Plant Dermatitis
The Significance of Variety-Specific Sensitization

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It is now well recognized that allergic sensitivity to a plant may be restricted to a single botanical species, or may extend to related species in the same genus and to other genera in the same family (Rook, 1960, 1961). It appears to be less widely appreciated that sensitivity may be confined to one or a few horticultural varieties of certain common garden plants, although there are several incidental references to this phenomenon in the literature. The object of this present article is to report three new cases and to discuss the theoretical interest and practical significance of what appears to be a common occurrence.

To the botanist a variety is population within a species, this population bearing several distinctive and inheritable characters. The horticulturalist applies the term less rigidly to "any plant with distinctive characters not worthy of specific rank, the characters being permanent in that they can be maintained by vegetative or seminal propagation" (Stearn, 1951). A horticultural variety (sometimes called a cultivar) is a variety or a race subordinate to a species that has originated and persisted under cultivation. Horticultural varieties may be produced in several different ways. (Crane and Lawrence, 1952). They may be the result of careful selection and breednig within a single species, as in the case of **Primula obconica** (Hill, 1912) and will then come more or less true from seed. The horticulturalist has merely taken advantage of inherent genetic changes. Many other garden plants have been produced from two or more wild species by generations of hybridizing, as in the chrysanthemum and pelargonium ("geranium") and many of the tulips. Such hybrids must be propagated vegetatively and every individual specimen is then part of the same clone and all are necessarily identical in all respects. Still other varieties have resulted from spontaneous autopolyploidy : some of the best known tulips and hyacinths are sterile triploids. Here again propagation must obviously be vegetative.

Case 1.—A woman aged 57 was the owner of a small general store and greengrocery. For many years she had occasionally sold flowers although this was a very small part of her business. She regularly sold red and yellow tulips in bowls at Christmas and during the next three months sometimes sold as cut flowers tulips of many varieties brought in by local amateur growers. When she attended hospital in January 1951 with a basal-cell epithelioma, she was questioned about mild eczematous dermatitis of the backs of the hands. This she attributed confidently to her "Christmas tulips". She was equally confidnet that

she could handle other tulips with impunity. The "Christmas tulips" proved to be of the variety Keizerskroon. A patch test carried out with a leaf three weeks later was strongly positive. Tests with some other unidentified varieties of tulip were negative.

Case 2.—A woman aged 55 had worked as a florist's assistant for 30 years. From December 1954 until March 1955 she suffered from an intensely irritable vesicular dermatitis of the lateral aspect of the left ring finger, the medial aspect of the left middle finger and the lateral aspct of the right ring finger. The tips of both thumbs were thickened and fissured. After March she had no further trouble until December 1955 when the dermatitis recurred in the same distribution and was still present when she was referred to hospital in February 1956. She stated that tulips were responsible for the dermatitis and considered that the variety Rose Copeland was the main offender. Hyacinths and daffodils caused her no trouble, but the lily *Alstroemeria* provoked some skin irritation. Other employees and the proprietor experienced some discomfort from Rose Copeland. Patch tests were carried out with the leaves and stems of the four varieties of tulip which the patient handled most frequently. The reactions after 48 hours were as follows :

Athleet	Erythema	primary irritant reaction.
Alberio	Erythema	
John Gay	Erythema, oedema, papules.	
Rose Copeland	Erythema, oedema, papulovesicles extending beyond area of patch.	

Case 3.—A man aged 43 was a gardener for 2 years by a chrysanthemum grower. His previous employment as a gardener had involved only casual contact with these plants. He gave no family history of atopic disorders but 2 years ago had been treated for mild asthma wihch had not recurred. Early in September 1960 he developed an irritable eruption on both forearms which persisted in varying severity. Four or five weeks later his skin and eyelids became red and irritable and the latter became swollen. Throughout this period he was working continuously with chrysanthemums. He was referred to hospital on 27 October and was found to have diffuse oedema, erythema and scaling of the face and the flexor aspects of the forearms. He blamed the chrysanthemums for his trouble and believed that four varieties were mainly responsible. Two weeks later when the dermatitis had cleared, patch tests were carried out with leaves of the sixteen varieties of chrysanthemums grown at the nursery. The tests were read after 48 hours. The leaves of Susan Alesworth, Perfection, James Ryder, Serenus and White Hope, had provoked erythema, oedema and papulovesicles. There was no reaction to the twelve other varieties which included three of the patient's own suspects.

Through the good offices of Mr. John Gilmour, Messrs. H. Shoesmith Ltd. of Woking were approached for information concerning the origin of the varieties concerned. They reported that all the varieties

to which the patient reacted were seedlings from an old variety called Snowdonia, which in turn was a seeding from Blanche du Poitou. The varieties to which the patient failed to react were seedlings from many different varieties and were not derived from Snowdonia and had no common parent.

MECHANISMS AND INCIDENCE

The chemistry of the substances producing sensitization or primary irritant dermatitis has been fully elucidated only in the case of the poison-ivy family and a few plants of economic importance, such as celery and the lemon. There is, however, convincing circumstantial evidence that the s nsitizers and irritants all belong to the heterogenous group of non-essential compounds in plants known as secondary products. A genetic factor determines which of the secondary products can be produced by an individual plant although vigour of growth and cultural conditions may influence the relative amounts of these substances present at any given moment. Clearly the capacity of a plant to produce dermatitis is dependent upon the presence of the noxious substance, the quantity in which it is present, and its situation within the plant i.e. the readiness with which the skin can be contaminated.

