thiouracil drugs, so that persistence of auricular fibrillation suggests that some other cardiac abnormality might be an important factor in the cases in the second group. Six patients in this group showed clinical or electrocardiographic stigmata suggesting associated cardiovascular disease, compared with seven patients in the first group. Systolic blood pressures of 160 mm. Hg or over occurred in five patients in Group I and six patients in Group II; but electrocardiographic abnormalities were present in four out of nine patients in Group I and two out of 11 patients in Group II.

The average period of treatment to obtain reversion in this series was six weeks, while the average duration of symptoms before treatment was greater in Group I than in Group II. It is unfortunate that the duration of fibrillation before treatment could not be ascertained. Digitalis was given to a larger number of patients in Group I than in Group II. No difference in the ability to abolish fibrillation was detected in any one of the three thiouracil compounds used. Finally, there was a higher incidence of electrocardiographic abnormalities in the patients with persistent fibrillation.

Conclusion

In view of these findings it seems reasonable to conclude that if sinus rhythm is not restored by thiouracil alone after a maximum period of four months auricular fibrillation may become permanent unless other measures are taken. In these circumstances it is suggested that quinidine should be given to restore sinus rhythm if the thyrotoxicosis is under control. If thyrotoxicosis has not been effectively controlled by thiouracil, alternative treatment should be considered. There appears to be no reliable method of gauging the prospect of stopping fibrillation with thiouracil alone in any given patient, but the presence of electrocardiographic abnormalities indicating associated cardiovascular disease lessens the chance of reversion. Sinus

rhythm is also less likely to return if the patient has a history of symptoms for more than 4½ years before treatment. It is possible that digitalis tends to establish the arrhythmia, and its use should be avoided except where there is associated congestive heart failure.

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PHENOLOGY OF BRITISH HAY-FEVER PLANTS AND ITS SIGNIFICANCE TO ALLERGISTS

BY

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It is generally accepted that pollen can cause hay-fever only if it is actually present in the air and in significant quantity; in other words, that hay-fever is exclusively an inhalant allergy. Skin tests, it seems to be agreed, are very helpful in diagnosis but are by no means infallible. Even if a patient gives a positive reaction to a reliable pollen extract it is necessary before making the diagnosis to show that his symptoms coincide in time with the incidence of pollen of the type concerned; if they do not he should be presumed non-allergic to that type of pollen. It is therefore important that those interested in hay-fever and pollen asthma should know what pollens are likely to be present in the air at various times and in what relative quantities.

The study and recording of periodical phenomena of this kind is known as phenology.¹ During the past seven years the phenology of British hay-fever plants, and in particular of atmospheric pollen, has been studied closely by the method of pollen-trapping. The pollen caught on glass microslides, exposed day by day for a year or more at some fourteen stations in Great Britain—from South Wales and London to as far north as Aberdeen—has been analysed at Cardiff. Some of the results so far obtained² are summarized in the accompanying diagram.

The principal pollen types can be grouped under three headings—trees and shrubs, grasses, and other herbs. All the most important tree pollens are liberated in the spring. Grass pollens dominate in the months of June and July. Thereafter relatively little pollen is present in the air except locally.

The thick lines in the diagram indicate the periods during which the respective pollens are likely to be present in the air in lowland localities in the south of Great Britain. The thinner extensions of the thick lines indicate that the pollens are usually present in smaller quantities both before

FIG. 3.—Case 2.—There is right axis deviation. Auricular fibrillation. The QRS duration is 0.12 sec. in Leads III and CF₄, and 0.1 sec. in Leads I and II. The T wave is biphasic in Lead III and is sharply inverted in Lead CF₄. There is a secondary R wave in Leads II, III, and CF₄. One premature ventricular contraction can be seen in Lead III. These changes are indicative of intraventricular block, probably right bundle-branch block. (No digitalis.) (1 cm. = 1 mv.) (It is of interest that further studies two years later, using augmented unipolar leads, showed complete right bundle-branch block.)

¹Or phenomenology. Greek *phaenomenon*, an appearance; *logos*, a discourse.

