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NATURAL HISTORY OF ASTHMA

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Asthma probably affects at least 1 % of the population of Great Britain, (Grant, Logan) gives rise to much disability and sometimes has a fatal outcome. In spite of this, few studies of the natural history of the disease have been made.

This paper is based on an analysis of 625 cases attending as out-patients at two hospitals over a period of 6 years. The diagnosis has been based mainly on the history of attacks of dyspnoea of variable duration. In most cases wide spread expiratory wheezing has been heard on auscultation at some time. The great majority of cases had intermittent attacks but some (especially those with a longstanding history of severe asthma or with predominantly infective aetiology) had evidence of persistent expiratory obstruction between attacks. Asthma was considered to be primary in 553 cases and secondary to bronchitis in 72. In each case a full history has been taken with the help of a detailed questionnaire; an attempt has been made to assess the precipitating factors responsible and adjustments have been made in the records in the light of new information obtained at subsequent attendances: this applies particularly to evidence of infection and psychological stress. Many cases have attended at regular intervals for several years and others irregularly after follow-up enquiries.

TABLE 1
Age of attendance and onset of Symptoms in 625 cases of Asthma.

Age Group	Age at attendance		Age of onset	
	No. in each age group		No. in each age group	
	Male	Female	Male	Female
0-10	34	19	152	109
10-19	96	68	41	60
20-29	49	57	28	56
30-39	37	66	31	48
40-49	38	63	23	37
50-59	31	40	17	15
60+	8	19	1	7
Total	293	332	293	332

There were 293 males and 332 females. The clinics at which these patients were seen were nominally for adults, but a certain number of children (53) below the age of ten were seen. These showed the usual predominance of males (34) over females (19). This excess of males is also seen in the figures of all patients whose asthma began in the first decade (Table 1). There were more males than females among those attending between 10 and 19 years, but those whose asthma began in this decade were predominantly female. In all subsequent decades up to 60 years females predominated both at the time of their first attendance and as regards their age of onset. This distribution is substantially in agreement with the findings of Bray, Linford Rees, Williams and Williams.

Two fifths (261 cases) of the entire group first developed their symptoms before the age of ten years and a further 101 patients started between 10 and 19 years. In each succeeding decade from 20 years onwards the number of those whose asthma began before 20 is approximately halved falling from 70 % in the age group 20-29, to 33 % between 30 and 39, 18 % between 40 and 49, 11 % between 50 and 59, and to 3.7 % in those over 60.

AETIOLOGICAL FACTORS

(a) *Heredity.* A family history of asthma was obtained in 251 cases (40 %). These figures agree with most published series. In 207 cases (33 %) the relatives were parents, grand-parents, children or siblings, whereas the relationship in the remaining 44 cases was that of aunt, uncle, cousin, nephew or niece. More than one case of asthma was frequently recorded among relatives of individual patients and eczema or hay-fever was also commonly encountered among them. If these were included a family history of so called 'Allergic disease' was found in 319 (51 %) of the patients in this series. One or other parent had asthma in 90 instances (45 mothers, 45 fathers) and of these 9 of each sex were said to have died of asthma, most commonly between 30 and 50 years of age. Twelve other relatives were also said to have died of asthma including 4 sisters, 2 brothers, 3 uncles, 1 aunt, 1 son and 1 daughter.

(b) *Allergic Factor.* The presence of allergy was accepted on the following grounds 1) a history of clinical sensitivity to inhalants confirmed by positive skin tests: intradermal tests were employed except for pollens which were tested by the prick method. A history of clinical sensitivity to inhalants with negative skin tests was not accepted as evidence of allergy unless other confirmatory information was available e.g., the result of inhalation tests. Skin tests to foods were not routinely employed and a convincing history of asthma or other allergic symptoms such as angeo-neurotic oedema following repeatedly the consumption of certain articles of diet was considered sufficient evidence. Drug sensitivities were accepted on the history only. 2) The presence of other so-called atopic disorders in the same patient. These included flexural eczema, rhinorrhoea and hay-fever, or repeated attacks of angeo-neurotic oedema, but not urticaria.

