have turned corrupt. He believed that the thin fluid expectorated was partly serous humour, partly condensed vapour, which descended from the brain into the lungs, not through the cavity of the windpipe, but through its coats, as water soaks through linen. This thin humour he supposed had been drawn into the brain by the increased rarity of that organ caused by undue heat, for heat made all things rare, and rarefaction in one part of the body, to express the idea roughly, produced suction from another. The expectorated matter, Cardan thought, was formed from the food.

"As a practical application of his theories, Cardan said that the basis of the Archbishop's cure must depend on the use of a food as cold-natured and humid as possible. The cold-natured food would resist the attraction of the brain, and humidity would obstruct the soaking down of matter from the brain through the coats of the windpipe, thus compelling it to descend by the interior of the channel, from which it could easily be coughed out. The chief attack by medicine was to be made on the unhealthy temperature of the brain, and with this view the head should be purged, with, of course, previous purgation of the body. Purgation of the head, he explained, might be effected through the palate, the nose or the sutures of the skull......He advised also the use of the shower bath as recommended by Celsus."

Nevertheless, Cardan observed his patient shrewdly and treated him with common sense: the prescribed regimen curtailed the patient's business occupations to four hours a day, increased his sleep to ten hours, enjoined a strict fast during a period of attack and an infrequent but nutritious diet at other times. (Note modern findings: starvation produces acidosis and this suppresses severity of asthma.) Cardan ordered that the pillow be of dry straw, but not feathers, the pillow case of linen, not leather, (This prohibition is interesting in light of the modern findings that some asthmases are caused by proteins from animal materials): enjoined a morning shower bath, and medicines to relieve constipation. Again, empirical medicine brought relief; again a patient was delighted and the physician well rewarded both in gold and in praise.

"At the end of two years and one month, a Scotaman arrived in Milan, bearing a letter from the Archbishop to Cardan. In the course of this, His Grace said: 'I thank you not only for your various and very welcome little gifts, but also for my health, that is in great part restored, for the almost complete subjugation of my disease, for strength regained; in fine, I may say, for life recovered. All those good things, and this body of mine itself, I hold as received from you..... The accustomed attacks now
scarcely occur once a month, and sometimes once in two months; then, too, they are not urgent and pressing, as they used to be, but are felt very lightly."

Thus medicine continued through the years that followed, the celebrated physician mixing a grain of common sense with the inherited nostrums; the ordinary practitioner clinging to authority. Neither introduced concepts startlingly new. Many of the physicians compounded their own "peerless" remedies which with proprietary zeal they strongly recommended. Many were in addition alchemists. So late as 1692 we may point to the type in the person of one William Salmon, Professor of Physick and Alchemist. Since no apparent reference appears to him or his treatise in previous accounts of asthma, I quote in full pertinent sections which reflect notions of asthma just before the advent of Floyer's treatise in 1698.

"Medicina Practica or Practical Physick Shewing the Method of Curing the most Usual Diseases happening to Humane Bodies" - by William Salmon, Professor of Physick (Living at the Blue-Ball by the Ditchside, near Holborn-Bridge) London, Printed by W. Bonny, for Tho. Hawkins in George-Yard in Lombard Street, and John Harris at the Harrow in the Poultrey, 1692.

I. Against Shortness of Breath
   Take of Saffron in Powder one Scruple, of Musk in Powder one Grain, give them in Wine; after take Spiritus Antiasthmaticus in Wine.

II. For the same
   Take Juniper Berries two Ounces, boyl them well in two Quarts of Water, and drink of the Decoction first and last, and at other times. This helps all diseases of the chest, and will make you breathe freely.

III. Against Shortness of Breath, with a Cough.
   Take the Roots of Valerian and boyl them with Liquorice, Raisins stoned, and Annisseeds, and drink of the Decoction often; this is singular good against the said Diseases; for it openeth up the Passages; and causeth the Phlegm to be spit out easily.

IV. Shortness of Breath.
   Physicians commonly say that the strongest purges are most proper in this disease, if the matter be highly peccant and inveterate. Paulus advises even to purge with colo-quintida: Some despise Agarick, tho' a plegmoga because of its weakness: Elaterium is a good purge, not only in dropsy but also in Asthma and Orthopneea; for that they are caused by gross matter it may be given of itself in the proper vehicle) to five or six grains; in composition you may give it thus:
Take Scammony ten grains; Gambogiae five grains; Elaterium half a grain, all being in fine powder mix them for a dose if the sick be strong. Galen also approves of the most violent things. Take mustard-seed one ounce; common salt half an ounce; elaterium, fifteen grains; grind them together and make troches (Galen saith eight troches so that in each troche you will have almost two grains of elaterium) or you may give it in powder with a little honey or the map of an apple. But that the cure may be safe, emollients, clysters may be given before hand and half a pint of Aqua mulas after. These purges may be given every fourth or fifth day.

Salmon.

V. Shortness of Breath cured by vomiting:
Experience shows that when a great quantity of matter lies in the lappets of the lungs, especially if there be sickness at stomach also, that then I say, Vomits are of great use, and sometimes the paroxysm is taken off by this remedy alone. Salt of vitriol may be given from half a drachm to a drachm; Aqua Benedicta from three to four drachms or one ounce to an ounce and a half to very strong persons: My catharticum argenteum, given from one to two drachms, is one of the best of remedies.

Salmon.

VI. Shortness of Breathing cured by reiterated Clysters.
Take mutton broth eight ounces; tincture of colocynthis half an ounce, infusion of crocus metallerum; elixir proprietas of each an ounce; mix and give it warm. In this case clysters ought to be given in small quantity less the guts too much distended should press upon the diaphragma and make the paroxysm more vehement and dangerous; and they ought also often to be repeated. Salmon.

VII. For a vehement shortness of Breath.
I have often given with great success my Syrupsus Nephriticus (see it in my Phylaxa, Lib. I. Cap. 34 Sect. 1) for that causes the matter contained in the cavity of the breath to be avoided with the urine in the bladder, the urine for the most part being much, thick and troubled by which the peccant humours are carried not only from the breast and places of respiration but also from the head veins and other parts. I have done wonders in this case by the assiduous use of Spirit of Sulphur per Camp. given in pectoral drinks. Salmon.

VIII. A pectoral drink.
Take raisins of the sun stoned, figs split, and Liquorice bruised two ounces. Elecampane Roots one ounce, spring water a gallon: Boil all to two quarts and strain it for use. Dose half a pint three or four times a day. Salmon.

IX. Use of Opiates.
If rest has been long wanting and there be withall a vehement flux of Rheum and cough, though the stopping of the catarrh cannot be without sensible danger, yet you must immediately give an opiate such as my Laudenum volatile cum aloe; for otherwise the obstruction will so increase with catarrh, that before you are aware the breath will be stopped, which there is no fear of by giving the opiates; for that all opiates stop the flux
by no other way: than by thickening the matter, whereby it cannot so easily flow to the part; the humour being thus thickened through the whole man, and not flowing to the bronchia of the lungs as formerly, it at length finds a vent by other ways and that for the most part by sweating or stool either of which ways you must endeavour to promote; according as you see the disposition of the body is inclinable. Salmon.

X. An inveterate asthma.
I cured an inveterate asthma that had been of fifteen or sixteen years standing, by giving my Pilulas Mirabiles twice and then my family pills as they are now prepared by me, (but as Hollier pretends to make them ) once, letting a day or two be between each; and so reiterating their course two or three times as you see occasion. Salmon.

XI. Shortness of Breath in a woman with child.
Truly, as I saw the peril of her life was not small, by reason of her being with child I could not pursue the usual methods of cure, I took the following course. I gave her my volatile laudanum at night on going to bed, and the spiritus antiasthmaticus in all her drink, and in this course in about a month's time she was freed perfectly from her disease." Salmon.

Nevertheless, a scientific renaissance had set in with the beginning of the seventeenth century though the tide rose slowly at first. A sudden interest developed in asthma; Joseph Frank gives the names and titles of more than one hundred and fifty papers on asthma, most of them dissertations, written during this and the following century by ambitious but ill-advised young men. 38

Van Helmont (1577-1644) who lived in Bruxelles, was a competent physician, but also a well-educated man and an original thinker. With Willis he must be given joint credit for separating true asthma as an independent disease from the hither-to undifferentiated "cardiac and renal asthma". To both is also usually given the credit for recognising and establishing the convulsive nature of asthmatic seizures but as will be seen from the early sections of this essay, their claim to originality in this observation cannot be sustained. Van Helmont did, as he describes, observe the spasmodic element in asthma, its sudden onsets, and its occurrence in attacks. 39. He also speaks of dry and moist asthma and draws a distinction between two supposed types of asthma: (1) asthma due to the womb which commands the whole woman,
and (2) that common to both sexes. In the book, *Ortus Medicinae* published in 1667 after his death, one finds his statement that the lungs are contracted or drawn together. He also relates several cases of asthma which have acquired special interest in the light of modern discoveries. A certain monk had attacks of asthma only when there was wind or dust, or when he had eaten fish fried in oil. A clergyman who suffered from asthmatic attacks most of the summer was free all winter. (Probably hay fever.) Each attack was marked by a simultaneous outbreak of urticaria. The patient's mother and sister were both subject to the latter ailment. (Precursor of theory of hereditary allergic sensitivity.) He had also observed a case where the only apparent cause of asthma was psychical: a "prudent" man was unjustly and publicly reproached by his superior but under the circumstances dared not utter a word. Soon afterwards he was seized with an asthmatic attack and two years later died of dropsy. Van Helmont recalled, also, having observed a woman in whom sweet odours or sorrow, caused difficulty in breathing, headaches and syncope. Van Helmont had one foot in the past and the other extended toward the future. Although he spiritedly opposed the old notion of "defluxions", he resorted to mysterious spirits, such as "Archeus" and "Latex" to explain the cause of illness. ("Archeus" may be traced back to Paracelsus.) According to him, "archeus", a vital spirit, was enshrined in the stomach, and when disturbed gave forth a peculiar fluid, which, reaching the lungs, caused asthma.

Theophilus Bonetus (1620-1689) lived in Geneva. He was a prolific writer, and gathered from literature a collection of cases of "antipathies or idiosyncrasies to food, (fruits, strawberries, bread, wine.....) which appeared in 1685 in his *Medicina Septentrionalis Collativa*. In his *Guide to the Practical Physician* he declares that convulsive asthma often results when morbific matter falling upon the pneumonic nerves sticks
somewhere in their passages, especially about their plexus. He reports several cases of bronchial asthma:

"A goldsmith's child was ill of almost desperate asthma. When I was called I suspected that the malignity of a mercurial fume had produced this disease. In another case a ten year old boy was affected at first with eczema. During a cold season this disease disappeared, but the filthy matter was turned upon the lungs and caused a horrible asthma, which ceased immediately when the wind turned to the south. In another case a patient had attacks on entering a wine cellar where the musk was fermenting." 44

In addition to the instances heretofore noted, other remarks as to the relation between asthma and the nerves and brain appear in Galen,45 Avicenna,46 Ballonius,47 and Felix Platerus.48 In his experiments on monkeys, Galen found that transverse cutting of the medulla spinalis affected both respiration and voice. Ballonius, describing a patient with renal calculus and dyspnoea, says that there is a "nervulus" (small nerve) from the sixth pair which penetrates the diaphragm and goes to the kidneys and perhaps also may cause dyspnoea.

Felix Platerus (1536-1614), one of the first to advocate treatment in place of imprisonment of mental patients, was of the opinion that an obstruction in the small pulmonary arteries caused asthma. But he added, that the larger nerves from the dorsal medulla, when disturbed by defluxions, occasion dyspnoea, e.g. in asthmatics. He witnessed attacks where no abnormal condition of the lungs could be detected.48

It is perhaps to Thomas Willis (1621-1675) that we must give credit for the full and unequivocal declaration that asthma is of nervous origin.

"Whatsoever," he says, "makes the blood to boil or raises it to an effervescence, as violent motion of the body, of mind, the drinking of wine, venery, excess of external cold or heat.... any great change of the air or of the year, slightest errors, a thousand other occasions, doth cause asthmatical assault to such as are predisposed."

"This kind of dyspnoea, merely convulsive, is excited by reason of the pneumonic nerves...." "It is not to be doubted
that the fits of asthma wholly depend on convulsive matter being fallen into the nerves, serving to the stretching forth of the lungs." (Compare this with the modern studies of the action of the sympathetic and parasympathetic nervous systems on asthma.) 

"Soon as the asthmatic attack is finished, no signs of abnormal disposition of the lungs can be found. Severe attacks of asthma may occur without any notable fault of the lungs." 49

Willis speaks of the "tyranny and cruelty" of the disease, and suspects the cause to lurk in the "muscular coats of the pulmonary vessels" meaning the bronchi.

Dr Needham described to him the case of a butcher who suffered long from asthma and eventually died during a fit. Post-mortem examination showed the lungs and other visceral organs to be normal. Willis also recognised the effect of diet on asthma. He describes the case of a twelve year old girl who had attacks of asthma by "reason of errors in diet or the great mutations of the year or air." Among other suggested remedies he includes opium which he says is often effectual when other remedies fail.

Morgagni criticized the views of Willis and advanced a belief that concretions in the bronchial tubes were responsible for asthma. He found extravasated serum in the vesicles of the lungs in most cases.

The 16th and 17th centuries produced men such as Vesalius, Harvey, Leeuwenhoek, van Helmont, Morgagni and others, who laid the foundation stones of modern anatomy, physiology, pathology, chemistry and other sciences. But these first builders of a new edifice could not envisage all its future ramparts and turrets. They still saw largely through the eyes of the past. While a few new concepts began to contend for recognition, the doctrines of the ancients clung tenaciously on at the opening of the 17th century, the false with the true.

Sennertus, for instance, held the opinion that asthma is caused by "straightening of the bronchial tubes from compression or obstruction of humours often thick and viscid, sometimes thin and serous, but copious in quantity." Yet one must note his allusion
to an hereditary disposition to asthma which he attributes to a certain "laxity and weakness of the lungs by which the organ is frequently more liable to receive a flux of humours and to permit their accumulation."

Riverius still clung to the classification of asthma as a type of respiratory difficulty intermediate in degree between dyspnoea and orthopnoea, ordinarily unassociated with temperature and characterised by wheezing. The latter, he said, is due to the contact of pituitous humours which fill the lungs, with the respired air. In dyspnoea, which he considered a milder form of asthma, he said there are less effusions in the lungs and hence no wheezing.

The discovery of oxygen, of its transport in the blood; awareness of the combustion process, and an intimate knowledge of the mechanism of the lungs and their innervation, lay yet in the future.