²Hyde, H. A., and Williams, D. A. "Studies in Atmospheric Pollen," I-III. *New Phytologist*, **43-5**, 1944-6. Hyde, H. A. "Studies in Atmospheric Pollen," IV-V. Unpublished.

and after their main periods. These periods vary from one year to another, the variation being greater in those types of pollen which appear in the spring than in those which appear later in the season. Thus the date of first appearance of hazel pollen in Cardiff has been known to vary between Jan. 1 and Feb. 7 (37 days), that of its first appearance in quantity between Feb. 1 and March 21 (48 days); the corresponding ranges of date for ash pollen are March 3 to April 16 (44 days) and March 17 to April 19 (33 days); birch, March 20 to April 14 (25 days) and April 4 to 28 (24 days); oak, April 10 to May 6 (26 days) and April 15 to May 14 (29 days); plantain, April 12 to May 6 (24 days) and April 20 to May 14 (24 days); grasses (apart from the almost year-long trickle of occasional grains), March 12 to April 21 (40 days) and May 28 to June 4 (7 days); nettle, May 4 to June 3 (30 days) and June 6 to 14 (8 days); lime, June 13 to 28 (15 days) and June 18 to July 5 (17 days); and mugwort, July 6 to 30 (24 days) and Aug. 1 to 10 (9 days). These dates do not vary greatly from place to place in the south in any one year, but they tend to be later in Scotland. The only satisfactory method of determining them for a particular year is by pollen-trapping.

Not only the time of appearance but also the quantitative incidence of a particular type of pollen varies from year to year; thus ash pollen was extremely abundant all over the country in 1943, but was almost negligible by comparison at Cardiff and probably elsewhere in 1944 and 1945. Further research would be needed to determine to what extent variations of this kind are general and whether they follow any kind of periodicity.

Most of the pollen types indicated in the diagram are derived from source plants native to and widely distributed in the country, and are likely to be encountered in significant quantity in all lowland localities except in the middle of the biggest towns. The types which come under this heading are as follows (in their usual order of appearance): hazel, elm, alder, ash, birch, oak, plantain, grasses, sorrel and dock (*Rumex* spp.), nettle, elder, chenopods, and mugwort.

Yew, poplar, beech, and pine, though all native in various parts of the country, are rather more local, even as planted trees, than are those in the preceding list. Plane, horse-chestnut, and lime are all street and park, not woodland, species, and their pollens are correspondingly localized; in particular, plane pollen, derived from the London plane,

Platanus acerifolia, is extremely abundant in central London. Heathers (the principal species of which is common ling, *Calluna vulgaris*) are confined to heathy places, apart from the neighbourhood of which their pollen is sparse in quantity.

The majority, but not all, of the types of pollen in the diagram are regarded by American allergists as antigenic. The exceptions include hazel and beech (doubtful), pine (very rarely), yew, horse-chestnut, nettle, and elder (clinical significance unknown), and heather (known to have caused symptoms in Great Britain—Dr. John Freeman, personal communication).

Grass pollinosis apart, the frequency of symptoms caused by the remaining pollens (trees and herbs of various kinds) in Great Britain would appear at present to be a matter of conjecture.

In addition to the pollens so far referred to, various others have been caught regularly in our apparatus. With one exception, none of these makes up more than 0.3% of the annual catch, and few are likely to occur in quantities which can be regarded as clinically significant. Among these types are the following (in order of numerical importance): parsley

family, buttercup, wood-rush, maple and sycamore (*Acer* spp.), rosaceous trees (hawthorn, etc.), sweet chestnut, sedges, rushes, walnut, mulberry, dog's mercury, privet, and some 20 others. The one exception is pollen of the insect-pollinated members of the daisy family—i.e., Compositae, excluding the mugworts—which comprises 0.5% of the total: this, however, is spread over some nine months of the year, and at no season does it attain the numerical importance of the types referred to in the diagram.

The importance of fish to supplement our present-day rations requires no emphasis for the dietitian or the housewife, but the necessity of delivering the catch to the fishmonger as fresh and as palatable as possible is not sufficiently appreciated by fishermen or distributors. Sea-water bacteria, non-pathogenic to man, are the chief cause of bad fish. These organisms, which are found in large numbers in the gills and skin of freshly caught fish, multiply rapidly at ordinary temperatures and invade the flesh. Careful chilling on the fishing vessel by stowage in crushed ice considerably retards bacterial growth and is an important factor in retaining the freshness of the catch, but the fish must also be properly washed and gutted at sea and stowed with reasonable care. These principles are particularly important now that over half our supplies come from distant grounds and trawlers are obliged to make voyages of three weeks or more. The revised leaflet *Care of the Trawler's Fish*, published by the Stationery Office for the Department of Scientific and Industrial Research, explains these points in simple terms, and lists the steps to be followed in the handling and stowage of the catch.

Diagram showing pollen phenology in England and Wales, based on pollen-trapping experiments carried out in 1942-7. The horizontal lines indicate the periods during which the respective types of pollen may be expected to be present in the air, though in fluctuating amounts. The main season of incidence of each type is marked by a heavier line and the peak period for grasses only by a still heavier one. The percentage figures appended to the names of the various pollen types are based on counts made in the course of the survey referred to in the text. Other types, not shown here, made up the remaining 3% of pollens caught and identified.