

From The General Hospital Nottingham, Great Britain.

SPOROBOLOMYCES AS A CAUSE OF RESPIRATORY ALLERGY¹

By

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INTRODUCTION

Seasonal allergic rhinitis and asthma develop as a result of sensitization of the respiratory tract to one or more inhaled allergens. The onset of seasonal asthma is frequently preceded by symptoms of allergic rhinitis, with recurrent sneezing bouts and watery nasal discharge alternating with nasal obstruction. The mucosal surface of the nose and throat is continuous with that of the trachea and bronchi, so that the longer the exposure to the allergen continues, (or the greater the atmospheric concentration of airborne allergen), the more likely are symptoms to spread lower down the respiratory tract producing a dry irritant cough and finally wheezing. All too often, patient or doctor fails to attach sufficient importance to the nasal symptoms and a false impression is gained that the seasonal allergic symptoms are confined to a shorter period than that which strictly applies.

The successful treatment of seasonal allergic rhinitis and asthma depends upon the identification of the allergen or allergens provoking the attack. To achieve this, the clinician must not only take a carefully detailed history of the months in which symptoms of respiratory allergy occur, but also ascertain any possible relationship between the attacks and variations in atmospheric temperature, humidity and the time of day. A seasonal daily record of allergic symptoms main-

¹ Based on a paper read at the Vth International Congress of Allergology, 12th October, 1964 in Madrid.

tained by the patient is invaluable in assessing the extent and varying severity of the symptoms.

PRESENT STUDY

There exists a large group of patients suffering from seasonal allergic rhinitis and asthma in the summer and early autumn months, whose symptoms extend well beyond the limits of the pollen season and appear to be provoked by other seasonal airborne allergens in addition to pollen. Since 1957 a special study has been conducted on those patients who have shown a poor response to pollen desensitization or whose symptoms of respiratory allergy extended over a period of more than two months, and could not therefore be explained on the basis of pollen allergy only. Each patient was required to maintain a simply daily record of allergic symptoms from April to September, and these were carefully assessed in conjunction with the known peak atmospheric concentrations of pollen and spores, (kindly provided by the Wright Fleming Institute at St. Mary's Hospital, London). These peak concentrations tend to follow a similar general trend over a relatively wide area, (*Hamilton 1957, Hyde & Adams 1960*), and are particularly helpful to the clinician in evaluating seasonal allergy (*Evans 1960*).

From this study, conducted in the English Midlands, it appeared that two spores—*Cladosporium* and *Sporobolomyces*—were of particular interest and importance. *Cladosporium* caused symptoms of respiratory allergy presenting more often as seasonal asthma than as rhinitis, only during prolonged hot dry weather, (a relatively infrequent event in the United Kingdom, such as occurred in the summers of 1959 and 1964). *Sporobolomyces*, described by Davies as a "pink mirror yeast producing characteristic hyaline basidiospores", (*Davies et al. 1963*), appeared to be a more important allergen. It occurred in heavy concentrations in the warm damp conditions that prevailed in England from July to September 1962, and again in July and August, 1963 (Fig. 1).

