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CONTACT SENSITIVITY TO PLANTS AND BALSAMS

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Much of our fundamental knowledge of contact dermatitis derives from experimental sensitization with plants, such as *primula obconica* and poison ivy. It is hardly surprising that plant allergens are frequent causes of clinical contact dermatitis. In Denmark primula, wood tars and balsams rank among the ten most common substances giving positive reactions in standard patch tests (table 1). In six Scandinavian clinics it was shown that sensitivity to balsam of Peru was about as common as sensitivity to chromate and nickel (15).

Table 1. *Positive reactions to standard patch tests among 1831 consecutive patients with dermatitis (1963–64, Finsen Institute, Copenhagen)*

Neomycin	165 (9.0 %)	Rubber	91 (5.0 %)
Woodtars	88 (4.8 %)	Nickel	82 (5.4 %)
Coal tar	68 (3.7 %)	p-Phenylendiamine	61 (3.3 %)
Lanolin	55 (3.0 %)	Cobalt	60 (3.2 %)
Balsam of Peru	51 (2.8 %)	*Primula obconica*	58 (3.2 %)

The actual prevalence of sensitivity to plants is unknown, both as regards the general population and those occupationally exposed. Between 25 and 60 per cent of unselected Americans are sensitive to poison ivy (12, 13, 26). No single European plant causes nearly so many cases of dermatitis, but a cautious estimate suggests that primula sensitivity must occur in one per cent of Danish women. Gardeners consider plant dermatitis to be an unavoidable nuisance in their profession. Only severe cases are brought to the attention of dermatologists. Few are reported and our impressions of the frequency may be erroneus. Thus among hop-pickers in England dermatitis was assumed to occur in one out of 3000, but a close study revealed that one in 30 had some rash during the season of work (3).

The sensitizers. Few plant allergens have been identified, and those known are of varied chemical character, although mainly phenolics (2). In recent years the allergens in several exotic woods have been identified (16, 23, 24). The chemical work involved is impressive, the more so because the substances isolated are commonly unstable. The difficulties may be illustrated by the fact that Scandinavian workers for three decades have endeavoured to identify the allergens in turpentine (4, 8, 18, 19). They are now assumed to be oxidation products of Δ-3-carene, but the constitution is still unknown (8, 18). The chemistry of poison ivy is well clarified (5, 11, 12). It contains four catechols, differing in the number of unsaturated carbon-links in the side-chain. Probably most plant allergens comprise several substances, which cross-sensitize with their chemical precursors and with degradation products. As known from sensitivity to balsam of Peru sensitization does not necessarily include all the poten-

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Table 2. *Site of Plant Allergens*

Organ	Examples	Organ	Examples
Leaves	Most plants	Wood	Teak, rosewood
Glandular hairs	Primula obconica	Bark	Cinnamon
Pollens	American rag weed	Sap	Fir
Stem	Artichoke	Fruit	Orange
Root	Dahlia		

tial allergens (9). Thus, chrysanthemum sensitivity may be caused by several chemicals; it is sometimes highly specific, limited to one particular sub-variety while in other cases it comprises several other compositae of related tribes (20).

The allergens may occur in any element of a plant (table 2). This is of some importance, since false negative reactions may result if a wrong element of the plant is selected for the patch test (22, 25). The cause of artichoke dermatitis thus remained a riddle until it eventually appeared that only the stem would give positive patch test reactions (25).

The metabolism of a plant varies according to the hour of the day and to the season (2, 21). Such variations may be a source of error in patch testing with *primula obconica*. Measured by the incidence of sensitizations from standard patch tests with primula, the allergen content of the average specimens kept at a test laboratory is low in winter and high in summer (table 3, fig. 1). Similar seasonal changes are assumed to occur in woods and in balsams, but have not been demonstrable with poison ivy (12, 13).

