Miscellanea

Ayan Dermatitis

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Dermatitis due to ayan wood (*Distemonanthus benthamianus*) is described. The main clinical features appear to be an initial slight itch followed later by intense erythema and pruritus often precipitated by washing. Previous work on the extractives of the wood have suggested that there may be two varieties of ayan, one rich in oxyayanin-B and the other rich in distemonanthin. Two other flavonoids, oxyayanin-A and ayanin, were found in both varieties.

Patch tests were carried out using the various extractives and the whole wood, and the results suggest that only oxyayanin-A and oxyayanin-B contribute to the sensitizing action. One type of ayan wood contains a preponderance of oxyayanin-B and the other a preponderance of distemonanthin; there is no quick method of distinguishing between the two, but it is the former which seems more liable to sensitize.

A small number of timbers, *e.g.*, mansonia (Bourne, 1956; Schulz, 1962), makoré (Sandermann and Barghoorn, 1955), guarea, and teak (Krogh, 1962, 1964; Schulz, 1962), are well known in the trade for the unpleasant symptoms that can be caused by the dust among workers handling the timber. The symptoms usually take the form of irritation of the eyes, respiratory passages or skin, though sometimes they are of a more general character. Information collected at the Forest Products Research Laboratory has shown that, in addition to these timbers, there is a further group of timbers which are only occasionally troublesome and for which the associated symptoms are less well authenticated.

Ayan (*Distemonanthus benthamianus*), which forms the subject of this communication, falls into the latter category and is a timber for which only two other reports of dermatitis and one of respiratory irritation have been brought to our attention during the last 20 years. The earlier cases of dermatitis were not followed up as far as we are aware, so it seemed appropriate, when the present case was encountered, that patch tests should be carried out to establish whether the patient had developed a sensitivity to ayan and, if so, which particular constituents were sensitizing.

Case History

J. McD., a man aged 56 years, had been employed by a firm of coffin manufacturers for 12 years. In addition to the traditional woods (oak and elm) the firm uses other timbers, among which the West African timber ayan is used occasionally. Although ayan wood is not used extensively in this country it has been imported for the past 20 years. It has only been used in coffin manufacture in the last 10 years or so.

Prior to his present employment the man had been employed in the building trade but not in a capacity which brought him into contact with wood, and he knew of no intolerance to wood until four years ago. He was then working in a department still known as the 'furnace', concerned with the disposal of wood shavings and sawdust. There is, in fact, no longer a furnace used and the waste material is now funnelled by a 'hopper' type of machine into large sacks. The patient and some colleagues are responsible for holding the sacks, pressing down their contents, and tying them.

Four years ago, whilst employed in this department, he was aware of a slight itch on the arms, chest, legs, crutch region, and dorsal aspects of the feet. He says that this was most troublesome on one particular day, and on washing at night he noticed marked redness of the skin in these sites with severe itching. This took some considerable time to settle, though he cannot remember the exact duration. He apparently suspected that the ayan wood might be the cause at this time. After the irritation had settled he had no further trouble until two years ago when, whilst working in the same department, ayan wood was used again and he developed a similar eruption.

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Six months ago, when he heard that ayan wood was about to be used once more, he deliberately missed his shift until he thought all the shavings would have been bagged. However, when he arrived at work he found a considerable amount of dust left from the previous shift which he suspected might still contain ayan. A similar clinical picture ensued with initial mild itch in the same sites followed by erythema and severe itching later in the evening after a bath.

His last attack occurred a few weeks ago. The management informed him that ayan was to be used once more and he was removed from the 'furnace' department to the general work of the yard. It was, however, a windy day and some of the bags burst and the dust was blown across the yard. Very quickly he noticed itching on the exposed parts, namely the hands and face.

We have not been able to inspect the skin at the height of any of his attacks but the main clinical features seem to be the initial slight irritation followed a few hours later by intense erythema and itching. At no time has vesiculation been noticed. His general health is good and there does not appear to be any systemic effect from the ayan dust in this case. There is no previous allergic history nor any family history of note.

Investigations Thirteen patch tests were carried out on the patient's back using the substances and solutions noted in the Table (Calnan, 1963). The dust samples were placed on a small square of gauze and held in position by an adhesive dressing. In the case of the solutions a small square of lint was dipped in the solution and covered by a piece of oiled silk and similarly held in position by an adhesive dressing. An exactly similar pattern of tests was performed simultaneously on a normal control subject. Neither subject was allergic to adhesives.

The subjects were told to report in 24 hours if there was severe itching on any test, but this did not occur and they were both seen 48 hours after testing, and the results were noted. They were asked to note if any other patches became red and itchy in the following 48 hours but neither observed this.

Results The results were graded visually by the size and intensity of erythema and the degree of swelling. In the patient the results were as shown in the Table. In the control subject all the tests were completely negative.