Employing these criteria 67.6 % of the entire series showed evidence of allergy. Specific sensitivities were recognised in 54.7 %, and associated allergic disorders were encountered

in 54 %. It is thus obvious that both the main criteria of allergy were fulfilled in the majority of cases classified as 'allergic'. The allergic factor was considered to be of predominant importance in about half of these cases, or about one third of the total. The incidence of allergy was highest in the first three decades and fell sharply and progressively after thirty (Table 2).

TABLE 2
Incidence of Main Precipitating Factors related to Age of Attendance.

Age group	Allergic.	Infective.	Psychological.	Doubtful.
0-9	38 (72 %)	29 (54.5 %)	8 (15 %)	5 (9.5 %)
10-19	133 (81 %)	82 (50 %)	26 (15.8 %)	7 (4.2 %)
20-29	96 (90 %)	64 (60 %)	29 (17.3 %)	12 (11.3 %)
30-39	63 (61 %)	74 (71.8 %)	37 (36 %)	9 (9 %)
40-49	49 (49 %)	66 (66 %)	34 (34 %)	3 (3 %)
50-59	30 (42.5 %)	60 (84.5 %)	26 (36.5 %)	4 (5.6 %)
60-69	15 (21.8 %)	23 (85 %)	1 (3.7 %)	0 (-)

The percentage figures refer to the total number attending in each age group.

Food sensitivity was found in 11 % of the total but in eleven cases caused vomiting, anejo-neurotic oedema or allergic syndromes other than asthma: flexural eczema was or had been present in 28.7 % of all food sensitive cases. The commonest foods to cause sensitivity were fish, eggs and nuts. After the age of 20 food sensitivity was uncommon.

Inhalant sensitivity was present in 48.5 % of cases, house dust, pollen, feathers and animal hairs being the most important agents in that order. Multiple sensitivities were the rule. Skin tests to horse dander were frequently obtained but could rarely be confirmed clinically. This material is of course still a common component of house dust in this country. Mould sensitivities were sought in cases with late summer asthma but confirmation was only obtained in a few instances. Two patients who had asthma only in their own homes but not when living in neighbouring houses, were found to be sen-

TABLE 3
Analysis of Main Features in Various Clinical Groups.

<i>Clinical Groups</i>	No. in Group	Percentage with family history of asthma	Percentage with extrinsic allergy	Percentage with infection	Percentage with Psychological factor	Percentage commencing before 10 years of age	Percentage of severely disabled cases	Percentage with history of status	Percentage of deaths	Age groups with highest proportion of cases	Ratio of Males to Females
Flexural Eczema Group	82	53.6	71	62.5	30.5	77	28	17	6.1	10-19	48
Pollen sensitive Group	111	42.3	100	47.7	18	50	15.3	13.5	2.7	10-19	48
Group with Prominent Psychological factor	93	45	42	58	100	11.4	28	14	4.3	30-60	26
Group with prominent infective factor	56	37.4	7.15	100	23	25	41	21.4	3.6	50-70	28
Group with Primary Bronchitis	72	34	8.5	100	20	25	51.5	18.5	8.6	40-60	36
Group with Nasal factors	625	40	54.7	69.1	24.7	28	36	22	8.0	30-60	19
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There is some over-lap between cases in the first four groups: for example some patients with flexural eczema were pollen sensitive and vice versa. Some patients with prominent psychological factors were also included in these groups or may have had nasal factors. No case in the infective group is also included in the group with primary bronchitis, nor would any member of the two groups be included in any other group except two cases in the infective group with nasal polypi who are also included under that heading.

sitive to a variety of moulds, which were subsequently grown from cultures taken in their homes.¹