Table 3. *Patch test sensitizations from Primula Obconica (1935–61)*

Month	Number	Per cent of cases tested
February		
Reactions on 1st–6th day	72	1.62
Late reactions	18	0.41
June		
Reactions on 1st–6th day	194	6.04
Late reactions	56	1.74

Plant dermatitis. Dermatitis provoked by plants may be allergic (20, 21), of primary irritant type (20,7) or a mixture of these. Some plants give phototoxic reactions (17, 20, 27).

In Scandinavia, *primula obconica* is the predominant cause of plant dermatitis. In Copenhagen five to eight per cent of all women referred for dermatitis in 1935–61 had positive patch test reactions to primula. Half of those sensitive had a primula dermatitis, 85 per cent were women (10). By comparison, dermatitis from other plants is rare (table 4 & 5), although several indoor plants occasionally cause eruptions in house-wives. Occupational dermatitis among florists and gardeners is quite common, usually caused by chrysanthemum, primula, narcissus and tulip.

The typical primula dermatitis is oedematous, with a linear arrangement of

SEASONAL VARIATIONS IN SENSITIZATIONS FROM PATCH TESTS WITH *PRIMULA OBCONICA* (LEAF) 1935—1961

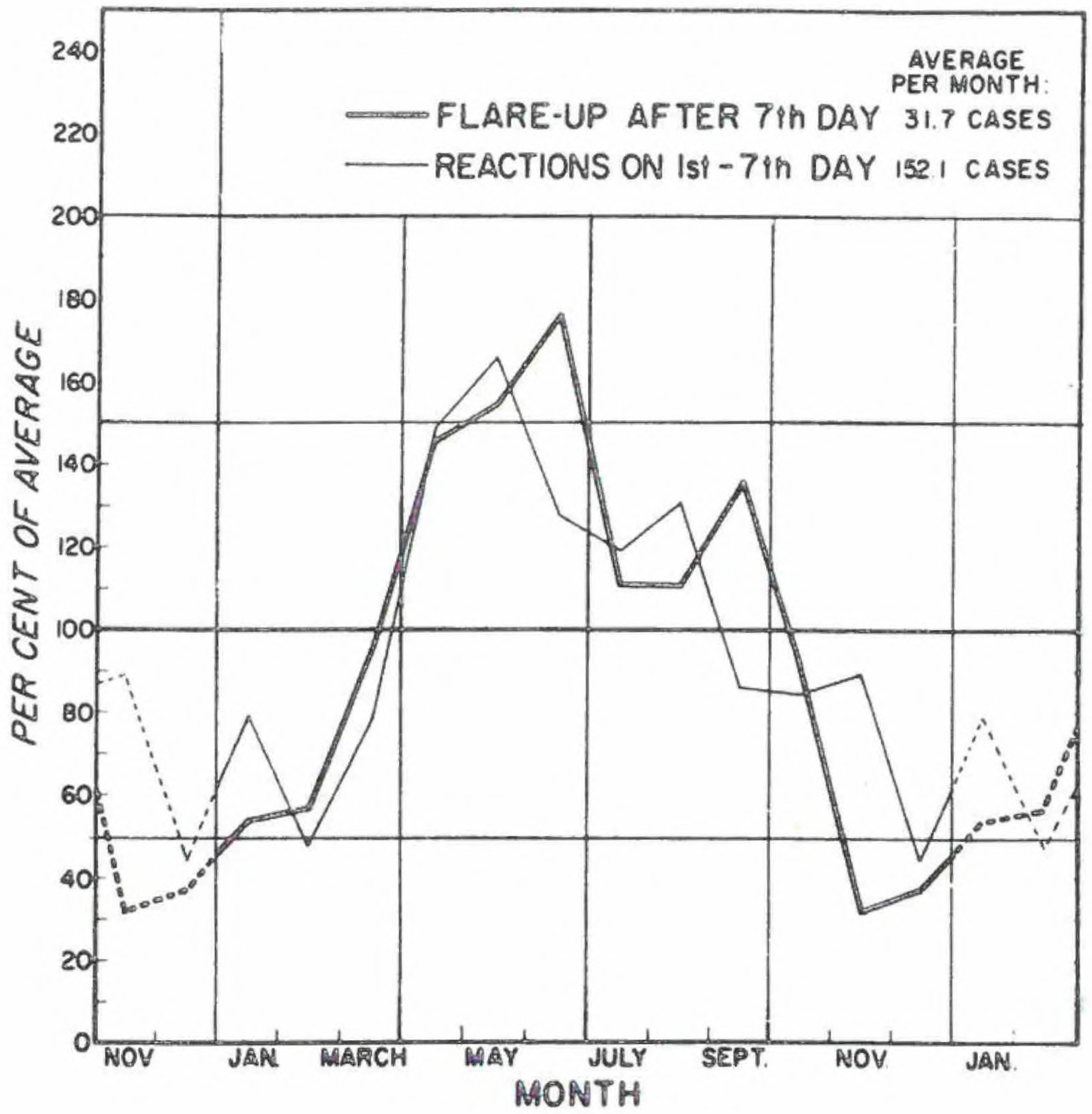

Fig. 1.

vesicles on hands, arms or face. This is so well known that it might be more useful to stress that half the cases have entirely different patterns, in no way suggestive of a plant dermatitis (10). Chrysanthemum dermatitis is lichenified and covers exposed areas of the skin. Bulbs from tulips, hyacinths and narcissi cause a keratotic, fissured dermatitis of the fingertips and underneath the free margin of the nails.

A rather small number of plant families cause dermatitis. Traditionally, however, dermatological interest has focussed on the sensitizing properties of plants, and on the risk of primary irritant reactions in patch testing. Negative reactions are rarely tabulated and never published.

A survey comprising all patch tests with plants indicates that the yield of positive reactions is strikingly low (table 4) due to repetitive testing with innocuous plants. During the six years selected for analysis, *primula obconica* which was included in the standard patch test series, accounted for 89 per cent of all positive reactions with plants; four species accounted for half of the 58 positive reactions obtained with other plants. Ninety-two per cent of the species tested gave negative reactions throughout (table 4). Some plants were fre-

Table 4. *Results of patch tests with plants, excluding primula obconica, which was tested routinely. Study comprising six years: 1944, 1947, 1950, 1953, 1956, 1959*

	Species	Total Tests	Positive Reactions	
	Number	Number	Number	Per cent
	23	595	58	9.7
	227	1513	0	0.0
Total	250	2108	58	9.7

quently tested. Thus, 600 tests were performed with six popular plants, in spite of consistently negative reactions.

A particular group of patients had been subjected to extensive testing, namely patients with a typical primula dermatitis and a false negative reaction to the primula obconica included in the standard patch test series. In such cases the tests should have included the patients' own primula.

The material supports the recommendation put forward by Rook (22): "The problem of patch testing with plants would be reduced to manageable proportions if confined to those species which often cause dermatitis and account for over 90 per cent of cases".

Dermatitis from woods is mainly of occupational origin (table 6). The incidence in a particular plant may be very high indeed. Among furniture makers in Bergen, Norway, 12 per cent (14) suffered from contact dermatitis from teak.

Table 5. *Results of patch tests with some popular plants (six years, cf. table 4)*

Species	Total Tests		Positive		Reactions
Name	Number		Number		Per cent
Primula obconica	11310		453		4.0
Geranium (Pelargonium)	135		13	29	8.8
Chrysanthemum	69		8		11.6
Tolmiea menziesii	145		4		2.8
Hibiscus (rose-mallow)	51		4		7.8
Begonia	147	600	0		0.0
Rhoicissus rhomb. (vine)	118		0		0.0
Philodendron	93		0		0.0
Cissus antarctica (vine)	86		0		0.0
Tradescantia	80		0		0.0
Hedera helix (ivy)	76		0		0.0

Table 6. *Contact Dermatitis from Timbers (Finsen Institute 1935–1963)*

Teak [1]	55 cases	Fir	12 cases
Rosewood (Palisander)	16 cases	Mahagony	9 cases

21 other types of timbers each caused one to four cases of contact dermatitis. Patients with dermatitis from fir and sensitivity to turpentine or colophony are rarely tested with saw-dust

[1] "Teak" includes Teak (Siam) and Iroko (Africa) which are chemically different and do not cross-sensitize.