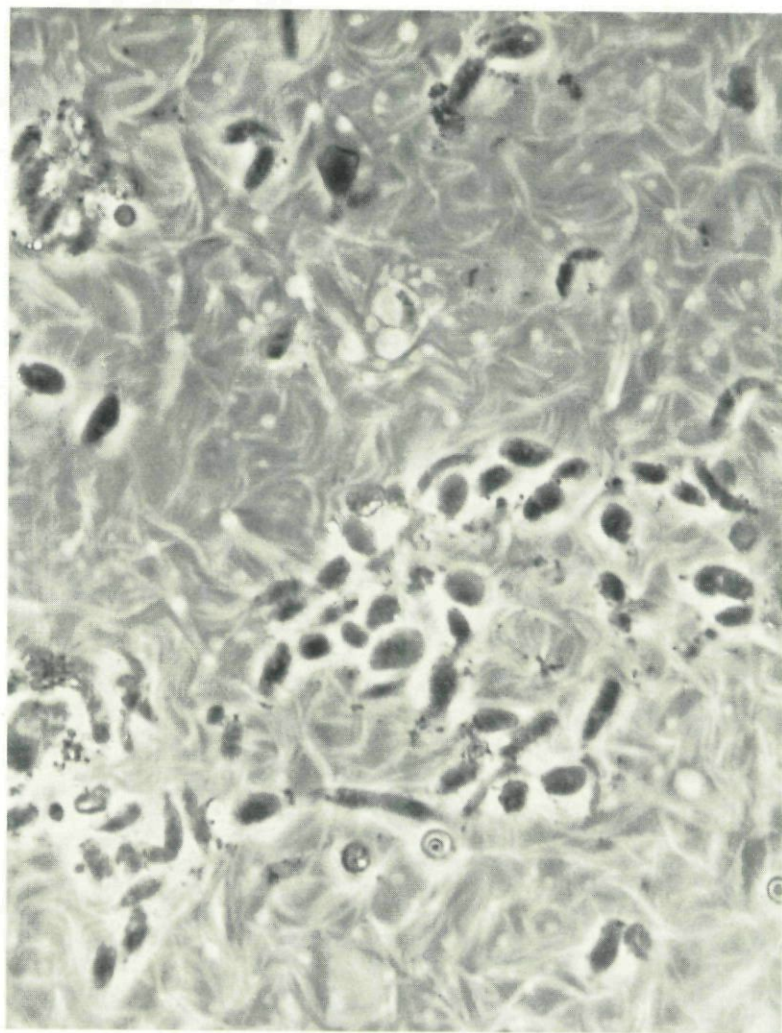


Fig. 1.

Sporobolomyces.

Phase contrast Photomicrograph of Hirst Trap deposit showing *Sporobolomyces*
(with a few *Tilletiopsis*) impacted on Petroleum Jelly.

Fig. 2.

Comparative daily record charts of (a) An untreated hay fever subject, and (b) A hay fever patient treated by hyposensitisation to pollen and subsequently found to be allergic to *sporobolomyces*.

(a) *Mr. H. W.*

Allergic to grass pollen only.

June		July		August
1 -	16 §	1 -	16 -	1-31
2 -	17 §	2 §	17 -	Clear -
3 -	18 *	3 †	18 -	Inter-
4 *	19 *	4 §	19 -	mittent
5 -	20 †	5 †	20 -	rain
6 -	21 *	6 †	21 -	
7 -	22 §	7 †	22 -	
8 -	23 §	8 †	23 -	
9 †	24 *	9 §	24 -	
10 -	25 *	10 Rain	25 -	
11 -	26 *	11 } Nose	26 -	
12 -	27 *	12 -	27 -	
13 -	28 *	13 } clearing	28 -	
14 -	29 -	14 } Clear	29 -	
15 *	30 -	15 } (rain)	30 -	

(b) *Mrs. B. H.*

Hyposensitization to grass/nettle pollen 1961-62.

*Subsequently found also to be allergic to *sporobolomyces*.*

June	July	August
1-30	17 * } Antihistamines	1-19 † } With
Clear -	18 † } gave prompt	to } wheez-
no symptoms	19 § } relief	§ } ing
	30 † } With	20-31 } Clear
	30 † } wheezing	

Intermittent rain from 10th July to 15th August.

* = mild † = moderate § = severe symptoms.

SELECTION OF CASES

Sensitivity to *Sporobolomyces* was suspected if the subject, unlike the patient whose only known sensitivity is to grass pollen, complained that nasal symptoms or asthma became

worse just before and during summer rain, (Fig. 2), or immediately following a heavy dew (*Evans* 1963). Many of these patients also noticed that their symptoms of respiratory allergy were aggravated if they went walking under trees, or near a river, and particularly after camping or staying in a caravan where they were in contact with heavy dew. Others noticed that picking fruit or consuming wine often provoked symptoms, whilst a few also appeared to exhibit a cross sensitivity to Brewers Yeast and were forced to reduce their beer consumption in the late summer months.

Allergy to *Sporobolomyces* was confirmed in the majority of cases by positive prick tests to a 5 per cent solution of *Sporobolomyces rosea*. Over 61 per cent of patients whose symptoms suggested sensitivity to *Sporobolomyces* gave positive prick or intradermal tests; the remaining 39 per cent gave negative or doubtful results to skin testing, but all gave a positive nasal provocation test to a 10 per cent solution of *Sporobolomyces*. Nasal provocation tests (*Juhlin-Dannfelt* 1950) were found to be a more reliable method of confirming allergy to *Sporobolomyces*, but a positive reaction may not appear until an hour or two after the test.

Sporobolomyces was shown to be allergenic by means of positive passive transfer tests using the Prausnitz-Küstner technique. *Bruce* (1963) has also shown that *Sporobolomyces* is allergenic by means of positive bronchial provocation tests. All patients shown to be sensitive to *Sporobolomyces* were found to be pollen sensitive in addition, and it seems probable that allergy to seasonal airborne spores is a phenomenon which develops only in patients already sensitized to pollen, or in some cases to house dust (*Evans* 1960).