Drug sensitivity was present in 26 cases (4.2 %) including aspirin (18), Penicillin (6), Lobelia (1), Ephedrine (1), Senna (1), D.D.T. (1), Sulphonamides (1). Asthma was not the manifestation of allergy in all these cases however. Aspirin caused asthma in sixteen and vomiting or aneigo-neurotic oedema in one case each; both these cases had other evidence of allergy as a precipitating factor of their asthmatic attacks. Penicillin caused asthma and flexural eczema together in one case — a nurse working in a children's hospital where aerosol penicillin was extensively employed; in the other five cases there were skin rashes only; four of these cases had other evidence of allergy as a factor in their asthma. Sulphonamides caused a rash in one case but the remaining drugs (Lobelia, ephedrine, senna) all caused asthma.

Twelve cases stated that scraping raw new potatoes after the dirt had been removed by washing invariably caused asthma. Skin tests to ordinary potato extracts were negative with one exception and this case alone is included in these figures. The case histories were so similar, however, that there can be little doubt that the symptoms in these patients were the result of a true allergy, possibly to a reagin insoluble in water, or rapidly destroyed by keeping.

Occupational factors were recognised in 3 % of all cases and included carpenters (sensitivity to ebony, red cedar, African hardwood) market gardeners (plant pollen), laboratory workers (guinea pigs, rabbits), dispenser (senna), printer (gum acacia) farmers (chicken feed, grain dust). The handling of dried plasma, tea dust and powdered dyes were also incriminated.

Two groups of cases which were considered to be predominantly allergic in origin may be briefly discussed: these are the flexural eczema group and the pollen sensitive group.

There were 82 cases (12 %) with flexural eczema. In

¹ I should like to thank R. R. Davies, Reader in Botany, St. Thomas's Hospital for making the cultures and identifying the individual moulds.

nearly every case the eczema preceded the onset of asthma. Most patients also suffered from rhinorrhoea. Asthmatic symptoms commenced before the age of ten in 63 cases, and before 20 in a further ten. As one would expect males exceeded females. There was an exceptionally high incidence of asthma in the family history (53.6 %). Allergic sensitivities to foods and inhalants were found in 70 % and infective and emotional factors in a higher proportion than for the series as a whole (see Table 3). In many the asthmatic symptoms were severe and disabling and the group included thirteen with pigeon chest deformity, whereas only five other patients with this condition were observed in the entire series. The high proportion of deaths (6.1 %) also confirms the severity of the asthma.

Sensitivity to pollen was present in 111 cases; in 35 it was the only significant allergen detected. The age of onset though still highest before ten, was spread more evenly over the next four decades. Females outnumbered males. Although this is a classically allergic group of cases it is of interest that infective episodes, mainly of frank bronchitic type with expectoration of purulent sputum, were associated with asthma in the winter months in fifty cases. There were three fatal cases (2.7 %), including one with flexural eczema who died of anaphylaxis following a pollen injection.

(c) *Infection*. The relationship between respiratory tract infection and asthma is a close one, but there is little evidence at present to show by what mechanism infection causes asthma. It was accepted as a factor in precipitating attacks under the following circumstances.

(1) If pus was found in the sputum during attacks of asthma. Pathogenic bacteria (Pneumococci, N.influenzae, St.aureus, E.coli, Friedlander bacillus) were cultured in many but not all these cases: Str.viridans, N.catarrhalis were often the only organisms detected. Care was taken to differentiate pus from eosinophils in the sputum as the two may be readily confused. (Helm, May and Livingstone).

2) If the patients recorded attacks of asthma following

or associated with frank bronchitis (episodes associated with cough, and production of sputum, often following a nose cold and sometimes associated with pyrexia). These attacks were usually experienced during the winter months.