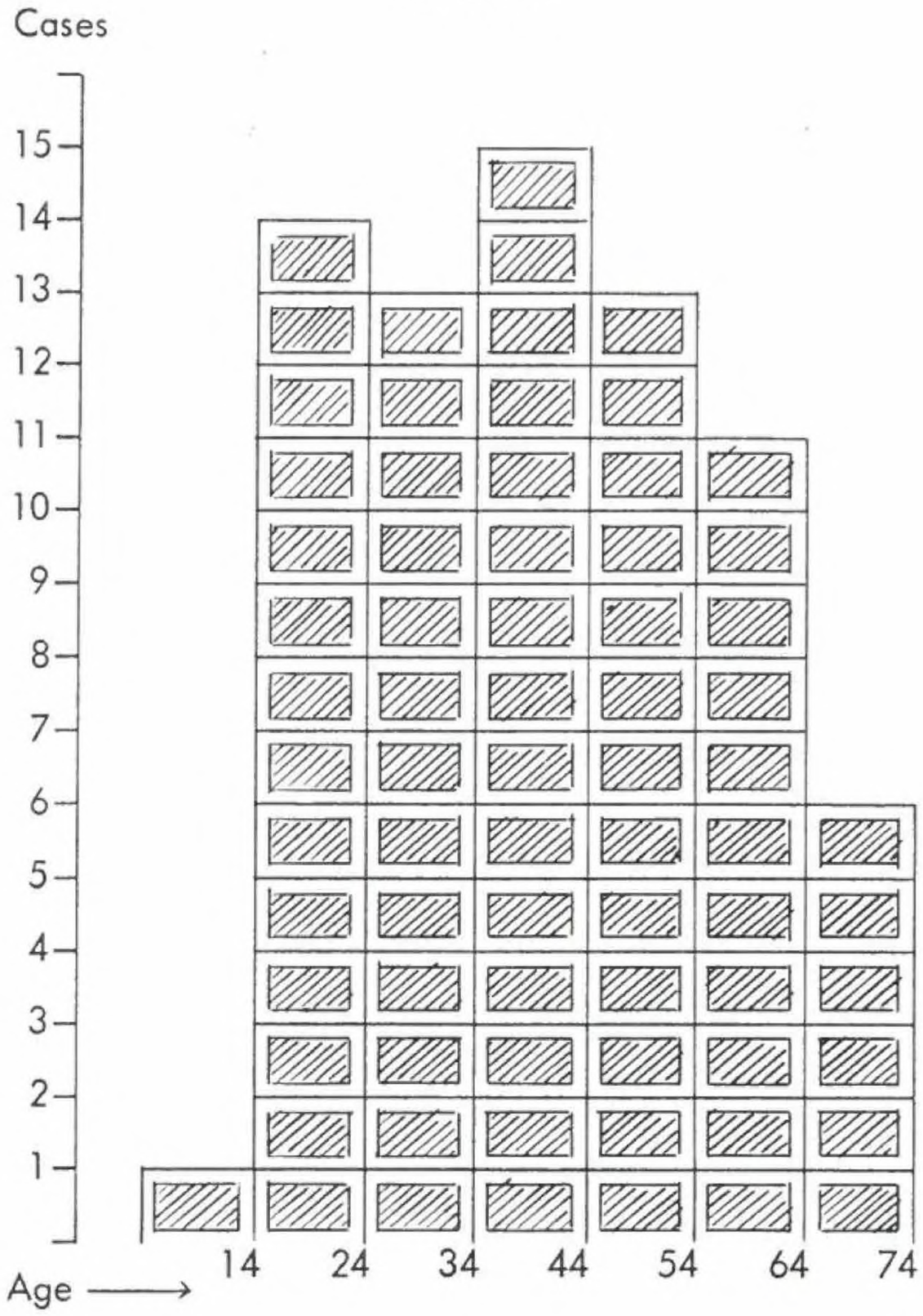

Fig. 2.