HYPOSENSITIZATION TREATMENT

Patients were selected for hyposensitization if they were shown to be sensitive to pollen and to *Sporobolomyces* and (i) derived little relief from symptomatic treatment with anti-histamines and bronchodilator drugs, or (ii) developed in-

creasingly frequent and progressively more severe symptoms of asthma, or (iii) exhibited a gradual spread in their "seasonal allergic spectrum".

Hyposensitization was achieved by using an aqueous solution prepared by the Bencard Allergy Unit of Beecham Research Laboratories Ltd., giving injections at weekly intervals terminating early in May. The majority of patients were treated with a solution comprising 70 per cent Grass Pollen and 30 per cent *Sporobolomyces*; in selected cases these proportions were varied slightly, either to include other allergens of subsidiary importance, or to increase the *Sporobolomyces* content. A *Sporobolomyces* content of less than 25 per cent appeared to be inadequate for effective hyposensitisation. Hyposensitisation procedure was repeated the following winter, and a series of 56 patients has now been treated over a period of 3-7 years, (the minimum treatment extended over two successive years, and the majority over three successive years).

RESULTS

Results of treatment were assessed on the basis of each patient's seasonal diary incorporating the daily record of the number of antihistamines and/or bronchodilator tablets required during the season. Patients recording moderate or severe symptoms for a total of more than 12 days, or requiring tablets regularly over a total of 12 days in their season were assessed as a poor result even though they might have recorded "improvement" in their symptoms. The results which are summarized in Table 1 show that 87.5 per cent of patients obtained a good result.

Prior to treatment, 20 patients in this group experienced symptoms of respiratory allergy over a period of 2-3 months; in 17 patients the season extended up to 4 months, and the remaining 19 patients had an even longer season (Table 2).

The figure of 87.5 per cent good results from hyposensitisation is therefore most encouraging. Hyposensitisation treatment of pollen allergy with aqueous extracts seldom yields

TABLE 1

*Results of Hyposensitisation to Pollen and Sporobolomyces
over a Minimum Period of Two to Three Years.*

	<i>Age under 21</i>	<i>Aged 21-40</i>	<i>Aged 41-65</i>	<i>Total</i>	<i>%</i>
Good result	11	25	13	49	87.5
Poor result	2	3	2	7	12.5
Total	13	28	15	56	

TABLE 2

Seasonal Duration of Symptoms.

<i>Months</i>	<i>A</i>	<i>B</i>	<i>Total</i>
2-3	16	4	20
4	9	8	17
Over 4	7	12	19
Total	32	24	56

(A) Patients allergic to pollen and sporobolomyces.

(B) Patients allergic to pollen/sporobolomyces and also to Cladosporium or housedust.

TABLE 3

Analysis of Poor Results from Pollen/Sporobolomyces Hyposensitisation.

<i>Apparent cause of poor result</i>	<i>No. of cases</i>
1. Inadequate hyposensitisation (Intolerance or failure to complete course)	2
2. Asthma improved: Hay Fever not improved	1
3. "Hay Fever" improved: Asthma unaltered	1
4. Superimposed perennial symptoms supervening; ? dust sensitivity	2
5. No obvious reason for failure	1
Total	7

more than 75-80 per cent good results, (Bruun 1959, Rackemann 1963). It is possible that some of the disappointing results with pollen hyposensitisation arise because of unsuspected or undetected allergy to seasonal air spores. Table 3 analyses those patients whose results from pollen/sporobolomyces hyposensitisation were poor.

CONCLUSIONS

This study of patients with an "extended hay fever season" indicates the importance of certain air spora to which allergy may develop in patients already sensitized to pollen. *Cladosporium* and now *Sporobolomyces* have been shown to be important allergens. Further study is required to establish to what extent other common spores such as Basidiospores may be a contributory cause of seasonal respiratory allergy.

SUMMARY

I. Many patients suffering from seasonal respiratory allergy experience symptoms extending beyond the accepted limits of the pollen season; an appreciable proportion of these patients are allergic to *Sporobolomyces*.

II. *Sporobolomyces* has been shown to be allergenic by nasal provocation tests and by Prausnitz-Küstner passive transfer tests. Good results were obtained from preseasonal hyposensitisation with aqueous extract of pollen and *Sporobolomyces*.

III. During the summers of 1962 and 1963 (when the atmospheric counts of *Sporobolomyces* were particularly high), 49 patients out of 56 subjected to hyposensitisation recorded good results.

ACKNOWLEDGEMENTS

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