Of 393 patients who attributed their first attack of asthma to a specific cause 103 stated that it followed an attack of bronchitis, 12 measles, 15 whooping cough and 54 pneumonia or other non-specified respiratory infection. Infection was considered to play a part in maintaining attacks of asthma in 63 % of all cases. Approximately 50 % of all patients attending before the age of twenty had evidence of recurrent infection, with an increasing incidence in subsequent decades (Table 2). In the first decade and after thirty years of age infection was often thought to be the predominant and not uncommonly the only factor responsible for precipitating attacks. Between ten and thirty years its importance was relatively minor. Our experience suggests that it is rare for any chronic asthmatic not to develop infective episodes sooner or later; in other words although infection may be a factor predisposing to asthmatic attacks, asthma itself predisposes to the development of respiratory tract infections.

The following clinical pictures were encountered 1) cases of spasmodic asthma who from time to time developed infective episodes. The attack was often ushered in with nasal catarrh followed by productive cough, purulent sputum and sometimes pyrexia. They usually occurred during the winter months, and were often associated with or followed by asthma which was often more persistent and difficult to treat than those attacks not precipitated by infection. 2) cases in whom infection appeared to play the predominant part but was seldom florid. Asthma developed for the first time after a respiratory tract infection or it was insidious in origin. The picture was predominantly one of asthma of subacute type often persisting for weeks or sometimes months at a time with scanty sputum containing pus (with or without pathogens). These presumably correspond to Rackemann's intrinsic cases, although he also includes those with emotional factors

under this heading. High blood eosinophilia was common. 3) cases in whom repeated attacks of bronchitis preceded the onset of asthma often by many years; the bronchial obstruction appeared to be secondary to the bronchitis. The history of onset of wheezing dyspnoea for the first time in these cases was often dramatic and on clinical grounds they differed strikingly from uncomplicated chronic bronchitis.

Infection of the respiratory tract was the only factor of importance in 127 cases (21.4 %): 56 (8.9 %) were regarded as cases of primary infective asthma, and 72 (11.5 %) as primary bronchitics with secondary asthma. Chronic antrum infection was present in two and bronchiectasis in four of the former group. The remaining cases with infection (41.6 %) also had emotional or allergic factors of equal or greater importance.

Comparison of the 56 cases of primary asthma in whom the infective was the only or predominant factor, was made with the 72 patients whose asthma was secondary to repeated attacks of bronchitis (Table 3). There was a remarkable similarity between the two groups. The sexes were equally divided in both. The proportion whose asthma commenced before twenty was much lower than for the series as a whole, although 9.5 % of children below the age of ten had asthma secondary to bronchitis. The majority of infected cases were between 30 and 70 years of age. Both groups had a high incidence of attacks of status asthmaticus. The death rate was higher among the primary bronchitics. Persistent wheezing was present between attacks in many of both groups but especially among the latter, who also coughed up sputum between attacks in nearly all cases.

d) *Emotional Factors.* The problem of assessing the significance of emotional factors is difficult. In reply to the question "Does worry or excitement bring on attacks of asthma"?, 68 % of 326 consecutive patients over 10 years of age said "Yes". Positive answers were given by 62.5 % of men and 74 % of women. If we consider the mere presence of environmental factors associated with emotional stress as significant,

there are few who could not claim an emotional element in their asthma from time to time. It was therefore considered essential that there should be reasonable evidence of a relationship in time between the patients asthmatic state and the presence of disturbing emotional situations or gross personality defects or both. The following criteria have therefore been applied before accepting emotional causes as significant in the precipitation of attacks: —

- 1) A history of attacks of asthma repeatedly associated with incidents of an emotional nature often of a trivial kind e.g., pressure at work, minor domestic quarrels, sickness or death in family. These were often found in patients with personality defects who had difficulty in adapting to the normal stresses of life.
- 2) A history of a long lasting stressful factor usually concerned with personal relationships which coincided with the development or deterioration of asthma, e.g., conjugal difficulties affecting the patient or his parents, situations concerned with living conditions such as living with in-laws, rejection by one or other parent, jealousy between siblings.