Table 7. *Regional distribution of contact dermatitis from exotic woods (73 cases)*

Site	Number of cases	Site	Number of beses
Face	47 (64 %)	Forearms	24 (33 %)
Neck	18 (25 %)	Elbow flexues	11 (15 %)
Hands	33 (45 %)	Genital regions	16 (22 %)

Occupational dermatitis occurs at any age (fig. 2) and mainly affects the exposed surfaces of the skin, first the face and then the hands and lower arms (table 7). Specific features are: lichenified patches is the elbow flexures, and the genital dermatitis, caused by dust penetrating the trousers during sawing and planing.

Non-occupational dermatitis from exotic woods may be caused by knife-handles, furniture and by hobby-work; but our material includes two house-

wives with teak dermatitis caused by handling of their husbands' working clothes.

The origin of a dermatitis provoked by the handle of a single kitchen knife is almost impôssible to trace. In order to investigate whether this cause of dermatitis was at all common, extracts of some tropical woods were included in the routine patch test series in Lund and in Copenhagen (6). A single case of dermatitis from a knife-handle of rosewood was detected among 519 consecutive patients tested. The number of positive reactions is, however, too low to justify routine testing with wood extracts (table 8).

Table 8. *Extracts of exotic woods in standard patch tests*

		Total	Positive
1964.	Rosewood (Palisander)	275	4 (1.5 %)
1965.	Teak (Siam)	249	2 (0.8 %)
	Iroko	249	2 (0.8 %)
	Babunga	249	0 (0.0 %)

An interesting outcome of the study was the peculiar coincidence of positive reactions to primula obconica and rosewood, suggestive of an immunochemical relationship (table 9). If confirmed, it may give a clue to the chemistry of primula allergens, since one allergen in rosewood is already known (24).

Dermatitis from balsams usually arises from therapeutic use of popular medicaments, but also from contact with balsams of fir and spruce (7). Sensitivity is of particular importance by including many other substances encountered in daily life (9) (fig. 3).

Table 9. *Coincidence of positive reactions to rosewood and primula obconica*

a) In standard patch tests (275 consecutive patients):

Rosewood	Primula	
+	neg	1 case
+	+	3 cases
neg	+	15 cases

b) Among patients sensitive to Primula (25 patients):

+	+	9 cases
neg	+	16 cases

Positive reactions to wood tars may have similar implications. In a recent study we found that 35 per cent of patients sensitive to wood tars were also sensitive to perfumes of popular toilet soaps and detergents.

Vegetables rarely give rise to contact dermatitis. Inclusion of potatoes, carrots, and strawberries into standard patch test series confirmed that sensitivity to these is rare (6). Orange dermatitis is more common, usually localized to the hands. In the canning industry most vegetables are handled by machines; but