Plant breeding is designed to increase the horticulturally desirable properties of plant, such as the colour and form of the flower and the length of the flowering season. These morphological and physiological features are of course genetically determined. It is to be expected that such changes in the genetic constitution of a plant will also modify the range of secondary products and hence involve the possibility of increasing or decreasing the capacity to produce dermatitis. *Primula obconica*, by far the commonest cause of plant dermatitis in Britain, occurs in many varieties, obtained by breeding and selection within the species. All varieties at present commercially available appear to be equally liable to produce dermatitis. Attempts have been made, by hybridizing, with related innocuous species, to breed a harmless variety. Georg Arends, a well-known German horticulturalist, devoted many years to this project, and although he was eventually able to breed a primin-free primula, he demonstrated that reduction of primin content involved reduction in beauty of flower (Teuscher, 1958).

It is instructive to consider in some detail some common plants in which varietal differences in the capacity to produce dermatitis have been recorded or are likely to exist.

Tulips.—The garden tulips, introduced into Europe in the sixteenth century are derived from an unknown hybrid complex (Hall, 1929). The ancestral species, natives of the Near and Middle East, have not been certainly identified. The numerous different forms and varieties have been obtained by selection and crossing of existing hybrids. Dermatitis among bulb handlers and florists is an important and common hazard for the tulip grower. On existing evidence it seems certain

that both primary irritant and sensitization dermatitis occurs. Cases 1 and 2 illustrate differences in the sensitizing capacity of tulip varieties. The bulb handlers have long been aware of these differences and for over twenty-five years the variety Rose Copeland has been regarded as the worst offender (Burtwistle, 1935). This variety also enjoys a bad reputation among florists. Van der Werf (1959) found that Preludium most commonly affected those cutting tulips, but he reported one patient who gave much sronger reactions to two other varieties.

Hyacinths.—The florist's hyacinth has been derived by selective breeding from *Hyacinthus orientalis* and its botanical variety, *H.o. provincialis*. Some of the best known varieties such as General de Wet, King of the Blues and Lord Derby, are sterile triploids (Crane and Lawrence, 1952). Primary irritant dermatitis is very common in the bulb fields. Marked differences in the capacity of varieties to produce primary irritation and the much less common but more severe sensitization dermatitis have been noted. Van der Werf (1959) found that L'Innocence, Carnegie and City of Haarlem were the worst offenders.

Narcissi.—The garden narcissi, which of course include the daffodils, are hybrids derived from various combinations of twelve or more wild species of the genus *Narcissus*. Dermatitis, often of great severity, is a srious problem in those cutting and packing the blooms. Either sensitization or primary irritant dermatitis may be provoked. That certain varieties are particularly liable to produce dermatitis has been known at least since 1910 (Walsh, 1910). Van der Werf (1959) has observed varietal differences in the bulb fields of Holland. Information collected during a recent visit to the Isles of Scilly suggested that the varieties Actaea and Princeps were most often incriminated (Bell, 1960).

Chrysanthemums.—The garden chrysanthemums, known collectively as *C. morifolium*, have been evolved through 2500 years by selection and hybridization from wild species of the Far East, of which *C. indicum* and *C. sinense* are the most important. Chrysanthemums are a much more common cause of sensitization dermatitis among both commercial growers and amateurs than is suggested by the paucity of published case reports. Although many growers are inclined to attribute special virulence to certain varieties, this phenomenon was not recorded by dermatologists until Olivier and Renkin (1954) described the case of a horticulturalist with dermatitis of the face and hands who gave a strongly positive patch test to the variety Petite Amie, but no reaction whatever to the eight other varieties which he grew. My Case 3 reacted only to the seedlings of a single parent variety.

Celery.—Celery is *Apium graveolens* and the numerous varieties in cultivation have been obtained by selective breeding within the species. The variety of celery known as Pascal Green grown in the United States was shown to have a greater tendency to produce dermatitis than some other varieties (Wiswell *et al.*, 1948; Palumbo and Lynn, 1953).

Pelargonium.—The pelargoniums (garden "geraniums") have been produced by selective hybridization of a number of wild species of South African origin. The part played by the various species in the formation of the different modern classes has been well reviewed by Clifford (1958). The zonal and the scented pelargoniums are known to cause dermatitis. Varietal differences in sensitizing capacity have not been recorded but seem likely to be present and should be sought.

THE SIGNIFICANCE OF VARIETAL DIFFERENCES IN SENSITIZING CAPACITY

Diagnosis.—Patients should always be patch tested with the actual horticultural variety or varieties with which they have been in contact. Unexpected and misleading negative tests may result from the choice of the wrong variety.

Management.—Since desensitization is seldom practicable, the recognition that the patient reacts to only one or a limited number of the varieties he wishes to grow may be of great importance to the commercial grower. By eliminating those varieties to which he reacts he may continue his occupation.

Investigation.—The demonstration by Arends of a genetic linkage between a biochemical character (presence of primin) and a morphological character (size and form of flower) has been mentioned. Careful comparison of the morphological features of the most powerfully sensitizing varieties of other plants, with those that do not sensitize, may make it possible to recognize potential sensitizers by some external character. Of the five varieties to which Case 3 gave positive reactions four are white or near white and one is pink. None of the varieties to which he failed to react is white. No conclusion can be drawn until many further observations have been recorded.

In the case of plants whose original parent species are known it would be of considerable interest to patch test patients who react to one or more of the modern varieties with any of the parent species which can be obtained.

SUMMARY

Three cases of plant dermatitis are reported, in which the patients were shown to react to only one or a limited number of the horticultural varieties they handled.

The mechanisms underlying this phenomenon are described and a short account is given of some of the plants concerned. Others likely to manifest this phenomenon are mentioned.

The significance of variety-specific dermatitis is discussed and its practical importance for the patient and the dermatologist is emphasized.

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