An attempt has been made to exclude cases whose emotional stress was purely a reaction to the asthmatic attacks themselves, since this is probably a factor of some importance in most cases of severe or longstanding asthma. Using these standards emotional factors were thought to play a significant part in 24.7 % of all cases, the frequency and importance reaching a maximum between the ages of 30 and 60 years. Psychological factors were thought to be solely responsible for asthma in 13 cases (2.1 %) only. In 34 cases (5.4 %) the first attack was apparently related to an emotional incident, for example in one patient asthma began a few weeks after the death of her child following a severe scald, in another the observation of a fatal road accident was followed by an attack of asthma within half an hour. Bomb incidents and evacuation from home were other examples given. There was sometimes a hysterical element present, the attacks apparently

serving some useful purpose, and sometimes an association with feelings of guilt, but most often it appeared that a mere heightening of emotional tension had a deleterious effect.

An analysis of 93 cases in whom the emotional factor was thought to be predominant showed that women preponderated over men in a proportion of 67:26, and that a family history was present in about the expected number of cases (45 %). The highest proportion of cases was found among women between 30 and 50 years of age. Evidence of allergy was present in 42 % and of infection in 58 %. There were four deaths (4.3 %).

MISCELLANEOUS FACTORS

Many patients stated that factors of a non-specific kind e.g., exertion, fog, cold winds and fatigue were capable of precipitating attacks of asthma. Though these appeared important in individual cases they were only occasionally regarded as of more than contributory significance. Exertion most often caused wheezing when infective factors predominated. In most cases mild broncho-spasm was merely made more obvious by exertion but in some young people attacks of true asthma developed after exercise. In four of these, all young male subjects, exercise appeared to be the only precipitating factor of importance, and in each, attacks of asthma were reproduced with reduction of vital capacity to less than 50 % of its initial value after a brief period of vigorous exertion: it was of interest that immediately after cessation of effort the vital capacity and the expiratory flow rate was often as high or higher than the preliminary readings taken at rest; the asthmatic state developed gradually to reach a peak 10 and 20 minutes later. Fog and cold air only appeared to precipitate attacks in patients with respiratory tract infection.

One group that perhaps deserves special notice include fifty patients with a nasal factor (polypi 37, antrum infection only, 13). There were 14 % of cases of this type in each decade between 30 and 60 years. Four cases (8 %) were sensitive to

aspirin. The group contained a high proportion with a history of status asthmaticus and had a high mortality (8 %).

ASSESSMENT OF SEVERITY OF SYMPTOMS

In considering the prognosis of asthma it is helpful to grade patients according to the severity of their symptoms during the year prior to attendance. This can readily be done by adapting Harris's method for the assessment of psycho-neurotic cases. The following five groups have been found convenient: —

- 1) Those who are prevented from working on account of their asthma.
- 2) Those with attacks sufficiently severe and frequent to interfere considerably with their life, necessitating long periods away from work or school, either at home or in hospital.
- 3) Patients able to lead a normal life with the help of symptomatic remedies but liable to occasional attacks of some severity.
- 4) Patients able to control attacks easily with symptomatic remedies.
- 5) Patients free or almost free from symptoms.

All cases in the present series have been classified according to this method. Table 4 shows the total number of cases in each of the five groups at the time of attendance for each ten year period. Percentage figures of each decade are included in brackets.

It can readily be seen that the proportion of severe cases rises steeply with age. Examination of the cases in each group shows that this rise is correlated with respiratory tract infection and emotional disturbances. The incidence of allergic factors on the other hand is inversely related to severity. These findings are shown in Table 5 in which the percentage of cases with allergic, infective and emotional factors are compared. The first two groups also show a much higher proportion of deaths from asthma than groups 3 and 4. This is not indeed