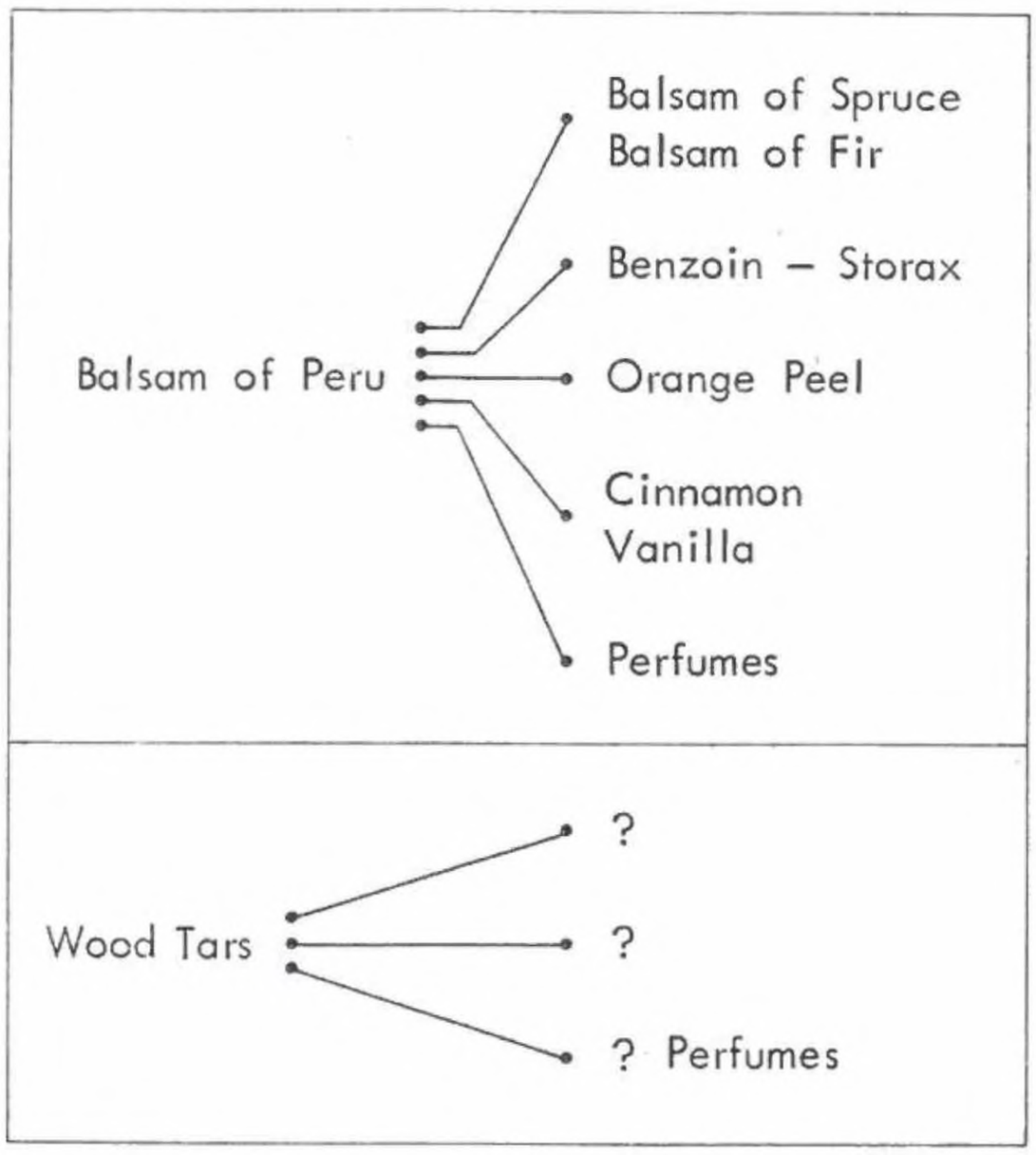

Fig. 3.

asparagus peeling causes a high incidence of dermatitis. Because of the short season of work most of the women engaged in the peeling get through without medical treatment.

Some unsolved problems. Little is known about dermatitis from weeds, wild plants and shrubs.

A survey of the causes and the prevalence of occupational dermatitis from plants is much needed and would certainly yield valuable information of the distribution and chemistry of the sensitizers in plants.

The time is ripe for fresh studies of the allergens in *primula obconica,* using modern methods of chemical technology.

Hyposensitization to tropical woods, chrysanthemum and other plant allergens may be feasible, and deserves a trial in cases of occupational incapacitation.

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