We will not be surprised, therefore, to find that our peerless Harvey, discoverer of the fact of circulation and Father of Modern Medicine, shared in the prevalent ignorance on some of these matters. We find him saying in his works:

"Whence also it becomes probable that the expiration of the lungs is a means by which these vapours being cast off, the blood is fanned and purified: whilst inspiration is a means by which the blood in its passage between the two ventricles of the heart is tempered by cold of the ambient atmosphere, lest, getting heated, and blown up with a kind of fermentation like milk or honey set over the fire, it should so distend the lungs that the animal get suffocated, somewhat in the same way perchance, as one labouring under severe asthma which Galen himself seems to refer to its proper cause when he says it is owing to an obstruction of the smaller arteries viz., the vasa venosa et arteriosa. And I found by experience that patients affected with asthma might be brought out of states of very imminent danger by having cupping glasses applied and a plentiful affusion of cold water upon the chest."

Closely associated with the evolving conceptions of asthma in modern times has been the simultaneous evolution of
our knowledge of respiration. Without insight into these mechanisms, scientific progress must eventually have stopped short in a Gordian knot of speculative assertion and counter-assertion. Now during the age we are considering, experimental work was done which foreshadowed the full grasp of the physiology of respiration. In 1628 Harvey published his classical thesis explaining his experiments which proved the circulation of the blood. It is not apropos to trace the theories of the pneumatists, but suffice it to say that up to this time since the day of Galen, men had believed that the object of respiration was to cool the fiery heart. They thought the purpose of chest movements to be the introduction of air for generation of vital spirits by the pulmonary vein and through it the expulsion of the heart's smoky vapours from the body. "Before Harvey's time," said Allbutt, "respiration was regarded not as a means of combustion but of refrigeration. How man became such a fiery dragon was the puzzle." Harvey's demonstration proved that venous blood is converted into arterial blood in the lungs, but beyond that point, no man could say how or why we breathe.

As a glimpse into Pepys diary shows us, professional men of that day regarded the mystery as inscrutable.

"But what among other fine discourse pleased me most was Sir G. Ent about Respiration; that it is not to this day known or concluded among physicians, nor to be done either, how the action is managed by nature, or for what use it is."

(Pepys's Diary, Mynors Bright's ed., London, 1900, v. 191.)

Miguel Servet or Servetus (1509-53) whom Calvin caused to be burned at the stake over a theological quibble, had previously discovered and recorded in his "Restitutio Christianismi" (1553) that "the blood in the pulmonary circulation passes into having the heart, after/being mixed with air in the lungs."

Now began the search for oxygen. Robert Hooke (1635-1703)
in 1667 performed an experiment in which he blew a bellows briskly over the open thorax of a dog. He proved that the animal could be kept alive by this artificial respiration in complete absence of any movement of chest or lungs. He thus showed that the essential phase of respiration is not the associated movements but certain blood changes in the lungs.

Robert Boyle, the great chemist (1627-91), in 1660 performed experiments in vacuo with flames and animals by which he showed that air is necessary both for life and for combustion.

Next, John Mayow (1643-79) showed by convincing experiments that dark venous blood takes up a certain ingredient from the air (which being a constituent of nitre, KN03, he termed igneo-aerial particles or nitro-aerial spirit of air) and is thereby converted into a bright red fluid. Thus, though he fell short of discovering oxygen, Mayow fully grasped the principle that the object of breathing is to effect an inter-change of gases between the air and blood, the air giving up its nitro-aerial spirit and taking away vapours carried by the blood.

Up to this time, the work of respiration had been done altogether by Englishmen. It remained for the Frenchman, Lavoisier (1743-94), to discover oxygen in 1775. Furthermore, in conjunction with the astronomer Laplace (1780-85), he proved that respiration is the complete analogue of combustion, the resulting chemical products being carbon dioxide and water.

During this era, too, lived Richard Lower of Cornwall (1631-91), an able physiologist and practical physician who in February 1665 was the first man in history to perform direct transfusion of blood from one animal to another. Working with Schneider, in 1672 he disproved one of the fondest assumptions of the ancients, the old Galenic idea (subscribed to even by Vesalius) that nasal secretions originate in the pituitary body.
CHAPTER VI.

THEORIES GROW LIKE MUSHROOMS.

Anyone who undertakes a history of asthma is compelled in the end to exercise the critical faculty. The period from 1698 to 1900 might correctly be called the age of multiplication of theories. Man likes to speculate and a slight impulse is sufficient to set his ratiocinative faculties in operation. Much of the reasoning carried the attractive hallmark of logic and sought in clever, ingenious ways to cover the chief phenomena of asthma by an acceptable hypothesis. From this welter of suggestion and counter-suggestion, there indeed emerged ever more clearly certain ideas which presaged and gave direction to all subsequent research. As might be expected, some who observed, experimented and speculated, made shrewd inferences which time proved to be real contributions.

In contrast, the great multitude of writers either reiterated the views of others in slightly varied form or drew half-true, dangerous generalisations from a limited experience with some single type of treatment. Yet with all the folly and futility which marked much that was said and done, by the process of accretion genuine progress was resulting. It became increasingly clear that the disease had no single etiology. The ailment was protean like in its causation. In fact some, viewing the bewildering number of verifiable causes, concluded that asthma is not a disease at all, but a symptom or syndrome, like headache, which may be the outward manifestation of other and diverse diseases of more fundamental character.

The thinkers of this period were handicapped in not, having all the basic facts of the problem, just as we are today, but in greater degree. They could not reap scientific harvests not yet planted. One might call it the period of the practical physician, men who studied the disease at first hand, compiled case histories, tried multitudinous remedies, and drew conclusions.
often brilliant, which nevertheless carried the limitations of the observational method. Conjoined with these efforts we find isolated experiments seeking to demonstrate or disprove some current hypothesis, or to elucidate a condition or mechanism beyond the range of empirical medicine. It was not an age of close co-operation between clinic and laboratory so much as an age of individual achievement. New and important discoveries in all directions, and new inventions began to make their impact felt. The medium of a developing literature was calculated to keep the leaders of thought abreast of new advances and was conducive to the building of a mosaic of accumulating knowledge. But there was a singular dearth of analytical thinkers who yet possessed the synthetic type of mind qualified to sift, evaluate and harmonise. The rarity of exercise of this function may also be laid at the door of several conspiring factors, namely:

(1) The arduous duties of the practicing physician did not permit time for the extensive research and reading necessary;

(2) Different physicians had contradictory experiences with the same remedy. Many laboratory experiments on fundamental subjects of inquiry yielded contradictory results. The first was possibly due to difference in skill, to variations in the quantity and quality of the drugs used, to individual variations in patients which escaped observation, and to the operation of unsuspected psychological influences in many cases. The second came about partially through the newness of laboratory technique, variations in the individual skill of experimenters, lack of perfectly controlled and standardised conditions, ignorance of important qualifying principles, and often fatal preconceptions in which the experimenter set out to prove a certain hypothesis. The contrariety of findings in both cases inclined each individual to depend for the most part on his own personal observations;

(3) There was a tendency toward exclusionary thinking, an
espousal of one single theory or another coupled with an attempt to prove it at all costs while discounting rival theories. This was partially due to the prevalent determination to find a single fundamental cause, or cause causans.

(4) So much of the essential mechanisms remained unknown that it would have been difficult to find any common denominator for diverse observations which growing scientific findings today enable us to relate.

At first, the writer proposed to trace the minor divergences from main theories, and multiplying the sub-theories with some approach to exhaustiveness, but this procedure is hardly adapted to the scope of an essay. Moreover, perspective would be obscured and the bibliography encumbered beyond practicability. Therefore, chief consideration will be given to the more significant contributions so far as they can be appraised at this time, and sub-theories and divergences of thought will be summarised at intervals with only the name of the individual proponent and the date of his writing. This device will permit interested persons to locate the writing through the Medicus Index and other means.

In tracing the history of asthma, several alternative procedures invited attention. One was to trace thought simply by a chronological progression, (the customary practice but one which leads to obfuscation of thought); another, to trace in biographical vein, the struggles and contributions of eight or ten men who have made a decided imprint on the subject (a method well adapted to creation of popular interest, but impracticable if justice is to be done to the numerous theories and contributors from an historical standpoint); still another, to trace the genesis, evolution and fate of individual ideas (a plan which promotes analytical presentation yet is apt to produce a disjointed
rather than continuous narrative); and lastly, to narrate separately the interesting succession of scientific experiments, physiological and otherwise, which have paralleled clinical aspects. Because ideas, discoveries and experiments interact one upon another, it is thought preferable to employ somewhat of a chronological approach while yet endeavouring to preserve the separate identity of dissimilar trains of thought.

A distinguishing characteristic of all theories of this period is their pre-occupation with the mechanical or anatomical conditions which occasion the dyspnoea in asthma.

Among the chief theories developed are these:—

(1) That a spasm of the bronchial muscles results in constriction of the bronchocles;

(2) That a swelling of the bronchial mucosa narrows the lumen of the bronchocle and so hinders the free passage of air;

(3) That excessive secretions occur which block the air passage and by congestion interfere with the free passage of air.

Other minor theories are advanced.

Collateral to these theories are those which seek to explain the initiation of one or more of the above mechanisms, these being:—

(1) That the initiating cause is a nervous mechanism.

(2) That the initiating cause is a humoral mechanism.

(3) That the initiating cause is purely mechanical.

Needless to say, abundant and often conflicting theories were advanced to explain the exact rationale or mode of operation of each major theory.

Again, we may note a further group of theories of causation of asthma, which passing over the intrinsic mechanisms involved, singled out certain exciting causes as the root of the evil. These have since proven to be so
limitless and diverse, that such observations have simply served to illustrate the complex etiology without penetrating far into the crux of the problem.

Floyer (1649-1734), himself an asthmatic, in 1698 published the first English treatise devoted exclusively to asthma. He divided asthma into two types: the first he called "continued" asthma, caused by some definite organic pathology usually manifest; the second type, of less obvious etiology, he called an "idiopathic," "convulsive," or "periodic flatulent asthma" and suggested that it was caused by "the constriction of the bronchi and bladders of the lung by windy spirits." (This latter type seems essentially the same as the "convulsive asthma" of Willis.) His principal views seem largely derived from Willis and van Helmont. He declares asthma to be due to "contraction of the bronchial muscles and the vesicles of the lungs." He further observes: "The nerves make the same sort of ligation on the arteries, as we observe by the intermitting pulse and the cold hands and feet." Here we see assuming shape, the vessel turgescence or blood congestion theory which Floyer couples with nervous muscle spasm. Again, he suggests that asthma might be the result of herpetic eruptions occurring on the bronchial mucosa instead of on the skin.

He observed that many found the smoky London air unbearable. Like many physicians of more ancient times he recognised the hereditary aspect in asthma. He describes a case where the patient, his brothers, sisters and grandfather were victims of asthma, though his father and mother were both free from it. The patient in question suffered attacks after eating eggs, salads and potted meats. Floyer observed that "diet may be agreeable or injurious to asthmatics."

William Cullen (1710-1790), a noted teacher of medicine,
added his prestige and authority to the theory of nervous spasm. He felt that vessel turgescence was an exciting cause which often produced the spasm of the broncheolar muscles. Best known as a teacher of medicine, he was influenced by Willis, but carried these ideas further. Insistent on making spasmodic asthma, or convulsive asthma, a clinical entity instead of simply a severe type of dyspnoea, he pointed out characteristics which he felt enabled the absolute identification of spasmodic asthma, or "asthma convulsive". These included hereditary tendency, occurrence in attacks with free intermissions, its nocturnal frequency, its relation to weather changes, its typical clinical picture etc. He believed its proximate cause to be:

"preternatural, and in some measure, a spasmodic constriction of the muscular fibres of the bronchi, which not only prevents the dilatation of the bronchi necessary to a free and full inspiration, but also gives a rigidity which prevents the full and free expiration. This constriction is readily excited by a turgescence of the blood or other cause bringing about any unusual fullness and distension of the vessels of the lungs."

He arrived at the conclusion that asthma very often depends on a predisposition, so that one subject must avoid attacks so far as possible by avoiding exciting causes. He further declared that since various asthmatics show different idiosyncrasies to external conditions, no specific treatment for all cases can be prescribed. Thus a person might be affected by meteorological and atmospheric conditions, by action of nervous influence on the mind, by particular odours, by irritation of smoke or dust.55

Next, Bree (1811) reviewed the theories of his immediate predecessors and enlarged on them. He held the cause of the disease to be "an excessive contraction of all the muscles of respiration without acute fever, excited by an irritant in some of the viscera whose functions these muscles are intended to serve." He did not subscribe to the prevailing view that asthma was a purely nervous spasm. By ingenious argument
along teleological lines, he contended that the bronchial spasm is not the result of an inscrutable neurosis but a natural and strenuous effort on the part of the lungs to rid themselves of irritating matter. This latter he thought in most cases consisted of a serous effusion which exuded into the air vesicles. He compared asthmatic spasms to the tenesmus and griping dysentery; in both, the muscular action, he said, is an effort to expel irritating material. He classified asthma as "continued" or "periodic." In the "continued" type (as of Floyer and Cullen) "it cannot be properly said to be free from convulsive contractions of the respiratory muscles, but these are carried on without regular paroxysms." In contrast, periodic asthma occurs in "regular paroxysms of convulsive contractions."

Paralleling these various writings a series of laboratory experiments had begun, but it was not until 1808 that scientific proof was adduced for the theories of William Floyer, Cullen and others that asthma was nervous in origin and that constriction of broncholar muscles occurs.

Some of the discoveries, inventions and experiments may be summarised.

(1) Haller, 1775: By application of concentrated acids caused lung tissue to contract.57

(2) Varinier, 1799: By introduction of irritating fluids or direct stimulation of inner surfaces of fine air passages caused slow contractions.58

(3) Goodwin, 1788: A small opening made in the thorax of a dead person caused the lung to collapse. Water introduced through an opening in the trachea into the lungs of cats or dogs produced difficulty in breathing, and artificial hydrothorax.59 (Repeated and confirmed by Bree, 1797).

(4) Prochaska, 1797: When the chest of a live animal was opened, the lungs collapsed to a greater degree than in cases
of a killed animal. Conclusion: Lungs have muscle tissue.

(5) Reissisen, 1808 and 1822: proved that there were smooth muscle fibres in the terminal bronchi; that the "eighth" (tenth) pair of nerves ended in the bronchial blood vessels, and that the "lung was a contractible bladder."  


(7) Laennec (1761-1862): Invented stethoscope and introduced diagnosis of chest diseases by immediate auscultation: proved occurrence of muscular spasms. This also soon resulted in the distinction of bronchial asthma from several hitherto undifferentiated chest diseases also characterised by dyspnoea.  

(8) Dupuytren, Dupuy and Magendie: Demonstrated that section of the "eighth" (tenth) pair of nerves inevitably produced convulsions of respiratory muscles.  

(9) Legallois, 1812: Showed that bilateral section of the vagus nerve causes pneumonia; also that medulla oblongata is source of respiratory motions ( Accord.: Bell)  

(10) Wedemeyer, 1828: Upon galvanic stimulation of bronchi of dogs and of cats secured contraction of small but not large bronchioles; no contractions ensued on direct irritation of smaller bronchi or inner surfaces; ( Accord. Williams 1840; Budd 1842.)  

(11) Longet, 1842: Performed horse and oxen experiments: contractions of bronchi occurred when a galvanic current was applied to branches of the vagus nerve in larger bronchi. Manometer method: vagus stimulation of an animal into whose trachea a water manometer had been inserted, resulted in a rise of the fluid column.  

(12) Marshall Hall, 1833; From experiments concluded that the medulla oblongata controls respiration: discovered reflex source of muscular action.  

(13) Positive and Negative Experimental Results on Vagus, etc. Wintrich, 1854; Donders, 1853; Budd, 1841. 
Volkmann, 1844: Stimulated vagus of an animal with galvanic current: instead of using manometer, he directed expelled air through a glass tube against a candle flame; following stimulation the flame was bent away from the tube opening.70

Rugenberg, 1863, and von Toeplitz 1873: Decided that in manometric readings rise of manometer following vagus stimulation is due to oesophageal contractions which lift the stomach against the diaphragm and so compress the lungs, raising the intratracheal air pressure.71

Courtý, 1859: reported successful treatment of severe attack in woman by injecting atropine near vagus nerve.72

Bert, 1870: After experiments declared that though contractions occur upon direct lung stimulation or vagus irritation, they are too weak to uphold bronchospasm theory.

(ISolated lungs preparation used.)73

Horvath, 1876: Thorough experiments. Conclusion: Sufficient stimulation of peripheral ends of vagi cause a narrowing of bronchioles through contraction of their muscles.74

Addison, 1855: Discovered importance of adrenal bodies (Addison's disease) but did not relate them to asthma.75

Oliver and Schafer, 1894: Discovered activity of adrenal extract.76

Gerlach, 1876: Definitely refuted Rugenberg's contentions by repeating experiments with chest open, abdominal organs intact, fixed or entirely removed, and eosophagus fixed. He also ruled out trachea as source of contractions.77

Von Leyden, 1872: Discovered in sputum certain crystals (which now bear his name) which he maintained result from the inflammatory process in the lungs, irritate the vagal nerve endings in mucous membranes, and reflexly induce a spasm.

In addition, he argued that the inflamed mucous membrane, without crystal formation, could so irritate vagal endings as to produce the same result. 78
Curschmann, 1882: contended that the inflammatory process pictured by Von Leyden is of a particular type; he termed it "bronchiolitis exudativa," it is characterised by viscid sputum containing spirals, which he described, and now bear his name. These secretions he said, partially block the bronchioles, and interfere with respiration; the effort to clear the passages results in sympathetic bronchial spasm.

MacGillavry, 1876: Punctured many small holes in surface and of lungs; with manometer measured pressure required to force air through bronchi and lungs so that it could escape through small aperture. On stimulating vagus, a marked increase in pressure proved necessary to force air through apertures. Conclusion: Increased obstruction in respiratory passages is due to muscular contraction caused by vagus stimulation.

Roy and Brown, 1885: (1) By experiments found that in animals under ether anaesthesia, section of one vagus nerve and stimulation of central stump results in bronchial dilatation. Conclusion: Vagus contains dilatative as well as contractive fibres.

Sandmann, 1890: Asserted that fluctuations in intra-tracheal pressure result partially from contractions of bronchial and lung muscles, but partly from altered blood volume of the lungs, heart and large vessels of thorax.

Beer, 1892: In curarized or narcotized animals, experimental factors may be varied to rule out one or another factor. He used both a resting lung and one operated by artificial respiration. His experiments were comprehensive and decisive. He left circulation intact in some experiments, excluded it in others and showed that while vagus stimulation causes circulatory changes which contribute to an increase in intra-tracheal pressure, a rise still occurs when circulation is excluded, attributable only to bronchial constriction. He showed the sinking of the diaphragm on vagal stimulation to be due to dilatation of
the lungs, and that the latter was independent of circulatory factors, being caused rather by emphysema arising from bronchial constriction.84 (Accord: Einthoven, 1892. 85)

(28) Röntgen, 1896: Professor of Physics at Wurzburg, in January, 1896, recorded discovery of the X-Ray. It was immediately applied to medicine, and has been used for diagnosis, study of lung conditions, and therapy in asthma cases.

(29) Gustav Killian of Mainz, 1898: Introduced direct bronchoscopy.

(30) Aufrecht, 1900, discovered that the muscular coat of the bronchial muscles consists of two layers: a relatively heavy circular coat and a very thin longitudinal layer. This resulted in a new conception that the expulsive mechanism of the broncholes is by contraction of the longitudinal layer.86

(31) Solis-Cohen, 1900: Found that adrenaline injections are capable of arresting temporarily the asthmatic paroxysm.87

Each of the fundamental theories enlisted supporters, the position of the muscle spasm proponents being materially strengthened by:

(1) The conclusive demonstration by Reisseisen; accepted by all thereafter, that circular muscle fibres exist in the bronchi;

(2) That these muscle fibres contract upon sufficient stimulation of the peripheral ends of the vagus nerves. Proven by Gerlach, Horvath, Einthoven, Brodie and Dixon, Beer and others)

(3) The evidence later adduced that the muscle may be caused to contract by the presence of certain substances in the blood, even when the vagi are completely out of function.

Laennec (1819) adopted the theory and his prestige helped to entrench it so that by 1900 it had become the most popular of the contending hypotheses.

Curschmann's theory of "bronchiolitis exudativa" commanded a respectable following. At a later date he enlarged it to include broncho-apasm.

But second in strength was the school which denied that bronchial constriction played any significant part in the dyspnoea of asthma, contending instead that the essential cause was
obstruction produced by swollen mucous membranes and various types of bronchitis. (Beau (1848), was one of the originators of this school of thought from the strictly modern standpoint and was well supported by men of some prestige, such as Berkart (1878), Ungar (1882), von Strumpell (1901) (to whom lack of hypertrophy of bronchial muscles in post-mortem examinations seemed a weighty argument against the muscle spasm theory); Traube (1878) (who believed asthma was caused by a certain type of acute pulmonary catarrh probably resulting from disturbance of vasomotor nerves to the bronchial mucous membranes); Bretonneau; Weber (1872), Moritz (1884) (who maintained that the congestion of the bronchial mucous membrane is the direct extension of a congestive process in the nose); Pieniazek (1905) (who on a basis of direct bronchoscopic examinations during an attack, reached his conclusions and postulated a vasomotor disturbance); Sir Andrew Clark (1886) (who believed that the pulmonary mucous membrane was affected by a superficial oedema similar to anticaeria. ) He thought that local changes in the lining of the respiratory passages caused an anoxaemia which in turn stimulated the respiratory centre and induced dyspnoea and the muscular exertions of the asthmatic paroxysm); Grossman (1907) (who explained dyspnoea by the theory that vascular dilatation caused the lung to lose its elasticity and mobility. He said this effects a dilatation of lungs and bronchi rather than a contraction, thus interfering with collapse of the lung and making respiration a protracted and forced muscular action); Winter (1910) (who postulated vasomotor disturbance of mucous membranes through direct or reflex vagal irritation, consequent congestion having both chemical and mechanical effects on respiration, with loss of consistency and motility of the lung preventing normal respiratory excursions); Wm. Osler (1912) "The hyperemia and swelling of the mucosa and the extremely viscid, tenacious mucous explain well the hindrance to inspiration and expiration and also the quality of rales".

Still another theory which enlisted some support was the
proposition that in asthma the fault lies not in the lungs themselves but arises from spasm of the diaphragm and other muscles of respiration. This view was probably first advanced by Budd in 1841 after his experiments which he thought proved the inability of the bronchi to contract. To this theory, with occasional variations, the following subscribed: Wintrich (1854), Kidd, (1861), See (1866) (spasm of inspiratory muscles, especially diaphragm, resulting from neurosis of vagus); Von Bamberger (1874), Stork (1875), Riegel (1882), Jaccoud (1879). The theory in later years lost popularity as the physiological mechanisms of respiration became clear and virtually destroyed its foundation.

Brown, in (1917), explained asthma on the theory of "nonpassive expiration." The essence of his view is that normally expiration is passive, but that the asthmatic passes over to forced expiration, involving active muscular effort which increases intra-alveolar tension and mechanically interferes with the bronchial blood and lymph circulation. The ensuing congestion impedes exit of air and causes dyspnoea. He considers his view as falling logically into the category of vessel turgescence.

Those who espoused the several theories had again a latitude of choice as to whether they would regard the underlying mechanism as nervous or humoral.

Here again the widest variety of views obtained; the nervous mechanism being explained differently by the various theorists:

(1) A momentary alteration in the state of a nervous influence; Laennec (1835).

(2) Irritability of the nerves of the lungs: La Fevre (1835); Eberle (1838); Andral (1851); Merkel (1861);

(3) Phrenic nerve causes spasm of diaphragm: Duchenne (1855).

(4) Morbid condition in medulla: Kidd (1861).

(5) Vagus stimulation: Included are all proponents of bronchial spasm theory; Einthoven (1892); Brodie and Dixon (1902); et al; Kyle (1899 - vasomotor paralysis); Pieniazek (1905 - vasomotor paralysis) also Behrens (1906); Von Strumpell (1908 - vasomotor secretory disturbance).
60.

(6) Not by vagus stimulation: Rosenthal (Berlin, 1862).

(7) Pneumogastric, other nerves, or nerve centers - these either reflexly or directly, causing spasmodic contraction of the bronchial muscle: Salter (1860); Haring (1904); Freudenthal (1911).

(8) Neurosis: See (1865); Trousseau (1867); Hoffman (1902); Sinle (1903); Newcomb (1904); Levy (1905); Aveillis (1905); Kohn (1905); Rochester (1906); Pescatore (1911).

(9) By reflex originating in sensitive part of nose: Frankel (1881); Baumgarten (+ neurosis, 1892); Kyle (1899); Farrell (1901); Watson-Williams (1901); Francis (1903); MacDonald (1904); Spiesz (1910).

(10) Control of respiration is through a tonus existing in the vagi: (Levy 1890 - Probably originator of the vagotonia theory of asthma); Cholewa (1912); Curschmann (1912: vagotonia or sympatheticotonia).

(11) Cause of asthma lies in some tissue or tissues affecting the vagi or sympathetic nervous system: Kingscote (1900).

(12) Hyperstimulation or excitability of certain bulbar centres, especially the vasomotor: De Luca (1901); Brugelman (1910).

(13) General vasomotor disturbances: Galdi (1905); Coggeshall (1905).

(14) Reflex neurosis: Dock (1906).

(15) Neurosis of respiration centre: Moller (1908); Dixon (1909).

(16) Abnormality of one or other of inferior ethinoidal nerves: Neumayer (1911-12).


(18) etc. etc.

Others preferred to consider the underlying mechanism of asthma as "humoral". Thus, Duclos in 1801 said that an "herpetic" principle in the blood, bringing about an edematous condition of the mucous membrane of the lungs, brought on the attack. Todd in 1850 ascribed the symptoms to a "materies morbi" affecting and poisoning the nerves of respiration and inducing a feeling of air hunger.

In this age, even as now, it seemed that the views of many possessed a grain of truth - a grain of gold as it were, but mixed with much alloy. Very few were so sound on so broad a range as Hyde Salter whose book on asthma in 1860 was at once recognised as a classic and has continued to be so esteemed to the
present day. He had the rare faculty of perceiving that the truth in so complex a subject lay in several directions rather than along a single road.

He gives us this excellent description of the physiology of asthma.

"If we could see into an asthmatic during a fit we should see pulmonary venous congestion, distended right heart, large veins full and a scant supply of arterialized blood finding its way to the left ventricle."

He saw the necessity for both the nervous and humoral routes in asthma production. He also called attention to asthma resulting from toxaemia and from animal emanations (rabbits, horses, dogs, wild beasts etc.)

His pathology of asthma is so sound that I reproduce it.


"What I shall endeavour to show is this: -

1. That asthma is essentially, and, with perhaps the exception of a single class of cases, exclusively, a nervous disease: that the nervous system is the seat of the essential pathological condition.

2. That the phenomena of asthma - the distressing sensation and the demand for extraordinary respiratory efforts - immediately depend upon a spastic contraction of the fibre cells of organic or unstriped muscle, which minute anatomy has demonstrated to exist in the bronchial tubes.

3. That these phenomena are those of excito-motory or reflex action.

4. That the extent to which the nervous system is involved differs very much in different cases, being in some cases restricted to the nervous system of the air passages themselves.

5. That in a large number of cases the pneumogastric nerve, both in its gastric and pulmonary portions, is the seat of the disease.

6. That there is a large class of cases in which the nervous circuit between the source of irritation and the seat of the resulting muscular phenomena involves other portions of the nervous system besides the pneumogastric.

7. That there are other cases in which the source of irritation, giving rise to the asthmatic paroxysm, appears to be central - in the brain; consequently, in which the action though excito-motory is not reflex.

8. That there is yet a class of cases in which the exciting cause of paroxysms appears to be essentially humoral."
With our sense of order somewhat restored, let us close this chapter, saving for future consideration those other ideas which took root in this time but flowered at a later day.
CHAPTER VII.

ASTHMA and HAY FEVER: BROTHERS UNRECOGNISED.

(THE BIRTH OF ALLERGY).

In the limited compass of an essay on asthma it is not possible to deal exhaustively with hay fever. Yet since the epochal discovery in the twentieth century that both very often have a common allergical origin or etiology, the two are inseparably linked together. The finding that asthma, like hay fever, in a huge category of cases arises from a hypersensitivity of the individual to some certain protein had a profound effect on subsequent thought and experimentation. Consequently, it is only proper that some allusion be made to the historical antecedents of allergy and hay fever.

A few definitions will facilitate understanding and appreciation of what is to follow. Bray, in his splendid "Recent Advances in Allergy", 3rd Edition, London, 1937, P. 4, states what are now by common consent, the prevailing definitions:

"I use the term hypersensitiveness to include all reactions in which a hypersusceptibility to some foreign agent is evidenced as compared with normals, and subdivide it into (1) anaphylaxis, and (2) allergy.

1. Anaphylaxis is the term applied to the induced-manifestations of hypersensitiveness in laboratory animals, which, according to the manner of production, may be subdivided into (a) active, when an antigen is responsible, and (b) passive, when brought about by antibodies. In all instances anaphylaxis is due to an antigen-antibody reaction taking place in special sensitised tissues.

2. Allergy is the term applied to the (a) natural or spontaneous manifestations of hypersensitiveness in man, which include asthma, hay fever, eczema, urticaria, and migraine, and to the (b) induced states such as serum sickness and the passive transfer of hypersensitiveness by sensitised serum.

Allergy is thus a state of exaggerated susceptibility to various foreign substances or physical agents that are harmless to the great majority of ordinary normal individuals. The reaction is of similar type in the same individual for each substance,
generally appearing after minute quantities, and differing from any toxic action the substance might have in large doses. The allergic exciting agent is termed the allergen, and the allergic antibody designated the allergin. Cells are sensitised when the allergin is in or on them and thus accounting for their altered reactivity. When the cellular concentration of allergins reaches a certain point, the excess becomes free in the blood. These circulating allergins still retain their specific reactivity, and upon this fact the Prausnitz-Kustner reaction depends. When the allergen comes in contact with the allergin in the sensitised cells a rapid reaction occurs, resulting in the production of the lesions and symptoms of allergy. Should the allergin circulate in the blood in sufficient quantities to neutralise all the allergen and prevent its access to the sensitised cells it may prevent, instead of produce an allergic reaction. The terms active and passive sensitisation are applied to the hypersensitive state according to its manner of production, and desensitisation to a decrease of hypersensitiveness from therapeutic intervention or increased tolerance.

Galen (130-200 A.D.) in connection with his discussion of the prolongation of life, describes a case which well may have been one of goat's milk allergy. He says:

"We are acquainted with an old farmer more than one hundred years old, whose principal nourishment was goat's milk which he took sometimes with bread broken into it, and again with bread spread with honey or with tops of thyme baked with bread. With the thought that goat's milk had prolonged his life, another, imitating him, suffered continually no matter how he took it."

Without overstretching the imagination, we may recognise in the following a practice of heating and boiling foods in allergic gastro-intestinal disturbance. In the Babylonian Talmud (second century A.D.), Nedorim 50b, section VI., page 100, lines 20-30, Samuel says:

"Put an egg 1,000 times in hot (warm) water and 1,000 times in cold water, till the egg becomes small, to be swallowed unchewed. If he suffers from bowel disturbances (and pain), the trouble can be located and proper treatment instituted, on studying the changes in egg material."

Valerianus (570) - The Hieroglyphica of John Hierius Valerianus - or Fifty-eight Books of commentaries on the sacred writings of
of the Egyptians and other Nations, etc., which was published at Frankfurt-on-the-Main, in 1678, contains an interesting reference to rose odor sensitivity. Book VIII. of Hiero-
glyphica treats of the significance of certain animals, beetles, 
hedge-hogs, etc., in ancient history. Our reference is to 
be found in Chapter 25. Virtus enervata deliciis Cap. XXV. 
(Strength weakened by delicacies).

"There was a famous leader of soldiers who was 
so opposed to pleasures that he would swoon as 
soon as he perceived the fragrance of roses as 
though this were proof that valor, however manly, 
becomes enervated by allurements. This story 
is also handed down by Aristotile and gave occa-
sion for a silly hieroglyphic. If an artist 
 wishing to depict stern Hannibal as being effem-
inate or as doubting, or yielding at Capua, he would 
give him a shield with the sign of the beetle and 
around the edge of the shield would entwine wreathe 
of roses. There are very many persons who cannot 
endure the exhalation of roses and among these are 
even rather great men. For when I was at Rome 
I saw Oliver Caraffa, a Cardinal of great celebrity, 
who was forced to withdraw every year at the time 
the roses were in bloom and to shut himself up within 
the gardens he had at the Quirinal. Guards were 
placed at the gates so that no one coming either 
to greet or for the sake of friendship would bring a 
rose along. Among the Roman nobility there was one, 
Peter Melinus, remarkable for his ability, erudi-
tion and family position who was greatly affected by 
the smell of roses. These things concerning the 
beetle have occurred to me and these are the ones I 
could recall. I would have written more besides, if 
at the present time I had not been deprived of the 
commentary which I have formerly prepared and joined 
to the one on the vulture. This was taken from the 
bookcase of that most eminent man Albert Pius an 
associate of the carvers, and somehow carried to 
Germany by some book fancier, or rather book thief."

Van Helmont (1577-1644) - In the 1707 editions 
of 'The Complete Works of John Baptist Van Helmont," 
there occurs a comprehensive dissertation on Asthma 
and Cough. It is interesting because it mentions a 
case of a man, who in the summer had white blebs 
like a leper. His mother suffered from a similar 
itch and so did his sister.

In 1673, John Nicholas Binningerus, Doctor of Medicine, wrote his 'Five Centuries of Observations 
and Medical Cures'. In it he described a large and 
fleshy woman who, at the time of the blooming of the 
roses, suffered from coryza.

In the 140th observation of Dr Samuel Ledel, re-
corded in Miscellaneae Curiosae published at Nuremberg 
in 1683, the effect of the odour of roses on the 
sight is recorded.
In the same series, *Miscellanea Curiosa* for 1686, James Augustin Hunerwolff records an interesting effect of the odour of roses. "I know a man who suffered a severe nasal catarrh as often as he entered a rose garden when it was in bloom, or whenever he smelled a rose bud."

In the "Storehouse of Medicine, etc. by A. Constantino De Rebecque, M.D., published in 1691 at Geneva, the author cites his own interesting case. He said that when he first suffered from catarrh in the summer he supposed it to be the result of hot weather but that later he discovered that his trouble was caused by the roses blooming at that time. He proved this by smelling a rose out of season and then suffering from a severe asthmatic attack which lasted for many days.

Botallus in 1565, in his "Two Short Commentaries of Leonard Botallus" probably made the first complete medical reference to hay fever:

"I know for a certainty of men who at the smell of roses were seized with a loathing against their chief enemy and that to such an extent as to be subject to headaches or a sneezing fit or a running at the nostrils so that for two days it could not be stopped by rubbing.

I know likewise of a woman who at the smell of musk would fall over, collapse and if she perceived it nearby would faint or be forced to vomit or have a severe headache."

The modern developments in hay fever, anaphylaxis and allergy up to the beginning of the present 'intensive research' epoch, may be presented most succintly in outline form.

I. Hay Fever: (Pollin Allergy)

1. Bostock (1819) of Liverpool: First described the "summer catarrh" with complete accuracy, with such definite and complete symptomology (sneezing, swollen and running eyes, congested and running nose etc.) that his account has never been improved upon. He pointed out its seasonal occurrence, and gave it the name "hay fever".

2. Gordon (1829): Stressed causal relationship of flowers of grasses, particularly *Anthoxanthum odoratum*, and first introduced the term "hay asthma".

3. Gream (1850): Noted dust as an exciting cause and commented on influence of rain in reducing intensity of symptoms.

4. Swett (1852) of New York: First described two forms of the disease in America, a summer and an autumn variety.

5. Phoebus (1862) of Giessen: Commented on marked predisposition in sufferers; stated that Kirkman
was first patient to experiment on himself by sniffing pollens of grass up nose (Anthoxanthum odoratum) and obtaining typical symptoms. 100

6. Wyman (1872): Identified pollen from rag-weed (Ambrosia) as a chief cause in America. 101

7. Blackley of Manchester: (1873): By experiments on his own mucous membrane and skin, proved that pollen of Gramineae is a chief cause in Britain; in 1881 showed that an air filter or purifier over nose and eyes modifies attacks; in 1890 perfected a home filter. 102

8. Dunbar (1903): Firmly established and amplified pollen theory. 103

9. Curtis (1900): Attempted to produce active immunity by hypodermic injections of flower extracts, some success. Also tried administering rag-weed extract orally. 104

10. Noon & Freeman (England), 105 Cook (America) 1911: Applied dilute pollen extracts to conjunctiva of hay fever victims; used pollens indicated for therapeutic treatment with favourable results. 106

11. Cloves (1913): First in America to use reactions, cutaneous and ophthalmic, in connection with rag-weeds and to employ vaccination for treatment. 107

12. Koessler (1914), America: First placed desensitisation on a scientific basis. 108

13. Cooke and Vander Veer (1916): Discussed pronounced hereditary tendency and noted that multiple pollen reactions are usually found. 109

II. Anaphylaxis:-

1. Magendie of Bordeaux (1839): Observed that subsequent injections of egg albumen caused death in rabbits previously tolerant to an initial injection. (Probably the first experiment in supersensitization of tissues or anaphylaxis.) True also in dog experiments. 110

2. Koch (1890): Found that tuberculous animals proved hypersensitive to doses of tuberculin which to normal animals were non-toxic. 111

3. Flexner (1894): Found that if an animal were given an injection of dog serum, followed in a few days by a second one, (non-lethal to a control animal), the twice injected animal died. 112

4. Richet and Hericourt (1898-1902): First recognised the dependence of hypersusceptible condition on prior inoculation with the same substance, plus a minimum incubation period between. Richet used eel serum on dogs; named phenomenon "anaphylaxis" because of its antithesis to prophylaxis. 113

5. Arthus, 1903: Found that repeated subcutaneous serum injections in rabbits at several day intervals produced oedema, abscesses and gangrene at place of inoculation; and that intravenous inoculations produced death. 114
6. Rosenau and Anderson (1906-8): Endeavoured to destroy toxin in serum by physical and chemical agents; using guinea pigs found the hypersusceptible state a sensitive one, brought on by variety of animal and vegetable products and bacteria, and that sensitivity could be transmitted from mother to offspring. 115

7. Gay and Southard (1907): Were the first to describe passive anaphylaxis. 116


III. Allergy:

1. Edward Jenner, of Berkley, who, on May 14, 1796 gave to Medicine vaccination against smallpox, describes a case which we may now recognise as being perhaps the first definite example of a local protein reaction (and anaphylaxis). Mary Barge had suffered with cowpox thirty-one years before. In 1791 Jenner inoculated her with variolous matter and "An efflorescence of a palish red colour soon appeared about the parts where the matter was inserted and spread itself rather extensively, but died away in a few days without producing any variolous symptoms." In the footnote at the bottom of page 13 of this little monograph he says: "It is remarkable that variolous matter, when the system is disposed to reject it, should excite inflammation on the part to which it is applied more speedily than when it produces the smallpox. Indeed it becomes almost a criterion by which we can determine whether the infection will be received or not. It seems as if a change which endures through life had been produced in the action, or disposition to action, in the vessels of the skin, and it is remarkable too that whether this change has been effected by the smallpox or the cowpox, that the disposition to sudden cuticular inflammation is the same on the application of variolous matter." 118

2. Weichhardt and Wolff-Eisner (1905-6): First suggested that human hypersensitiveness was related to the experimental anaphylaxis noted in animals. 119

3. Von Pirquet (1906): Invented term "allergie" or "allergy", meaning "altered reactivity". He implied that its usual basis was an antigen-antibody reaction. 120

4. Meltzer (1910): Suggested that bronchial asthma was anaphylactic. His reasoning was based on observed similarity of bronchial constriction in asthma and in animals killed by the anaphylactic shock. 121

Koessler (1913): Accord: reported asthma case due to hypersensitivity to hen's eggs. 122

5. Doerr (1912): Extended "allergy" to all forms of changed reaction capacity whether exciting substance was antigen or not. 122
As a result of these various experiments and observations and Meltzer's carrying the animal experiments over to man, for a time everyone inclined to the view that anaphylaxis in animals and asthma in man were part and parcel of the same phenomenon. Gradually, it was perceived that while asthma is very often an allergical affection similar to anaphylaxis, the latter in all its characteristic incidents, is true to type in animals only. Thus anaphylaxis ("without protection": Richet and Portier, 1902) is a state of sensitivity appearing on reinjection of antigenic substances into animals; in all members of a susceptible species the condition can be thus artificially induced; the condition is usually acquired, but when inherited, is through the mother, not father, and only against the same substance to which the mother is sensitive; duration is short in the young; the condition is produced only by soluble proteins; the reaction is due to immune bodies, anaphylactine, precipitine; a sensitising dose is required and a provocative dose if ten days have elapsed; repeated reactions result only from multiples of the first reaction-producing dose; the lesions produced vary with the species, but are for the most part due to contraction of non-striped muscle. Bronchial spasm results in guinea-pigs, liver changes in dogs, pulmonary arterial constriction in rabbits, but the reaction is always identical in the same species whatever antigen is used.

In contrast, allergy ("altered energy or reaction": Von Pirquet, 1906) is a series of peculiar reactions which result upon injections of foreign serum, tuberculin or vaccination; not more than 1 to 10% of human beings are allergic, and the condition apparently cannot be artificially induced in those not subject; the condition is frequently inherited through mother or father, against various substances; the duration in the young is long; and many non-protein as well as protein substances produce symptoms, the reaction being due to allergins of unknown immunological nature; a sensitising dose is
is not always required, nor a time interval, and first and repeated reactions can be elicited with identical infinitesimal quantities of the related allergen. Different tissues vary so remarkably in sensitiveness to the same protein as to indicate high sensitivity in some tissues and absence in others. Reactions occur chiefly in skin, respiratory and gastro-intestinal tissues.

(Abstracted from Bray: Recent Advances in Allergy, 3rd ed., 1937, p. 18.)

It is interesting to observe that allergy was a conception of the clinic while anaphylaxis came out of the laboratory. Insensibly, the whole complexion of the asthma problem had begun to change; allergy usurped and practically monopolised the spot-light shortly before focussed on contending theories of causation, and the investigation of associated nervous mechanisms. In 1910 there began a period of bewildering activity during which new methods and new instrumentalities of research were added to the old. Yet as we shall see, man's insatiable love of spinning theories ran on as in the past.
Whether the gradual decay of man (which some so clearly perceive) has made him more susceptible to asthma and its newly related twin brother, hay fever, is speculation. But certainly both maladies seem to grow in popularity with the passing years. Feinberg, the American worker, shows that at the present time there are three million sufferers from these two afflictions each year in the United States alone. Certainly the prevalence of a disease has much to do with the thoroughness of its investigation. An awareness now began to emerge of the insufficiency of existing methods in coping with so complex a problem as the asthma syndrome. Empirical medicine had carried the fruitfulness of the observational method to the end point. The further elucidations of intrinsic mechanisms seemed incumbent upon the physiological laboratory, the clinical evolution of allergy at once passed to the hands of specialists, and bio-chemists fell heir to research traditions which a short fifty years before still lay within the grasp of the general medical practitioner.

Fortunately, the clinical specialists were themselves practicing or attempting to practice the art of healing; and much of the laboratory work progressed in close co-operation with hospitals or clinics, so that theory did not often become lost in vacuity. A drag-net system came to be used under which scientific inquiry began to scan, search, and research every possibly factor which it seemed might provide a key to the asthma problem. One has only to see the scores and sometimes hundreds of scientific papers on asthma from all parts of the world, listed each three months in the Medicus Index, to appreciate the intensity of the search.

The answer still evades us, but from these efforts has
come an accession of valuable scientific information which has utility beyond the province of asthma or hay fever. The new age has replaced the old spirit of individual competition with a thorough going co-operation that augurs well for the future. Moreover, in such treatises as Coca, Walzer and Thommen's "Asthma and Hay Fever in Theory and Practice," Baltimore, Md. 1931, and Bray's "Recent Advances in Allergy," 3rd ed. London, 1937 we see syntheses of developing thought by men who are themselves leading contributors and practitioners. The lack of such work was a notable weakness of the last century.

An essay could be devoted to any single aspect of the asthma problem; what is given must therefore stand as an abbreviated account of major trends and considerations.

I. The Continuing Progress of Physiological Experiment.

1. Brodie and Dixon (1903) performed experiments on decerebrate animals in which they measured volume changes in lung lobes by a plethysmograph. They demonstrated reflex bronchial constriction follows stimulation of a cut vagus nerve, the cornea, or nasal mucous membrane. They were able to induce bronchial muscle spasm by pilocarpine, and terminate it completely and immediately by atropine or sympathetic stimulation. They advanced these findings in support of the broncho-spasm theory, and argued further that:

(a) The theory that bronchioles are plugged or obstructed by secretions is not tenable, for the onset and termination of asthma are rapid and early in the attack moist signs and expectoration are often absent.

(b) Obstruction of bronchioles by engorgement of bronchial mucous is unlikely, because that membrane is thin and poorly supplied with blood.

2. Establishment by McDowall and Thornton (1930) of a simple method for recording on a smoked drum the movements of isolated bronchi. See illustration., p. 72a.

3. Thornton and Gillespie, using the isolated bronchial preparation, have demonstrated not only the usual reactions of bronchi to drugs, but also that:
McDowell and Thornton's apparatus for recording the movements of isolated bronchial preparations.

"The apparatus is essentially in principle a U-tube which is tapped at its lowest point D. The perfusion fluid flows from the pressure bottle A down the proximal limb of the U-tube and is warmed to the requisite temperature in its passage by a heating coil B. The height to which the fluid rises in the distal limb of the U depends upon the rate at which it is allowed to escape at D. This rate is in turn dependent upon the rapidity with which the fluid is allowed to flow down the trachea, into the alveoli of the lungs and out through scarifications on their surface. If the bronchial muscle is constricted the amount escaping is diminished and the height of the fluid in the distal column of the U rises, as measured by the scale E, and the movement of the air column above raises the volume recorder F. If the bronchial muscle is relaxed the fluid flows more freely through the lungs and the level in the distal limb falls.

The figures marked in the following records refer to the readings on the scale E, and the records themselves are those marked on a revolving drum by the movements of the volume recorder F."
(a) Bronchial muscle is sensitive to slight changes in hydrogen-ion concentration of perfusing fluid; acid dilates and alkali constricts it within physiological ranges.

(b) Bronchial muscle is affected also by the calcium-potassium ratio: slight increases in calcium in the perfusing fluid constricts and diminution of potassium has the same effect. 125

4. D'Silva, in 1933, found that hypodermic injection of adrenaline in cats raises their blood-serum potassium over 50 per cent, suggesting that adrenaline may relieve bronchial constriction indirectly through chemical, humoral mechanisms rather than by nervous channels. 126

5. Hudson in 1929, using lipiodol showed that bronchi dilate and elongate with inspiration and constrict and shorten with expiration, thus solving the long standing question as to why inspiration is easy and expiration difficult in asthma. Films taken showed the tubes to be small and their permeability to lipiodol much reduced in asthmatic lungs, so that lipiodol failed to reach the bronchioles.

The fact that the infundibula are conical and narrow towards bronchioles rather than towards periphery, is an additional mechanical reason. 133

Steinberg, in 1932, made similar observations using roentgenologic methods.133

7. Experiments have multiplied on histamine or Lewis's (1924-7) "H-substance" the accumulating evidence indicating that this chemical may be secreted by the body in response to shock or other exciting cause, and pass in the blood to the lungs, there causing bronchial constriction. (Best, Dale, Dudley, Thorpes, McHenry, Weil and Manwaring Lewis) 134

As Bray (Allergy 3rd ed.) says (p. 35): "At present extreme interest is centred round histamine because (a) when injected intravenously into animals, it produces shock which is characterised by marked smooth muscle contraction - the bronchial constriction produced in guinea-pigs closely resembling anaphylactic shock; (b) when applied to the skin of animals or man it leads to prompt wheal formation, similar to reactions obtained in allergic persons when the specific allergen to which they are sensitive is applied to the skin and (c) it is
so prevalent in the tissues of the body, as well as capable of being produced in the lumen of the intestine and lungs."

(8) Eppinger and Hess (1909), Nervous factor: By pharmacological experiments in which they used pilocarpine and adrenaline showed that many clinical conditions, asthmatic in character arose from a disbalance of sympathetic and para-sympathetic elements of the autonomic nervous system. Small doses of the drugs produce no symptoms in normal individuals; in case of unbalance of the autonomic nervous system, exaggerated responses are caused in organs where the two nervous elements operate antagonistically of a type depending on whether sympathetic or para-sympathetic nervous system is dominant.138

(9) Gillespie (1931) suggested use of atropine to distinguish nervous asthma and allergic asthma. Since vagus stimulation causes broncho-constriction; paralysing vagal nerve endings by atropine would cut off nervous impulses and abolish asthma of nervous origin, but have no effect on asthma due to allergens in blood or which act locally to produce a myogenic response.139

(10) Oriel (1929-1933) devised a technique for isolating the nitrogenous substance from urine taken from the allergic asthmatic during an attack. This nitrogenous "proteose" he suggested, contains the specific antigen to which the asthmatic is sensitive; thus he will give a positive skin reaction to his own proteose intradermally, the Prausnitz-Kustner reaction can be obtained with it, and a serum made from it for a series of injections designed to build up an immunity. Using this method he claims that in protein-sensitive asthmatics 23% are almost free after a course of injections, 46% much improved, 23% improved, and 8% unimproved. A controversy exists among experimenters as to the accuracy of the various contentions, most agreeing that "specific" positive skin reactions cannot be obtained by it.129
Prausnitz-Kustner Reaction: Kustner was sensitive to fish; in 1921 his serum was introduced into the skin of Prausnitz. It was then found by the "skin scratch"/that the skin of Prausnitz was now locally and passively sensitised to fish at the site of the injection.

This "reaction by proxy" was a valuable clinical discovery, enabling infants, nervous persons or those otherwise unfit (or far removed from the testing place) to have a "skin scratch" test made on another person.130

Daly, 1935: Proved that bronchial arteries are supplied with sympathetic vaso-constrictor fibres; that excitation of autonomic nervous system produces bronchoconstriction, pulmonary vasoconstriction and dilatation depending upon nerve pathways stimulated, provided adequate bronchial arterial supply is maintained; such responses do not occur if bronchial arterial supply is cut off; hence it is suggested that temporary depletion of bronchial arterial supply may account for pulmonary vasomotor and bronchomotor "attacks". The inference is also drawn from experiments on monkeys and guinea pigs that bronchial musculature is under some sort of intrinsic control, and that an interference with these intrinsic mechanisms is the potential cause of asthmatic dyspnoea.

Heymens performed dog experiments showing the presence of the carotid sinus at the bifurcation of the common carotid artery. He showed that variations (i.e. increase or decrease) in the CO2 content of the blood sets up a nervous reflex through nerve filaments, in the walls of the sinus, which travel to the respiratory centre and speeds or slows the breathing.

Steinberg (1925): Found that in narcosis, a vasomotor dilatation of vessels occurs in nasal mucous membranes. This suggests the possibility that if the same phenomenon occurs during sleep, the slight exaggeration of congestion already present in the bronchiole mucous membrane of the asthmatic may embarrass respiration and induce a paroxysm. Further research
into the physiology of sleep is necessary for evolution of the possibility. 128

2. Specific Testing for Hypersensitiveness :-

One of the practical contributions to therapy in recent years is "skin testing" in cases of allergic asthma. The patient's skin is scratched in several places and dilute solutions of various pollens and proteins applied. Those to which he is allergic produce a characteristic wheal. He is then given, (with varying success) a series of inoculations of the substance indicated, in progressively increasing quantities to build up an immunity.

Scattered observations, vague in nature, were precursors of the modern practice begun by Noon and Freeman in 1911. Among these were Jenner (1798), Kirkman (1835), Hyde Salter (1860). Specific developmental work was done by Blackley (1873), Dunbar (1903), Von Pirquet and Schick (1905), Smith (1909), Moss (1910).

The technique has been extended by Cook, Schloss, Goodale, Talbot and Black, the last named being a notable contributor to both therapy and theory in this and other aspects of allergy.

The present injection treatment based on the indications obtained is almost completely successful in 25% of allergic asthma cases, 25% it helps more than moderately, 25% moderately only, and 25% not at all.

3. Hereditary Factor:--

In very early times, the inherited predisposition to asthma was observed. In more modern days writers have agreed to those observations: Sennertus (1650), Cullen (1784), Ryan (1793), Davidson (1795), Eberle (1831), Ramadge (1835), Andral (1839), Salter (1860), Steavenson (1879).

Sir John Floyer (1698) said: "As my asthma was not hereditary from my ancestors, so, I thank God, neither of my two sons are inclined to it, who are now past the age in which it seized me."
Geddings (1883) said: "That this tendency is hereditary in nature is conceded by every prominent writer on asthma."

Drinkwater in (1909) recorded a convincing pedigree which in later years was followed by several others, some of them even more extensive, but the issue is unsettled as to whether the mode of inheritance is as a dominant or recessive Mendelian factor. Bray's statistics (Bray's allergy p. 82) led him to the view that "the conditions of true chromosomal inheritance are not fulfilled in allergic conditions."

That active sensitisation is brought about by the direct influence of the sensitising agent (as overindulgence by mother in certain proteins) transmitted through the placenta of the mother to the cells of the foetus was shown by Ratner in 1929.

Passive sensitisation has been shown possible, but rare, (Cooke and Vander Veer, 1916) This occurs by passive transfer of antibodies from a sensitised mother, the child always receiving the mother's specific type of sensitisation.

Bray has made interesting statistical studies on sex incidence which shows that from birth to puberty males are twice as subject as females, but that thereafter the ratio is less than one to one. He infers that puberty is a milestone, that it exerts some beneficial effect upon symptoms in the male and some deleterious effect on the female.

4. Views of psycho-pathologists and psychologists:

Psychologists have claimed as exciting causes many psychological factors; among them:

a. The association of kindred feelings and moods (Berkart (1915)).

b. A sexual neurosis.

c. Purposive achievement: Gillespie (1936);

d. Imitation.

e. Over-protection: Rogerson, Hardcastle and Duguid (1935) - Studies at Guy's Hospital Clinic.

f. Claustrophobia: Strauss (1935);

g. Vasomotor irritability: Francis (1929).
h. Expectation: Hurst (1929);

i. Conditioned reflex: Place or object thought to induce attack in persons already allergic without presence of specific allergen (Bray, Hurst);

j. "No doubt under the influence of emotional excitement a quantity of allergen formerly below the threshold is increased in stimulant value and becomes effective." (Bray: Allergy, p. 102).

k. Diehl and Heinichen (1931) found that the swelling from intracutaneous injection of a specific allergen into a person under hypnosis would be either increased or diminished by 60 to 81% by suggestion that it would cause more or less burning and itching.

l. Hansen (1929) showed that hypnotism often can cure a fully developed paroxysm or prevent attacks for a longer or shorter period. He instructed patients to inhale the specific allergen while under hypnosis and then endeavoured to protect from a resulting allergic reaction by posthypnotic suggestion.

m. "Mental and psychic states are capable of provoking allergic responses, but only in those persons who are already allergic." (Bray: Allergy p. 10)

5. Endocrine Factor:—

The operation of adrenaline, observed long before to have an almost specific effect in breaking the climax of an asthmatic paroxysm, was explained by growth of physiological knowledge. An adequate supply of adrenaline secreted by the adrenal gland, was proven necessary for activity of the sympathetic nervous system which acts antagonistically to the parasympathetic to produce bronchial dilatation; when the requisite supply of adrenaline is not forthcoming, the parasympathetic nervous system gains the upper hand and causes broncho-constriction. Disfunction of the adrenal gland has thus assumed great importance in the etiology of asthma.

The suggestion that other endocrine disfunctions are causal (as of the thyroid gland etc.) are still controversial.

6. Nasal Factor:—

Herck (in 1844) was the first to recognise the importance of the nasal factor in asthma; Voltolini (1872) reported eleven cases cured by removal of nasal polypi; Frankel (1874)
The Nerve Paths concerned in the Naso-Pulmonary Reflex - (George W. Gray)
demonstrated that asthma may be associated with any chronic nasal catarrh as well as with polypi; Sandemann (1890) showed that broncho-spasm can result from nasal stimulation; Adam (1901) advanced the theory that asthma is caused by autogenous toxins from infection and nasal irritation; Brodie and Dixon (1903) showed that if certain parts of the nasal mucosa are stimulated a bronchial spasm results; Matthews (1913) in a study of 300 asthmatics found that 90.6% had a principal etiologic lesion in the upper respiratory tract.

A movement started during the last century which favoured surgical interference such as removal of nasal polypi, turbinates, obstructions, hemisection of inferior ethmoidal nerves etc. Recent statistical studies showing the small percentage of favourable results (1 in 7) has caused the pendulum to swing against such drastic remedies except as a last resort. Here the impact of allergy has been felt. Since allergical asthma arises principally through humoral mechanisms, and only nervous asthma via nerves (as by nasal reflex) we have the dictum of present day authority: "In no case where protein sensitisation can be demonstrated should dependence be placed on nasal surgery."

Bray, 1937. 141

7. Asthma and Associated Diseases :-

Fishberg (1932), Pinner (1927), Krause (1928), Malone (1931), by special clinical and statistical studies have proven absolutely false the once popular assumption that tuberculosis and asthma are associated. By similar studies, French investigators have as conclusively shown that syphilis plays no etiologic role in cases of asthma.

8. Blood Changes :-

To the French investigators is due credit for most of what is known about the complex blood changes in allergic conditions. Widal and his colleagues consider as the most important of those experimentally demonstrated the following :-
a. Drop in arterial pressure and reduction in white cells. Coincident features described by them include:

b. Change in colour of blood, inversion of leucocytic formula, modifications in coagulability of blood, drop in refractive index of serum, presence in serums of dialysable albumens.

This condition of the blood they first called "haemoclasic crisis" and subsequently "colloido-clasic shock." 142

**Modifications of the pH:** "During reactions there is always a drop in the pH of the blood, the tension of carbonic acid rises considerably, whilst the amount of bicarbonate undergoes a rapid drop."

**Drop in Alkali Reserve:** "During attacks this drops from 60-65 to 56-44 volumes of carbon dioxide per cent." Bray - 1937

**Eosinophilia:** In 1889 Von Muller observed an increase in number of eosinophils in sputum of asthmatics; Fink in 1890 noted and described an eosinophilia in the course of the disease; Accord: Gabritochevsky (1891): Van Noorden in 1892 discovered that eosinophils increased more markedly during attacks than during intervals: Salecker in 1902 said that he noted less marked blood changes in acute than in chronic asthma; Moschcowitz (1910) observed the concurrence of anaphylaxis and eosinophilia; Staubli (1911) denied that eosinophilia was a phenomenon restricted to asthmatic fits but declared it was a constant and diagnostic sign of asthma; Hiss (1914) advanced the proposition that eosinophilic diathesis was the foundation of the allergic condition.

**Theories of Origin of Eosinophils:**

(a) "A distinct strain of eosinophil cell is formed in the bone-marrow and disseminated throughout the body by the blood stream". (Ehrlich 1908).

(b) "There is no distinct strain of eosinophil cells, the granules being phagocytosed and altered particles of red blood cells." (Weidenreich, 1905).

(c) "There are two types of eosinophil cells, those of the blood and those of the tissues." (Gutig, 1905)

Probably the correct theory according to experimental allergic studies. 144
Eosinophilia is often associated with processes involving hypersecretion of mucous and constructive operations, and in allergic conditions a "local eosinophilia" has been shown by the French school to be present at the site of reaction.

Eosinophilia has become a definite diagnostical test for asthma.

9. Biochemical Aspects :-

Ringer in 1864 observed a marked diminution of urea and chlorides in the urine of asthmatics immediately following the attack and inferred some profound metabolic disturbance. Jack (1901) advanced the suggestion that asthma was but a symptom of abnormal biochemical or pathological processes beginning in the intestinal canal. Murdoch (1901) observed cases of asthma due to absence of hydrochloric acid in the stomach.

Today, extensive research is in progress on the acid-base equilibrium of blood, the blood chlorides, blood cholesterol, blood sugar, amino-acid content of blood, uric acid content of blood and blood calcium values. In biochemistry of the urine, the 'ether reaction' or 'proteose' of Oriel (1929-1933) heretofore noted, has excited tremendous discussion and controversy.

Acid therapy in its several forms has been brought in following the experimental demonstration that acidity represses and alkalinity augments asthmatic attacks. This aids the well marked deficiency of acid secretion demonstrated by Bray in 1936-7 to occur during the asthmatic attack.

10. Etiology of Asthma :-

See illustrative diagram summing up causative factors of asthma proposed in the past and now considered a part of the verified etiology of the disease.

10. Pathology :-

Often no definite post-mortem findings can be made. Only 189 post-mortem examinations had been made by 1936. The
Diagrammatic Representation of the Etiological Factors concerned in the production of Asthma (George W. Gray)
consensus of opinion is that a great need exists for further
careful work to establish the characteristic pathology, if any.

Local pathological changes noted in the past include :-

(a) Thickening and Hyalinisation of Basement Membrane:
    First noted by Monckelberg (1909);
(b) "Hypertrophy of Bronchial Musculature": Salter first ob-
    served it pathologically (1860), but the first to observe
    it histologically was Monckeberg (1909).
(c) "Eosinophilia of the Tissues;"
(d) "Sacculation of the Epithelial Layer of the Bronchi;"
(e) "Bronchial Stenosis;"
(f) "Hypertrophy and Metaplasia of the Epithelium". 145

11. Treatment:-

(a) X-rays: These have come to be used diagnostically to-
    gether with screening, to detect foreign bodies in the
    respiratory tract, tubercular affections, and gross
    lung damage.
(b) Adrenaline chloride injections, even in rapid succession
    (every 30 or 60 seconds) in acute attacks or "status asth-
    maticus" have come to be the first measure since eventu-
    ually it always brings relief. It has been found that
    adrenaline is the most effective drug in all types of at-
    tacks, and has practically no contra-indications. The
    historical development has been from injection by
    physician to training the patient to inject himself at
    onset of attack.
(c) Other drugs: morphine is used very sparingly to relieve
    patient's mind and body from breathing strain. (Mor-
    phine has no effect on lumen of bronchi); atropine stim-
    ulates respiratory centre, diminishes bronchial secretion
    and paralyses parasympathetic nervous system which is
    causing contractions of bronchial muscles; caffeine
    stimulates cerebrum, relieves fatigue, stimulates re-
    spiration; ephedrine is effective in mild cases only.

History of Ephedrine:-

Ephedrine, the alkaloidal active principle from the
Chinese herb Ma Huang (Ephedra Vulgaris) came to the Occident
from the Orient. Chinese physicians had used it for 5,000
years in treatment of venereal diseases and respiratory disorders
when modern science undertook its chemical study. Yamanashi in
1885 isolated the active principle. Shortly afterwards he died
and the investigation was continued by Nagai and Hori (1887) who
succeeded in obtaining the alkaloid in pure form. This they named "ephedrine". The first to synthesize it was Formeau in 1904. Amatau and Kubota in 1917 demonstrated its sympathomimetic effects and adrenaline-like action. Thereafter it was marketed as "asthmatal."

The advantages of ephedrine are its administration by mouth, slow destruction in tissues and hence prolonged effects, its use as a preventive, the fact that a tolerance for it is not so easily developed as for adrenaline; and its availability for those who cannot take adrenaline.

Its disadvantages are slow onset of action, larger dose needed, disagreeable effects such as side-actions, and frequent lack of benefit to take.

(d) Starvation, acid diet etc. etc.

In an essay of the present type it is hardly feasible to trace the history of all palliative and preventive remedies. It must suffice to say that in addition to what has already been mentioned, a great variety of treatments by physical means has been introduced including: electrical stimulation, diathermy, CO₂ and gas inhalation, actino-therapy, practiced breathing, various types of artificial respirators, enclosed chambers, filter and purifier machines for hay fever and allergic asthma etc. Many, like other treatments, bring an occasional cure, but generally only palliative or preventive relief.

12. Modern Analysis of Asthma :

The modern analyses are themselves accumulated historical experience tested by science and augmented by recent findings and hence are illuminating.

(1) Causes of asthma : see diagram, p. 81a.

(2) Walzer's Generic Classification of Asthma (1931); (Asthma and Hay Fever in Theory and Practice p. 239: Coca, Walzer and Thomson.) "Asthmatic Breathing (Asthma.)"

A. Bronchial asthma - Allergic (Hereditary) asthma. Synonyms. "Typical," "True," "Spasmodic" Asthma, or "Asthma" as the term is employed in its most usual sense.
1. Immunologic. Mediated by some mechanism of hypersensitiveness. (antibody, reagin). May manifest cutaneous hypersensitiveness or may lack positive skin reactions (as in drug activity). Induced by (a) inhalants; (b) ingestants; (c) injectants; (d) contactants.

2. Non-immunologic. Not mediated by any known mechanism of hypersensitiveness (antibody), reagin. Usually caused by respiratory infection, but also occasionally by organic pathology, physical and chemical agents, endocrine, dyscrasias, psychic and nervous disturbances; etc.

B. Non-allergic (Non-hereditary) asthma. Synonyms: "Atypical" or "False" asthma, "Asthmatoïd" or "Asthmatic bronchitis."

1. Non-immunologic. Caused by infection of the respiratory tract or by organic pathology of the heart, lungs, kidneys, thymus, bronchial glands, etc., by foreign bodies in the lungs, tumours and aneurysms in the neck or chest etc.

2. (Immunologic? Ascariasis asthma in laboratory workers?)

3. Types of Asthma according to Bray (1932) (Bray: Recent Advances in Allergy 3rd ed. p. 196.

A. Types of Asthma in Childhood.

1. Acute Bronchitic Type of Infancy.

a. Often obscure because associated with so much catarrh; bronchitis of smaller tubes coming on with great suddenness.

2. The Hereditary Type.

a. Occurs usually in blonde children, mostly boys; ordinarily before third year; intimately related to eczema; skin tests easy to obtain.

3. Eczema-Prurigo-Asthma Syndrome.

a. A variant of 2.; begins in early childhood with intense recurrent nocturnal itching.

4. The Lung Damage Type.

a. Takes form of bronchitis with super-added spasm, uncommon before age of five years.


a. True hay fever; of seasonal occurrence (summer and autumn); due to pollens, odours and emanations; uncommon before four years of age.

3. Types of Asthma in Adults:—
1. Cases with clear-cut Paroxysms and Definite Free Intervals:
   (a) Occasional attacks type: attack follows contact with occasional sensitiser: food, pollen, epidermal or bacterium.
   (b) Frequent attacks type: Usually due to continued operation of some specific allergen.

2. Cases with Constant Symptoms and no Definite Free Interval:
   (a) Cases without chronic pulmonary inflammation;
   (b) Cases with pulmonary inflammation and distension.


   "1. During Attacks: simple, due to the many characteristic signs:
   a. Time of onset - commonly in early hours or morning;
   b. Forward lean of patient, with bracing of shoulders;
   c. Distension of neck veins, and standing out of neck muscles during deliberate efforts to inspire;
   d. Hyper-resonant sound upon percussion of chest;
   e. Prolonged difficult expiration upon auscultation;
   f. Wheezing, sibilant and sonorous rhonchi; and later secretory changes.

2. In the Free Interval: comparatively difficult. Main points:
   a. Type of the attack, and the frequent nocturnal and week-end periodicity;
   b. The early stage of onset;
   c. A family history of allergic manifestations in immediate relatives;
   d. A previous history of eczema or prurigo in infancy, or nettle-rash, food-upsets, recurrent attacks of 'bronchitis' or 'pneumonia';
   e. The relationship of some exanthem or infection to the onset of symptoms;
   f. The frequent association of itching skin affections, food-upsets, sick headaches, sneezing attacks, stiffness in the head, hard, dry unproductive cough, and 'wet noses' with the allergic state;
   g. An eosinophilia both in the blood and at the site of the reaction;
   h. The characteristic sputum of asthmatic adults with Curschmann's spirals and eosinophils; sputum is rarely obtained in children.
   i. Protein skin reactions can generally be obtained, especially in early life;"
j. A hypochlorhydria on fractional gastric analysis occurs in the majority of allergic children and to a lesser degree in adults, especially in the hereditary type.

k. The therapeutic test, the response to the administration of adrenaline and ephedrine, often furnishes a most valuable clue.

Differential Diagnosis: "The chief difficulties are met in differentiating asthma from the dyspnoea of cardiac or renal disease, the recurrent bronchitis of children, and the severe bronchitis of old age. But in none of these other pathological conditions does the dyspnoea have the same prolonged, difficult, expiratory, wheezing character that is so characteristic of asthma."

(5) Classification of Conditions which may cause Dyspnoea, and which may be mistaken for Asthma (Maytum, 1930).


A. Larynx.

1. Laryngeal spasm.
   (a) Spasmodic croup.
   (b) Laryngismus stridulus.
   (c) Laryngeal erisis of tabes dorsalis.

2. Inflammation.
   (a) Acute: Acute laryngitis. Diphtheritic laryngitis.
   (b) Chronic: Tuberculosis. Syphilis.

3. Angioneurotic oedema.

4. Paralysis of the vocal cords.

5. Laryngeal stenosis.

6. Foreign body.


B. Trachea and bronchi.

1. Intrinsic lesions.
   (a) Acute and chronic bronchitis.
   (b) Chronic inflammation with stenosis; bronchiectasis, tuberculosis, syphilis; foreign body.
   (c) Neoplasm; benign, malignant.

2. Extrinsic lesions.
   (a) Substernal enlargement or carcinoma of the thyroid gland.
   (b) Enlargement of the thymus gland.
   (c) Aneurysm of thoracic aorta.
   (d) Tuberculous tracheobronchial nodes.
   (e) Mediastinal neoplasm: benign, malignant.
C. Lung:

1. Inflammation.
   (a) Pneumonia.
   (b) Tuberculosis.
   (c) Pneumoconiosis and pulmonary fibrosis.

2. Idiopathic pulmonary emphysema.


4. External pressure.
   (a) Pneumothorax.
   (b) Hydrothorax.

II. Circulatory System:

A. Cardiac decompensation.
B. Coronary sclerosis.
C. Paroxysmal auricular flutter or fibrillation:
   paroxysmal Tachycardia.

III. Renal System (dyspnoea due to myocardial degeneration).

IV. Nervous System.

A. Functional air hunger.
B. Hysterical polypnoea.
C. Respiratory syndrome following encephalitis.


"Multitudinous forms of therapy have been advised to relieve or cure the asthmatic sufferer, but very few survive the test of time. The more important and practical are:

I. Avoidance or removal of the specific cause.
   (a) Active removal.
   (b) Passive avoidance.

II. Desensitisation:--

A. Specific or homologous.
   (a) Ingestion of gradually increasing doses.
   (b) Repeated cutaneous reactions.
   (c) Subcutaneous injections.
   (d) Denaturisation.

B. Non-specific or heterologous.
   (a) Peptone.
   (b) Tuberculin.
   (c) Milk.
   (d) Auto-haemo-therapy, auto-sero-Therapy.
   (e) Vaccines.
   (f) "Proteose."
   (g) Liver extract.
   (h) Histamine.
   (i) Sanocrysin.
III. Avoidance or removal of contributory factors.

(a) General hygiene.
(b) Diet.
(c) Reflex irritation.
(d) Endocrine dysfunction.
(e) Psychopathic states.

IV. Symptomatic treatment.

(a) Drugs.
(b) Surgery.

V. Physical Therapy.

(a) Electro-therapy.
(b) Actino-therapy.
(c) X-Ray Therapy.
(d) Pyrogenic Therapy.

VI. Remedial exercises.

The search continues as science multiplies its findings and new theories are spun. In the mean time a host of beneficial treatments has accumulated, from one of which almost every sufferer can secure some degree of relief. Though no cure has been found, hope springs eternal.
THE ASTHMA RESEARCH COUNCIL.

In October, 1927, the Earl of Limerick and Captain F.L.M. Boothby, C.B.E., R.N., both asthma sufferers, wrote to the press in the form of a plea to physicians and the British public in general, for an organized asthma research. The response was immediate, and in the same month in the Royal United Services Institution the Asthma Research Council was formally constituted under the leadership of the committee, which consisted of Doctors Hurst and McDowell and Surgeon Rear-Admiral Jeans, who launched the Council upon its program of research and its appeal for funds.

On March 24, 1928 an appeal issued by the Asthma Research Council stated that a Medical committee, comprised of doctors with special knowledge of asthma symptoms had been found.

This committee recommended:--

1. Clinics for investigation to be established at London's three leading hospitals.
2. That research into the phenomena of sensitisation and into the nature of the asthma attack from the physiological standpoint be made.
3. That research and travelling studentships be endowed.
4. That a microscopic study of atmospheric conditions be instituted.
5. That a careful investigation of the family history of asthmatics be made.
6. Available data, at home and abroad, concerning the complaint be collected and pooled.

An appeal was therefore made for £50,000 to be expended during the next five years in seeking the cause and cure of asthma, bronchitis, hay fever and all kindred complaints."

The appeal was signed by Lord Limerick, (president) Lord Greenway (vice-president) Mr Louis Campbell-Johnson, Mr Kelman Forrest, the Rev R.H.L. Sheppard, Mr E.R. Pickmere, (hon.treasurer) and Captain F.L.M. Boothby (hon. secretary.)

On January 11, 1929 the following letter was sent to the press by Sir Humphrey Rolleston, Lord Dawson of Penn, Dr A.F.Hurst and Lieutenant Colonel F.E. Freemantle, M.P.
"In view of statements which appeared in the press to the effect that there has been found a "certain cure" for asthma we desire to place on record that there is no such "cure" known to medical science and that there is not any one form of treatment which is effective in all forms of asthma."

They called for the moral and financial support of all well-to-do asthma sufferers for the Asthma Research Council.

In spite of a great need for funds, and the interference of 'quacks', the Council was inaugurated in January, 1929, by the Lord Mayor of London at Mansion House. A tremendous audience listened to the speeches and pleas that were made. The Lord Mayor read a letter from the Minister of Health to Dr A.F. Hurst, Chairman of the Advisory Committee: "Sir George Newman has told me of the research which is being done by the Asthma Research Council - - - Such investigation, in my opinion, is urgently needed."

It was announced at the meeting that the Medical Research Council had made a grant in aid of the work, and that the Halley-Stewart Trust made a grant of £2,500 for the establishment of asthma research clinics at Guy's Hospital and Great Ormond St. Hospital for Sick Children. Dr A.F. Hurst named the three centres for research:-

1. Guy's Hospital;
2. Great Ormond St. Hospital for Sick Children.
3. Great Ormond St. Hospital.

But he declared the need for other similar research clinics, and moved that the meeting be in favour of establishing centres for the scientific investigation into causes and treatment of asthma and allied diseases, commend the work of the Asthma Research Council and pledge itself to assist the work in every way. Over £700 was collected.

Among those present were: City sheriffs, Sir Albert and Lady Stein, Mr Halley-Stewart, Dr Stewart, Mr Campbell Johnston, Dr Freeman, Dr Barber, Dr Nabarra, Dr Cockayne, Surgeon Rear-Admiral Jeans, Dr Gillespie, Dr James Adam and Colonel Dalzell Hunter.
Following this excellently supported initial step of the council, even more encouragement came to the group when in this same year, 1929, the British Medical Association met in Manchester for a special Asthma session, and The Practitioner published an Asthma number in July.

With Lord Dufferin and Ava as president and Lord Greenway as chairman of the research committee, the Council reported in the spring of 1929 that at Guy's Hospital a team consisting of clinician, biochemist, bacteriologist, immunologist, rhinologist, psychologist and radiologist was working. They declared that a number of patients had been submitted for exhaustive examination and that 'certain elements in the blood' were found to be deficient. At Great Ormond-st Hospital for children, they reported that asthma was being studied under the direction of Dr G.W. Bray, with cyclic vomiting, epilepsy, migraine and skin disease. At the London Clinic, Ranelagh Road, S.W., physical methods of treatment including medicated inhalations, ultra-violet radiation, diathermy, and breathing exercises were being investigated by a physician familiar with asthma spas.

In July 1929 an asthma clinic was established at the General Infirmary, Leeds, with Dr H.H. Moll carrying out the research. In Birmingham work was started under Professor Wynn. In September, 1929, the council appointed Dr Marjorie Gillespie for asthma research at Stobhill Hospital, Glasgow.

Of great assistance to the council were the works of Dr John Freeman who has been doing asthma research since about 1905 at St Mary's Hospital and the interesting work of the Edinburgh Asthma Inquiry Committee over a period of years.

In 1936, Guy's Hospital reported that 610 cases had been through the asthma research clinic and as a result of the work done on these cases, protein desensitisation and the use of vaccines were the two methods upon which most of the future energy in investigation should be expended. At Guy's, Dr C.H. Rogerson worked on the psychological aspect in regards to asthma in children, and Dr E.B. Strauss in adults.
At the beginning of 1937 the reports of the Council were not encouraging. It came to the conclusion that there was no existing method of treatment that could come anywhere near to cure. Future inquiry will be rather to study individual cases than along lines of large scale method investigation. Therefore, it was necessary to reduce the number of patients at St. Mary's. Antibacterial, psychological and desensitising methods have been employed. Works at this clinic indicated that when specific protein sensitisation cannot be demonstrated, focal sepsis must be looked for and eradicated. From the beginning of March to the end of July a special hay fever clinic is held at St. Mary's.

In continuing the work of the council at King's College Hospital, the value of remedial breathing is being examined and the importance of increasing reserve air rather than vital capacity of the chest is being emphasized. At the Leeds General Infirmary large doses of potassium chloride have been found to help some patients, especially young ones. Quantitative methods of desensitisation are used with good results: that is, if a patient shows triple positive reaction to feathers, and double positive reaction to house dust, a mixed protein vaccine containing three parts dilution of feathers and two parts dilution of house dust is used.

At King's College attention has been focussed on the mechanism of the action of adrenaline on the body.

Sir Leonard Hill at St. John's clinic has found that many asthmatics are made uncomfortable by dull red and dark sources of heat and pleads for adequate ventilation to prevent this and also to sweep away 'droplet' infection.

At Charterhouse Clinic, Dr. Gilbert Scott has been treating asthma cases with widefield radiation over the whole abdomen and back, but excluding thorax, using small doses of X-ray.

"This report shows that if the results of this asthma research have not been as fruitful as might have been wished, there has been no lack of effort on the part of the workers."
The Asthma Research Council recognises and is studying the physical work which is being done at various Continental spas. The Bad Reichenhall, Bad Ems and Mont Dore are long famed for their healing waters. Vienna and the Lerchenfeld Institute at Hamburg are important European centres of asthma research. In Berlin, Fraulein von Rucktexhell of Bad Reichenhall is accomplishing amazing results with certain chest exercises.

Organised research has not been confined to Great Britain. It is proceeding on a large scale in the United States, where a National Association for the Study of Asthma has been formed, whose organ is the important magazine Allergy, a periodical devoted exclusively to these kindred problems. Foundations and trusts subsidize additional research, and many large hospitals are co-operating. The laboratory research is truly international as current articles show, these coming from Germany, France, Italy, Japan, and China as well as many other countries. Another journal devoted entirely to allergy has appeared in Italy, entitled "I Quaderni dell' Allergia", published once each two months since January, 1935, in Milan. The first International Congress on Asthma was held at Mont Dore in June, 1932. (For "Proceedings of the First International Congress on Asthma, Mont Dore, 1932", one may write Mason et Cie, Paris.)

That the world is intent on solving the asthma problem, if humanly possible, is clear.
CHAPTER X.

THE PHYSIOLOGICAL PERISCOPE.

As one becomes acquainted with the history of asthma, he becomes simultaneously aware of the deluge of ideas. Through the 'sea' of speculation it is possible that only by raising the physiological periscope can we hope to sight land away on the horizon.

Without pretending to exhaustiveness, what can we say as to the viewpoint of modern physiology? Here, more than in any other quarter, there is a keen awareness of the gaps in the scientific proof of any complete rationale or mechanism of asthma.

Dr I. de Burgh Daly, Professor of Physiology at the University of Edinburgh, has added to his notable work on the coronary circulation, very extensive experiments on asthma. That a man so steeped in the experimental critique has a cautious, sceptical attitude toward the problems involved tells a great deal.

The writer has profited from informal conversations with Dr Daly and in addition from the address delivered by him at the University of Edinburgh in January, 1938 on "The Innervation of the Lungs with Special Reference to Dyspnoea." Without advancing any fixed hypotheses on these occasions, Dr Daly presented physiological possibilities calculated to convince one that the mechanisms of asthma, when finally revealed, may involve revolutionary concepts or dynamic principles. What follows immediately after, is an attempt to pass on to the reader the stimulation of some of these thoughts, without in any way committing Dr Daly to the accuracy of this version, nor to the espousal of any new points suggested.

Dr Daly points out that no one can say it has yet been shown by experimental evidence what the exact mechanism of asthma is. The exact part of vagus nerve fibres in all possible aspects has not been elucidated. The great hope of future progress lies in accumulating evidence from trustworthy animal experiments. One
handicap so far has been the fact that experimental ani-
ments haven't proven susceptible to asthma as a disease. The
"simulated" or "experimental asthma" induced in dogs and other
animals by drugs, is not true asthma for the respiratory difficul-
ties are not operating in the presence of the abnormal patholo-
gical or physiological conditions which mark the true asthmatic.
Yet Dr Daly does not despair of the possibility of finding a way to
induce true asthma in experimental animals. When and if this can
be accomplished, a great impetus to the experimental study of asth-
ma will result.

Great emphasis must be laid on the fact that in asthmatic
we are dealing with a morbid physiology which may react unexpect-
edly and differently to the same stimulus. For instance, why does
excitement and sudden emotion banish the asthma paroxysm in one
person and bring it on in another? Perhaps the adrenaline dis-
charged may operate differently on the two systems. It is even
conceivable that the normal functioning of a set of nerves may be
entirely reversed or modified for temporary interludes in the
asthmatic.

Dr Daly shows that at least three types of dyspnoea must
be differentiated.

(1) Those which mediate through or have some effect on
the respiratory centre in the floor of the 4th
ventricle of the brain: (CO₂ falling in blood.);

(2) Broncho-spasm resulting from nervous reflex :

(3) Local origin types resulting from irritants brought
directly against lung tissue.

Though it was previously thought that the vague nerve
contained only vaso-constriction fibres, animal experiments now
show us that it contains vaso-dilator fibres as well.

Likewise, the previous assumption that the sympathetic
nerves contain only vaso-dilator fibres must yield to new experi-
mental findings that the sympathetic contains also vaso-constrictor
fibres. (See chart of nervous innervation).

One who has the asthmatic diathesis, can receive sensory
stimulation (nose, hearing etc.) of almost any kind setting up
The Innervation of the Lungs with special reference to Dyspnoea

Sensory Nerve coming from Nasal Mucosa to Bronch Motor Centre

Motor and sensory fibres in the Vagi

Sympathetic Motor Fibres

C = Broncho-Constrictor
d = Broncho-dilator fibres
vc, vaso-constrictor
vd, vaso-dilator

(After I. de B. Daly - Edinburgh)
do not gibe with ordinary physiological observations on normal persons. We cannot expect those with abnormal physiological constitutions to respond as the normal, "average reasonable man" would. Thus there is an invitation for study of the morbid physiology of those persons who have the asthma diathesis.

b. The Writer's Hypothesis:

The writer has not been able to make an historical analysis without indulging a speculation or two of his own. He therefore proffers these theories:

1. Asthmatic conditions fall into only two great classes, those of direct nervous origin and those of humoral origin.

2. Asthmatic attacks which arise from one of these primary causes may operate secondarily through the other in causing primary and/or collateral effects.

Thus where the exciting cause is first of all nervous, the nervous impulses may have not only an immediate effect by direct action, but a protracted effect by changing the sensitivity of the mucosa, and musculature etc. to excitants borne in the blood stream or tissue fluids.

Again, the incidence of irritants against the bronchial mucosa, musculature and tissues may have not only an immediate effect by causing broncho-spasm myogenically, but by irritation of nerve endings may accentuate or prolong the spasm, and also affect or modify the action of the respiratory centre.

3. Of these primary mechanisms, the humoral mechanism is most fundamental and accounts for the great majority of asthmatic attacks and the pathways of the nervous organisation are simply secondary links in the chain of causation whereby the paroxysm is prolonged.

4. Thus in a great class of cases the actuation of the asthmatic attack must be a blood borne irritant.

5. In another great class of cases, and in perhaps all, the smooth continuance of the gaseous interchange at the lungs is directly related to the problem.

(1) Carbonic acid is carried in the blood to the lungs where it must be converted into CO$_2$ and H$_2$O in order that the CO$_2$ may be given off and O$_2$ received. The reaction $H_2CO_3 \rightarrow CO_2 + H_2O$ proceeds very slowly, not being ionic in character, in fact too slowly for efficiency. Therefore the reaction is catalysed and speeded many fold by carbonic
anhydrase enzyme (discovered three years ago).

2. The intrinsic mechanism controlling the smooth functioning of the lungs is possibly in part the CO₂ given off at the lungs; failure of it through disfunction or deficiency of the enzyme production causes local disfunction and broncho-spasm. The respiratory centre is unaffected and hence inspiration proceeds with ease but expiration is difficult, prolonged and wheezy.

Broncho-spasm, mucus congestion, and congestion of blood occurring separately or together contribute to the respiratory difficulty.

3. The disfunction of the carbonic anhydrase enzyme results in very little CO₂ being given off at the lungs with the above immediate effects; the later consequence is carriage of CO₂ to the tissues producing an acid condition both in blood and tissues. At first this is met by a fall in the bicarbonate and alkali reserve but eventually the acidity builds up to a point such that the exciting effect on respiratory mechanisms overcomes the locally induced inhibitions. At this stage the paroxysm passes off and the asthma attack is thus 'self-curate.'

4. Since human beings are subject to asthma and animals as a class are not, there is ground for believing that man has some intrinsic respiratory mechanism which animals do not and that all types of asthma eventually mediate through disfunction of this mechanism. If this be true, and the mechanism is discoverable and disfunction subject to correction, the diverse etiology of asthma will become relatively unimportant.

5. Any hypothesis of asthma must account not only for the onset but the sudden disappearance of the paroxysm as though the mechanism involves self-righting properties.

6. Experimental studies desirable:
   (a) Further studies upon the effects of perfusing fluids which are alkaline, or acid; also of perfusing fluids containing various irritants. These should be performed both with nerve supply intact and nerve supply destroyed.
   (b) Studies of carbonic anhydrase enzyme from the standpoint of the presence and estimation in:
       1. Normal persons.
       2. Asthmatic persons, during free periods and during periods of attack.
   (c) Experimental application by injection or otherwise of carbonic anhydrase enzyme to asthmatics during paroxysms.
   (d) Repetition of "nerve section" etc. experiments in conjunction with humoral irritants to study prolonging and modifying actions upon the respiratory centre and mechanisms on the one hand and upon broncho-spasm on the other.
(e) Extensive spirometer studies of volume and composition of expired air in asthmatics during quiescent periods and during attacks.

The writer has not seen an analysis on "all fours" with the foregoing, nor any suggestion that carbonic anhydrase enzyme dysfunction may be a connected mechanism. Experimentation alone can prove or disprove these hypotheses.
Dr Hyde Salter, the great asthma authority of the last century relates some interesting cases.

"Fatigue and physical exhaustion and sudden or violent mental emotion, will bring on an attack. I was informed some short time since, by my friend, Dr Theophilus Thompson, of a case in which on two occasions severe asthma was brought on in a gentleman by sudden fear, from his having as he imagined administered an overdose of belladonna to his wife. I knew the case of an asthmatic boy, some years ago, who used constantly to be warned by his parents not to over-excite himself as if he did he would be sure to have asthma the next day. I was told of another case of a little asthmatic boy who found his disease a convenient immunity from correction: "Don't scold me," he would say if he had incurred his father's displeasure, "or I shall have the asthma;" and so he would. His fears were as correct as they were convenient.

p. 27. A gentleman, a confirmed asthmatic, was suffering an unusually bad attack of his complaint so bad that he was unable to move from his chair, or speak even, except in catchymonosyllables. He had been suffering all day, and in the evening his sister was going to give him an emetic of ipecacuanha, when she suddenly fell down in an hysterical fit to the occurrence of which she was subject. The suddenness of her attack and the severity of her sufferings so alarmed him that he sprang from his chair and ran to her relief, and as soon as had placed her in a position of safety ran down two flights of stairs to procure the restoratives that were usually administered; having run upstairs again with the same speed, and applied the remedies, he found to his surprise that his asthma was gone. (Probably due to secretion of adrenaline stimulated by sudden excitement.)

"A remarkable exception to this curative power of asthma excitement once came under my observation, in the case of a woman who suffered from a violent attack of asthma the whole of the time that she was in labour."

Alexander Francis, in his book "The Francis Treatment of Asthma", (cauterisation of asmogenic point or reflex focus in nose) declares:—

"When treating a case I am reminded of the trick of balancing a spoon on the edge of a knife. When you have it balanced, be content. A very slight movement of the knife one way or the other will upset the balance, and you will have to start the process again. So with balancing the vasomotor system. When this has been achieved, be content. Various things may upset the balance again, weeks, months or years later, when the balancing process has to be gone through once more. For this reason I have never claimed that I have cured a case of asthma."
Dr O. H. Brown (Brown, *On Asthma*) found that the practic-
ing physician rarely sees patients in acute seizures and thus
has inadequate opportunity to study the beginning, climax and
ending of attacks. To surmount the obstacle he employed an
asthmatic maid. In this patient and one hospital case he saw
over fifty paroxysms while in forth-five other asthmatic
patients during the same period he witnessed only five.

On the findings of Laennec that a patient had asthma
in the dark, Lebert advised the use of as many candles as pos-
sible in the rooms of asthmatics.

2. Asthma in literature:

Literary allusions to asthma are not super-
abundant, perhaps from benign sympathy for those afflicted,
possibly because the wheezing and panting forbids attachment of
romantic glamour to the malady.

Perhaps the reason peerless Homer used the word in the
Iliad was because it had not then so well defined a pathological
significance.

In Book XV. he says:

εἰδο- οδαγηαλέω ἵκετ' ἀθεματί, χῆδι ἀπίνουσών

This, Pope translated as follows:

"Not far, great Hector on the ground he spies
(His sad associates round with weeping eyes)
Ejecting blood, and panting yet for breath,
His senses wandered to the verge of death."

It seems that pulmonary disease, as such, is not men-
tioned in scripture. It is said of the widow's son at Zarephath
that his sickness was so sore that there was no breath left in
him. (I. Kings 17) Probably this simply indicates that he
died. 150

The medical knowledge of the biblical peoples was rudi-
mentary and crude. In Egypt there were medical schools in the
15th century B.C. (Papyrus Ebers, i, ciíi) but there are ho
traces of any system of medical education in Palestine in Bible times and allusions to physicians are few. While in Asa's time to seek the physician was to depart from God, Sirach, in later days regards him as God's servant, "for from the most high cometh healing." (382)

Until a late period, taboo against touching the dead, and the ceremonial uncleanness associated with such contact, kept the Jewish physicians in a state of ignorance regarding the interior of the human body.

Nevertheless, the Jews should have heard of asthma from the Greeks and the Romans. That they did is evidenced by "Some Medical Observations of Philo Judaeus" who lived during the time of Christ.

"In his essay on "Curses" he treats of those conditions which may affect the body, which are, from a moral standpoint, rewards of impiety and lawless iniquity. The disobedient are often, he says, attacked by bodily punishment.

In his description of these diseases he mentions "convulsions of the stomach, and obstructions in the passages of the lungs preventing the patient from breathing easily."

"There shall also come upon them asthmas and consumptions affecting the internal organs, producing heaviness and despondency, with great affliction."

Shakespeare made no use of the word asthma(152) and most of his allusions to difficulty in breathing were to distressed lovers sighing deeply or warriors mortally wounded. The character Constance in King John is suffering from a pulmonary complaint which might be either asthma or tuberculosis.

King John -- Act III. Scene IV. enter Constance -

King Philip: "Look, who comes here! a grave unto a soul; Holding the eternal spirit, against her will, In the vile prison of afflicted breath."

Asthma is entirely absent from the poetic vocabularies of the romanticists: Shelly, Keats, Wordsworth, Coleridge, etc. But in the refined advice of Lord Chesterfield it is not too mean a topic for timely suggestions.
Lord Chesterfield to his son.

Letter cc1iii, August 4, 1752.

"I am extremely concerned at the return of your old asthmatic complaint ------- It is very worth your while to submit to any course of medicine or diet; to any restraint or confinement in order to get rid of so troublesome and painful a distemper------- Notwithstanding this which is plain sense and reason; I much fear that as soon as ever you are got out of your present distress, you will take no preventive care, by a proper course of medicine and regimen; but like most people of your age, think it impossible that you should be ill again."

3. They, too, suffered.

Asthma is one of the most democratic of diseases, playing no favourites, harassing poor and rich alike; tyrannising both emperors and stable boys. If anything it has a predilection for the aristocrat and intellectual.

I have previously mentioned the fits of Seneca.

In the past, asthma has often been considered a paroxysmal neurosis in company with migraine, which is perhaps the disease of celebrated men, many of whom have been stimulated to write accounts of their malady, as for instance: Sir G. Airey, Sir John Herschel, Sir D. Brewster, Sir C. Wheatstone, W. H. Wollaston, and among medical men John Fothergill, Caleb Hillier Parry, Sir Samuel Wilks, E. Liveing, and Sir James McKenzie.

Oliver Wendell Holmes, famous American physician who contributed to the knowledge of puerperal fever but is dear to history as author of "The Autocrat of the Breakfast Table" and other literary productions, was a chronic asthmatic. His was the mild rather than the oppressive type. Having wheezed along to eighty, he remarked that for him it had proven one of those minor ailments which often protract a person's life by making him more solicitous of his health.

In the London Times for July 31, 1920, appeared two interesting news items concerning animal asthmas.

"A case has come to our notice of an officer in the Horse Guards who developed horse asthma and had to resign his
commission. Also, he had to give up hunting and avoid hunting-men until they had changed their clothes and washed after riding. The same patient when staying in a house where a case of diphtheria had occurred received from the local practitioner a dose of anti-diphtheria serum which, of course, is obtained from horses. As a result they sat up with him all night and were very relieved when he survived. He finds London much more comfortable nowadays because of the motors!"

"Another case has just been reported, that of a woman who was invited to a luncheon party. While there she developed terrible asthma in the middle of a meal. Suspicion fell on some sausages which by serological tests, were proved to contain horse meat!"

In 1815 there lived two men who thought they had nothing in common. One was the Emperor Napoleon, the other his inevitable Wellington. Actually they were linked together by a secret, peculiar fear. Neither could bear to be in the room with a cat. They had "cat horror" just as others in similar circumstances got bird asthma or horse asthma from breathing the emanations of those animals. Lord Roberts shared their sensitivity.

Some years later there lived in England a man whom many consider her most remarkable Prime Minister, Lord Beaconsfield or Disraeli. More than once he was compelled to cut short his remarks in important Parliamentary debates because of asthmatic seizures. He was too proud to admit his weakness to his opponents. Who can say how often or when the fate of the Empire hung on the whimsy of such an attack? As though in keeping with his noble and poetic nature, his sensitivity was to peacocks.

"The Houses of Parliament rose for the recess. Beaconsfield went to rest at Hughenden. He had great difficulty with his breathing and could no longer walk at all. To go to church he had to take Mary Anne's little pony-trap. The peacocks
annoyed him: he almost desired he said, to commit a kind of atrocity there and massacre the peacocks. Returning to London, he consulted Dr Kidd, a homoeopathic physician who had been strongly recommended to him. Kidd examined his old body, stripped as if for the examination of a recruit. He found in it asthma, bronchitis, and Bright's disease—fit for holding the rampant on the highway to India .......

(From "Disraeli" by Andre Maurois —— translated by Hamish Miles. p. 240)


This mandate, physicians have conscientiously endeavoured to fulfill in so far as asthma is concerned.

One is impressed by the number of medical asthmatics who entered upon inquiries into the subject and made notable contributions.

Among them we find: John Floyer, author of the first English treatise on Asthma (1698); John Arbuthnot (1733), originator of the character of John Bull; Hyde Salter (1860), author of Salter's Treatise on Asthma, the perennial classic; Trousseau (1866); Bree, who published the fourth edition of his widely known treatise on asthma in 1811; Kitzmiller; Gillette Hertz; Hall; La Fevre; Nooth.

Among those who suffered from hay fever were:
Bostock, Kirkland, Baron Herman von Helmholtz and Morrill Wyman.
IN CONCLUSION.

The history of asthma is an unfinished manuscript. It have already been inscribed imperishable names and more will be written as the future unfolds its mysteries. The search that began as a holiday outing for the new scientific method has become a long protracted quest, for what then appeared a reasonably simple problem is now shown to be profoundly complex and perhaps beyond our present knowledge and instruments to fathom.

As Professor Henry Moore of Dublin recently declared to the Royal Society of Medicine:

"During the past score years there has been a progressive increase of interest on the part of clinicians in the functional, as well as in the structural, aspects of disease, with the result that not only have pathology and physiology become enriched, but a better and more fundamental understanding of disease processes is being gradually, if slowly, obtained. In other words, we have come to think of disease in terms of physiology, that is, in terms of the living organism."

In retrospect, the history of asthma is seen to be undivorceable from the history of medicine and science. From an analytical standpoint one might consider it in a dual aspect, taking up first the efforts directly applied to asthma, and secondly, the collateral efforts, researches and discoveries independently made but impinging upon asthma traditions. In such category belong the important physiological work on respiration and its mechanisms, elucidation of the nervous system and like studies; and inventions as those of the stethoscope, the broncho-scope, the X-ray. Again, one could study asthma history from the three-sided view-point of symptomology, causation (etiology) and therapy, tracing the detailed history of the innumerable forms of treatment.

Over emphasis of the latter aspect is hardly warranted in a
paper such as this, particularly in view of the fact that no real cure has yet been found, and most remedies in most cases are palliative only.

We can see that the ancients had advanced far in symptomology and those aspects which lay within the range of direct observation. Their empirical therapy was often in agreement with the findings of modern science.

During the early middle ages, the promising medical tradition which was rapidly becoming experimental and laying aside philosophical and scholastic dogma, fell victim to ignorance, and the history of asthma is marked by a hiatus. We turn to the period only for entertainment afforded by quaint and superstitious ideas.

That man cannot forever escape his own curiosity is proven by the scientific renaissance whose great discoveries in respiration and in all fields, brought new materials to the hands of those studying asthma. More important, it restored the scientific tradition and ushered in the habit of differing in opinion, so marked a departure from the obsequious respect for authority which shortly before had chained human thought to the past.

Now began what we may justly call the era of rampant speculation, punctuated and given direction by isolated experiments and shrewd observations of the general practitioner. This era reached its height between 1800 and 1900. It was an age which made its contributions, but also one which made full use of the printing press. The literature of the subject multiplied enormously, particularly between 1850 and 1900. It varied as enormously in calibre. Every possible hypothesis was spun by one ingenious mind or another to account for every given phenomenon. But it must be said that important observations were being recorded which at the time seemed too contradictory and diverse to be true, yet later were verified and harmonised by new concepts such as allergy. To this period we must give credit for much important work in physiology particularly on
vagus nerve mechanisms, for the modern formulation of most of the mechanical theories of causation. The period gave evidence of that brilliant quality occasionally found in man, and approaching the psychic, to foresee truths lying in the future. Often hypotheses were advanced whose truth was momentarily beyond scientific demonstration, yet later proved true in detail. For instance in 1868, Brüer expressed the view, then considered rather fantastic, that "there is an automatic control of breathing through the vagi and that the stretching of the alveolar walls stimulate expiration and hinders inspiration". (Wren-Sitzungsberichte, 1868, lviii., p. 909)

Such hypotheses of themselves do not suffice, but they serve the purpose of science in giving direction to experiments. By planned experiments testing out all available hypotheses we have learned to find indisputable facts.

The period to which I have just alluded was characterised by wasteful lack of co-operation between science and medicine. Oftentimes views seemed influenced by desire for personal prestige.

Next came the period in which we find ourselves today, an era of strict co-operation between science and medicine. Laboratory research replaced empiricism more and more as the asthma problem was pushed back to more obscure causes and considerations. Allergy, a clinical discovery, commandeered attention and placed heavy emphasis on biochemistry. In cases of allergic asthma, the inoculation of sufferers with the protein to which they were sensitive, proved a complete protective in a certain percentage of cases, gave partial relief or resulted in failures in others. But of signal importance, was the finding in the "skin scratch tests" of a means for identifying in about 2/3rds of cases the exciting allergic cause. This knowledge alone often enables the sufferer to avoid the cause and thus effectually avoid all attacks. In addition, the present period has contributed experimental proofs of the humeral theory as the cause of some
types of asthma, studied the blood and its functions as never before, elucidated more fully the physiology of respiration and gained better understanding of the nervous system and its components. Thus we find a continuing series of experimental studies by physiologists on the actions of the sympathetic and para-sympathetic systems and their responses to various drugs.

There has become manifest among leading thinkers a tendency to believe that all three major theories of respiration hindrance may at times have a greater or lesser influence, often by simultaneous action, in causing the bronchial obstruction in asthma. The very diverse etiology of asthma has been absolutely proven. The distinctive pathology of asthma is being studied with thoroughgoing care for the first time. The broad etiology and frequent absence of pathological changes incline some toward the view that asthma is not a disease but a symptom. It has influenced others to suggest that the potential cause of asthma lies in an interference with intrinsic mechanisms of respiration. The broncho-spasm theory has been more strongly entrenched by physiological experiments. It has been found, moreover, that the broncho-spasm may be nervous in origin or humoral, with the implication that the spasms can be excited myogenically by mere contact of irritants with the bronchial muscle. Despite the failure to find a real cure, progress has been continuous and substantial.

The future indicates a likely focussing on the few primary mechanisms concerned in all types of asthma whatever their etiology, with a view to finding a means to prevent or control interference with these mechanisms. Allergy will likely fall into its natural position as one of these mechanisms and no longer monopolize thought. Conjectural theories, though spun by subtle minds, if unconfirmable, will be cut down one by one until only truth remains.
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