Discussion

The results demonstrate unequivocally that the patient had developed an allergy towards ayan. The reaction of the patient to ayan wood dust, unextracted, ether extracted, and ether + methanol extracted and to the crude extracts establish that the sensitizing substances are little affected by ether extraction but are completely removed by methanol extraction. Earlier investigations by King, King, and Sellars (1952) and King, King, and Stokes (1954)

TABLE

No.	Patch	Reaction ¹
1	Beech sawdust	—
2	Ayan sawdust (from Company)	++++
3	Ayan sawdust (from F.P.R.L.)	++++
4	Ayan (from Company) extracted 24 hrs. with ether	++++
5	Ayan (as in 4) extracted further 24 hrs. with methanol	—
6	Oxyayanin-B 0.1% in M.E.K.	+++
7	Ayanin 0.1% in M.E.K.	+
8	Methyl ethyl ketone (M.E.K.)	(±)
9	Distemonanthin 0.1% in ethanol	+
10	Crude methanol extract in ethanol	+++
11	Distemonanthin 0.1% in M.E.K.	(±)
12	Crude ether extract 0.1% in M.E.K.	+
13	Oxyayanin-A 0.1% in ethanol	++++

¹++++ strongly positive; +++ definitive positive; + slightly positive; (±) dubious minimal; — none;

M.E.K. = methyl ethyl ketone.

F.P.R.L. = Forest Products Research Laboratory.

of the extractable chemical constituents of ayan showed that four flavonoid compounds may be anticipated—ayanin (I), oxyayanin-A (II), oxyayanin-B (III), and distemonanthin (IV). In that work

- I. $R_1 = R_2 = H$
 II. $R_1 = OH; R_2 = H$
 III. $R_1 = H; R_2 = OH$

six batches of ayan were examined, five of which gave ayanin (ca. 0.1%), oxyayanin-A (ca. 0.08–0.15%), and distemonanthin (ca. 0.41–0.52%) whilst the sixth batch gave no distemonanthin but oxyayanin-B (ca. 0.67%) in its place. All four substances were available for patch testing and all produced some reaction. However, from the intensities it seems that distemonanthin and ayanin probably contribute very little to the sensitizing action of the wood dust. On the other hand, oxyayanin-A and oxyayanin-B, which produced strong reactions, are probably of considerable importance. These results are of particular interest as they suggest that ayan which contains large amounts of oxyayanin-B is more likely to cause trouble than ayan which is rich in

distemonanthin. Unfortunately, there is no quick method for distinguishing between the two types of wood, nor is it known how the two types are distributed in commercial supplies, but a variation in extractive content such as this may account for the sporadic occurrence of ayan dermatitis.

The above results do not exclude that there may be other unidentified sensitizing constituents in the crude methanol extract which are not so readily isolated.

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REFERENCES

- Bourne, L. B. (1956). *Brit. J. industr. Med.*, **13**, 55.
 Calnan, C. D. (1963). In *Clinical Aspects of Immunology*, ed. Gell and Coombs, p. 516. Blackwell Scientific Publications, Oxford.
 King, F. E., King, T. J., and Sellars, K. (1952). *J. chem. Soc.*, p. 92.
 —, —, and Stokes, P. J. (1954). *Ibid.*, p. 4587 and 4594.
 Krogh, H. K. (1962). *Brit. J. industr. Med.*, **19**, 42.
 — (1964). *Ibid.*, **21**, 65.
 Sandermann, W., and Barghoorn, A. W. (1955). *Holzfor-schung*, **9**, 112.
 Schulz, K. H. (1962). *Berufsdermatosen*, **10**, 17.

Pulmonary Hypersensitivity to the Grain Weevil

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A case of inhalant allergy to the grain weevil is described. Provocation inhalations of the weevil protein produced immediate responses shown by falls of as much as 25% in the F.E.V.₁₋₀. These changes were reversed by a bronchodilator. Arthus-type reactions also occurred approximately three hours after the inhalation of protein. In these the transfer factor was reduced by 25% and was not affected by a bronchodilator. Antihistamines were found to inhibit the immediate response but to have no effect on the Arthus reaction.

Coincident with the fall in transfer factor there were rises in the temperature and pulse rate. An Arthus-type as well as an immediate skin response was demonstrated. Precipitating antibodies were detected in the serum.

The similarity of these reactions to those seen in farmer's lung and to reactions to avian protein is discussed, together with the possibility of the wider implications of sensitivity to the grain weevil.

Pulmonary reactions to inhaled allergens are well recognized and seem to fall into two groups. The first is associated with an immediate reaction with wheezing and a change in the forced expiratory volume; and a second variety is associated with a more delayed response or Arthus-type hypersensitivity with systemic upset and a change in the transfer factor. The report of hypersensitivity to pigeon and budgerigar excreta (Hargreave, Pepys, Longbottom, and Wraith, 1966) has recently drawn attention to this latter type of reaction. This report showed that pigeon and budgerigar fanciers suffered from pulmonary disease associated with impaired

lung function. In particular there were changes in lung function associated with systemic upsets occurring some hours after the inhalation of the allergen and with a pattern rather similar to that of farmer's lung.

Asthma caused by the grain weevil (*Sitophilus granarius*) has been described (Frankland and Lunn, 1965; Lunn, 1966). Further pulmonary function studies, skin reactions, and antibody tests have been made on one of the subjects described. In particular the immediate and later effects of the inhalation of weevil extract and the effect of antihistamines in preventing reactions has been studied, together with changes in temperature, pulse, and skin reaction.

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