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# ECZEMAS DUE TO PLANT ALLERGENS IN MANUFACTURED PRODUCTS

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*Abstract:* Intolerance to plant allergens in manufactured products is widespread. Results of epidemiological investigations in STRASBOURG are given. The rate of allergy to *sesquiterpenic lactones* has fallen since 1974, due to the fact that the use of an ointment containing these lactones has decreased. Disguised forms of allergens are reviewed, for instance *limonene of Niaouli oil* (Biogaze), *colophony of "hypoallergenic" tapes or of testing material.* Chemical investigations are useful in prevention and in allergological control of medicaments.

*Key-words*: allergens, colophony, "hypoallergenic" tapes, limonene, sesquiterpenic lactones, testing material.

Plant allergy goes well beyond the context of horticulture or sylviculture, as the allergen may occur in all or part of the plant concerned (flower, fruit, pollen, root, leaf, wood) as well as in manufactured products containing the plant.

Intolerance to plant allergens in manufactured products is widespread: 261 cases of such allergies were recorded at the "Consultation d'Allergie de Strasbourg" between 1967 and 1972.

In more qualitative terms, allergy to plant products has considerable implications in view of the possibilities of cross allergy. For instance, a patient allergic to laurenobiolide (asesquiterpene lactone from Laurus nobilis in the Vegebom ointment) runs the risk of a relapse if he comes into contact with plants of the Compositae family which are thought to secrete sesquiterpene lactones (8) or with manufactured products containing Laurus nobilis oil (glossing of felt hats).

In this article we shall consider successively:

- the main plant allergens in manufactured products
- the results of epidemiological investigations concerning certain allergens
- various disguised forms of allergens
- the value of chemical investigations
- the prevention

## I - MAIN PLANT ALLERGENS IN MANUFACTURED PRODUCTS

The main allergens to be found in manufactured products are listed in Table I.

## II - RESULTS OF EPIDEMIOLOGICAL INVESTIGATIONS

1 - *The "epidemie" of allergy to sesquiterpene lactones* that occurred in Strasbourg from 1962 to 1973 (Table II) seemed due to the widespread use of an ointment containing an extract of Laurus nobilis (Vegebom). Costunolide, a sesquiterpene lactone of the germacranolide type, has been detected in laurel leaves; Tada has also identified laurenobiolide, another sesquiterpenic lactone of the germacranolide type in Laurus nobilis roots.

Another cause of allergy to sesquiterpenic lactones is eczema due to contact with liverworts (*Frullania tamarisci* and *Frullania dilatata,* in particular). Frullanolide, a sesquiterpenic lactone of the Eudesmanolide type, has been extracted from these liverworts (7).

Patients sensitive to Frullania are also sensitive to Vegebom and Laurus nobilis oil (5). This is because the various sesquiterpene lactones in these plants can produce cross-allergy reactions.

Whereas 10 or so cases of allergy to Vegebom were observed each year between 1962 and 1970, the rate has

*Table I*

| Allergy-inducing plant products | Origin | Use | Chemical allergen | Relapses observed or possible with | Clinical |
|---|---|---|---|---|---|
| Turpentine | – pine resin<br>– wood extract, paper manufacture by – product | Industry<br>– paint thinner<br>– varnish<br>Domestic polish | Oxidised $\Delta^3$ -carene<br>$\alpha$ pinène<br>$\beta$ pinene<br>limonene | Limonene<br>– of Biogaze<br>– of citrus fruit skin | Sub-ungual hyperkeratosis<br>pulpitis |
| Colophony | Pine resin | Industry (paint, varnish, solder)<br>Cosmetics (soap, hair-removing cream)<br>Pharmaceuticals (adhesive plaster) | Abietic acid and other resinic acids<br>Abietic alcohol | resinic acids, esters or salts of resinic acids | |
| Balsam of Peru<br>Benzoin | *Myroxolon balsamum*<br>*Styrax tonkinensis*<br>*Styrax benzoin* | Pharmaceuticals<br>cicatrizant, antiseptic anti-oxydant for ointment, perfume fixer | Coniferyl benzoate | Eugenol<br>Vanillin<br>Cinnamon | |
| Laurel oil | *Laurus nobilis* | Pharmaceuticals ointments<br>Clothes<br>Foodstuffs | Costunolide<br>Laurenobiolide | Sesquiterpenic lactones | Dermatitis from applied medicaments<br>Dermatitis of the forehead (hat)<br>Perioral dermatitis |
| Niaouli oil<br>Thyme oil | Niaouli<br>Thyme | Pharmaceuticals<br>Biogaze | Limonene<br>Terpineol | Limonene of turpentine or of citrus fruit skin | |
| Costus oil | