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ASTHMA HAY-FEVER & ALLIED CONDITIONS.

This subject has received considerable attention of late and much valuable light has been shed on it by such workers as Chandler Walker, who has had unrivalled opportunities of studying cases of asthma and hay-fever.

The relationship of these symptom-complexes to anaphylaxis has been clearly brought out, but at the same time there has probably been some tendency to attribute the cause of other conditions to an anaphylactic basis without any real evidence.

Nevertheless the subject of anaphylaxis in relation to clinical medicine is one of considerable importance, for a proper understanding of it will enable one to afford relief to many who suffer from distressing ailments, and to avoid the risk of disaster which occasionally threatens in the application of serum treatment.

The study of anaphylaxis has another important aspect in that it touches on the foundations of our knowledge of resistance and immunity. Thus every step forward in the elucidation of this phase of the process of immunity, must help on our understanding of the whole.

Few would deny that up to the present the treatment of asthma and hay-fever has been on the whole disappointing, partly at any rate on account of the difficulty in discovering the factors in the causation of any individual case.

That there is frequently a family predisposition is known to all, but it is not so certain that any particular type of individual is specially subject. There appears therefore to be a need to carefully study the personal peculiarities and family histories of the subjects of asthma and hay-fever, with special.

attention to stigmata of the so-called neurotic constitution. Such a research must necessarily occupy a long time to be of any real value, but appears to the writer to promise useful results.

#### DEFINITION.

Before proceeding to the question of etiology it is necessary to attempt a clear definition of both asthma and hay-fever.

The term "asthma" was formerly used much as we now use the term "dyspnoea" and this use of the word is still sometimes met with.

Of late however it has generally been restricted to indicate dyspnoea due to actual obstruction in the bronchioles and occurring characteristically in recurrent attacks.

A typical attack of bronchial asthma has such definite well-known features that it can not fail to be recognised as such, but the difficulty arises in clearly distinguishing from asthma, cases of chronic bronchitis and emphysema in which the dyspnoea may also be variable in degree.

Until we know more of the underlying mechanism it must remain somewhat arbitrary which of such cases of chronic bronchitis with attacks of dyspnoea are to be regarded as having asthma superimposed, and which are not to be so regarded. The clinical appearances will be mainly relied on but also the results of treatment.

A typical case of bronchial asthma is characterised by recurring attacks of dyspnoea, in some cases slight in others severe, in which inspiration and expiration are laboured and the latter greatly prolonged, the chest being in the inspiratory position, with diaphragm fixed and the respiratory excursion being small; wheezing and musical rhonchi are heard all over the chest and a short dry cough eventually results.

in the expectoration of small lumps, the "perles of Laennec" which consist of hard secretion moulded in the smaller tubes and then rolled into small balls.

Whilst a certain degree of inflammatory reaction no doubt occurs, it is generally agreed that the above mentioned features are brought about mainly by a spasm of the unstriped muscle of the bronchioles.

Still it is hardly feasible to call every case "bronchial asthma", which shows evidence of any degree of such spasm, for many influences may cause increase of the tonicity of the bronchial musculature, and there is little doubt that in cases of chronic bronchitis a variable degree of spasm is apt to occur from slight causes.

If reasonable proof can be afforded to show that there is a special mechanism underlying all attacks of typical asthma, it would seem best to restrict the term to cases which are due to such mechanism.

At present however this is not possible, and some difference of opinion will exist in atypical or complicated cases.

It is not yet definitely settled whether eosinophilia in the blood always occurs during an attack of asthma or not, but it is certainly the rule.

Probably undue emphasis is laid on the expiratory character of the dyspnoea, so that it is possible for one to receive the impression that there is practically no difficulty in inspiration. Whilst it is true that expiration is always prolonged and difficult, in some cases at least inspiration may be even more distressing. This is easy to understand when it is considered that the thorax is in the expanded position throughout an asthmatic seizure.

It is noteworthy that the abdominal muscles are comparatively flaccid even during expiration.

It is scarcely necessary to define what is understood by the term "hay-fever" for its characteristic recurrence each year in the pollen season with signs of irritation of the nasal mucosa and conjunctiva makes the diagnosis simple enough for a lay-man to make.

#### ETIOLOGY & PATHOGENESIS.

Here there are wide differences of opinion, but the occurrence of spasm of the unstriated muscle of the bronchioles is generally accepted, whereas the mechanism underlying it is in dispute. It is necessary to recall the exact anatomy and all that is known of the physiology of this unstriated muscle.

Besides plates of cartilage in a fibro-elastic membrane, the medium sized bronchial tubes have a well marked layer of unstriated muscle fibres running in a circular direction, lying internal to the cartilaginous layer, and next to the mucous membrane. As the finest branches are approached this muscular layer becomes relatively more marked, and just before its termination, where it communicates with several infundibula leading to alveoli, there is a special band-like thickening.

The nerve supply of the lungs comes from the pulmonary plexuses which are formed by pulmonary branches of the vagi and sympathetic branches from the 3rd, 4th & 5th dorsal nerves. It has apparently been shown by Brodie & Dixon<sup>(2)</sup> however that the bronchial muscle is affected only by the vagus, and that this nerve may convey either constrictor or dilator impulses; but some consider that here as in other organs there is a degree of antagonism between the vagus and sympathetic, and upon this view rests one explanation of the mechanism of bronchial spasm.<sup>(3)</sup> The sympathetic is supposed by some to supply the pulmonary arteries with vaso-motor fibres, and Starling<sup>(4)</sup> says that adrenalin causes some vaso-constriction in the lungs. The same authority states that when the vagi are artificially stimulated, or in the presence of

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abnormally high percentage of  $C O_2$ , the pressure necessary to drive a normal volume of air into the lungs in a definite time is more than doubled. Other gases or vapours have a similar effect. It is probable that this may be regarded as a protective mechanism to prevent inhalation of irritant gases etc., the spasm being an increase in the normal tonicity of the muscle. The latter is demonstrable by a lessened resistance to entry of air after section of the vagi. Of the many different viewpoints regarding the underlying cause of spasm three by well known authorities will serve to illustrate the position:-

McRae says "Hay-fever & Asthma are reactions anaphylactic in nature occurring in sensitized people, in others possibly reflex neuroses characterized, by swelling of the nasal or respiratory mucous membrane, increased secretion, and in asthma, spasm of the bronchial musculature resulting in dyspnoea chiefly expiratory in nature".

<sup>5.</sup> Still says "asthmatic patients come in large proportion of neurotic stock" but does not mention anaphylaxis as a possible factor.

<sup>6</sup> Again he says "The exciting causes of asthma throw perhaps as much light on its character as anything, for such a motley group is surely consistent with nothing but a neurosis". In a lecture in November 1921, he repeated this view and stated that the symptoms of asthma may be relieved, but the underlying state could not be removed.

Langdon Browne in a leading article in the Medical Review (3) explains the bronchial spasm as an outcome of what he terms "vagotonia", a condition in which there is a lack of balance between the endocrine glands concerned in augmenting vagal and sympathetic activities respectively. He considers that the suprarenals are mainly at fault in not producing sufficient epinephrin.