TABLE 4

Age group at attendance	Total number	Cases grouped according to severity of symptoms				
		1	2	3	4	5
0-9	53	0	5 (9.5 %)	34 (64 %)	14 (26.5 %)	0
10-19	164	0	20 (12.2 %)	118 (71.8 %)	26 (16 %)	0
20-29	106	2 (1.9 %)	14 (13 %)	67 (63.2 %)	23 (21.5 %)	0
30-39	103	2 (1.9 %)	37 (36 %)	52 (50.5 %)	12 (12 %)	0
40-49	101	13 (13 %)	30 (30 %)	48 (47 %)	10 (10 %)	0
50-59	71	12 (17 %)	29 (40.5 %)	23 (32.5 %)	7 (10 %)	0
60+	27	1 (3.7 %)	10 (37 %)	14 (51.2 %)	2 (7.5 %)	0
Total	625	30 (5 %)	145 (23 %)	356 (57 %)	94 (15 %)	0

surprising since many of those in group 1 and 2 were persistently wheezy and were readily made anoxic by small increases in bronchial obstruction.

TABLE 5

Comparison of Clinical Severity with Incidence of main precipitating factors.

Groups in order of severity of symptoms	Total number of cases in group	Percentage of cases in each group with		
		Allergic factor	Infective factor	Emotional factor
1	30	30	83.5	43.2
2	145	51	70.5	29.5
3	356	76	61.0	22.0
4	94	72	44.7	19.2

Twenty six deaths (males 14, females 12) have been recorded in the series during the period of observation: their distribution in the four groups is as follows: —

No. of cases in each group	Group 1	Group 2	Group 3	Group 4
	30	145	456	94
No. of cases in each group	30	145	356	94
No. of deaths in each group	9	12	5	0
Percentage of Deaths from Asthma in each group during six years ...	30	8.2	1.4	0

Five of these fatal cases, including one woman, were classified as having primary bronchitis with secondary asthma, (two in group 1 and three in group 2). One of the cases in group 1 committed suicide, an action thought to be related to the severity of her asthma and hence included.

Of the entire series, one hundred and two cases gave a history of attacks of status at their first attendance, and nineteen of these patients have since died, sixteen in status. Three other cases died in a sudden attack of asthma. It thus appears that asthma sufficiently severe to interfere with a normal way of life, particularly when associated with attacks of status, carries a bad prognosis, whereas when attacks are on the whole readily controlled the prognosis is relatively benign. Other factors contributing to a poor prognosis are repeated infective incidents or prominent emotional factors in those over forty years of age.

DISCUSSION

In this survey many features observed by others have been confirmed (Bray, Williams & Williams, Linford Rees). These include the high proportion of cases whose symptoms begin in the first decade, the preponderance of males over females up to the age of ten years, the reversal of the sex ratio around puberty and the high proportion of cases with a family history of asthma or other allergic disease. The importance of allergic, infective and emotional factors is confirmed, and it is shown that it is common for two or three such factors to be present in the same patient. An attempt has been made to grade patients in terms of the severity of their disease and to relate this to the main precipitating factors. The proportion of patients severely disabled by their disease, (those in classes 1 and 2) is certainly higher in a hospital series such as this, than it would be among asthmatic patients encountered in general practise. This is confirmed by the large number (102) of cases who gave a history of status asthmaticus. It was observed that the proportion of severely affected cases rose with increasing age. Those in whom allergic factors alone were discovered, were seldom severely disabled but it was repeatedly noticed

that infection of the bronchial tract or emotional stress exerted an unfavourable influence upon the course of the disease.

The patients in this series were not routinely examined by a psychiatrist, although many were referred for a psychiatric opinion. Most of the children and their parents were interviewed by trained almoners who were often able to bring to light unsuspected emotional stresses. A number of cases were also visited at home by a social worker. There is, however, a marked discrepancy between our figures (24.7 %) and those of Linford Rees who found an emotional factor in 70 % of 441 cases, a figure however, closely approximating to that of 68 % obtained by directly questioning our patients as to whether they considered that worry or excitement affected their asthma.

The flexural eczema group occupies a special position. That these cases have a more pronounced constitutional tendency to develop asthma than those in other groups is revealed by the higher percentage with a family history of asthma. All cases in the group have suffered by definition from two so-called 'allergic' disorders and the majority also had rhinorrhoea. The proportion of cases in whom extrinsic allergic factors played a significant part was higher than for the series as a whole, and in particular allergy to common foods was much higher among these patients than in any other group. The effect of foods included the precipitation of asthma, aneigo-neurotic oedema, urticaria, vomiting and rarely the exacerbation of eczema. A tendency for these food sensitivities to disappear as age increased was observed. Emotional and infective factors also played an important part in maintaining symptoms in this group and their treatment frequently presented an exceptionally difficult problem. Chest deformity was present in an unusually large number.

The relatively frequent association of respiratory tract infections in patients with proven pollen asthma was an unexpected finding; approximately half of these cases stated that they had attacks of asthma in the winter months associated with productive cough.

It is not at the present time possible to discuss the prognosis with any degree of certainty. In the few papers which have been published to show the result of a follow-up in a series of cases after an interval of years a high proportion of recoveries or partial recoveries are recorded (Rackemann, Flensburg).

Grant has also stated that whereas 3.3 % of 4,571 Cardiff University students gave a history of asthma, in 1.4 % attacks had ceased at the time of interview. This tendency to what must be regarded as spontaneous recovery during the first two decades, may well continue at least into the third and further. An analysis of the patients forming each ten year group shows that the incidence of those whose asthma began before twenty is approximately halved in each succeeding decade, falling to 11 % between 50 and 60. This may well be a reflection of such a tendency to improve in those who avoid chronic or recurrent infection.

Forty seven cases in the series recorded periods of freedom lasting from one to forty years before a recurrence brought them the hospital. The sexes were equally affected and in 17 cases the period of freedom was for more than ten years. The greatest number of remissions (23) took place between 10 and 19 years, but 6 were recorded between 20-39 and 8 between 30-39. These figures therefore suggest that remission is most likely to take place during adolescence, and then in the succeeding two decades.

That the prognosis is not wholly satisfactory is shown by the fact that during the period of observation (six years), twenty six cases (4 %) died directly or indirectly from asthma or allergic sensitivities, nineteen in status asthmaticus, two from anaphylaxis (to pollen 1, and A.C.T.H. 1), one from oedema of the glottis and one from broncho-pneumonia after surgical removal of an emphysematous cyst; one committed suicide. Williams, Flensburg, Rackemann, McCracken and Leigh have all drawn attention to the mortality from asthma. Those cases who gave a history of repeated attacks of status had a particularly high mortality (19 %, sixteen in status). It is also of

interest that 18 parents and 12 other relatives of the patients seen were stated to have died from asthma.

CONCLUSION

The picture that emerges from this study is therefore one of a constitutional disease manifested by an abnormally sensitive bronchial tract, which may be constricted by a wide variety of stimuli. The majority of cases commence in childhood or adolescence and at this time allergic factors appear to play an important part. It is at this period of life that multiple manifestations of allergic disease are most often seen. Many probably undergo spontaneous improvement and perhaps recovery. As age proceeds infection appears to play an increasingly important part, both in the precipitation and maintenance of asthma, and after forty may be associated with organic lung damage. It is not always easy to say on clinical grounds how often the infective episodes in asthma constitute a genuine bronchitis and how often they are confined to the upper respiratory tract: it is certain however that there may be little difference in the final picture of the primary bronchitic who develops attacks of asthmatic breathing and the primary asthmatic who develops bronchitis. The combined or serial effects of allergy, infection and emotion are often seen in the same patient. As age increases a higher proportion of cases is encountered who have a persistently prolonged expiration and are dyspnoeic on effort as well as during spontaneous attacks. A fatal outcome is rare in patients who are not severely disabled or whose asthma is purely allergic in origin, but occurs not uncommonly in those with repeated attacks of status.

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I wish to thank the following for their assistance in investigating the home circumstances and social background of patients in this series:

- Miss *P. Corby*, Almoner, Woolwich War Memorial Hospital, London.
 Miss *A. Dennetts*, Social Worker, Public Health Department, Woolwich.
 Miss *A. McGregor*, Almoner, King's College Hospital, London.

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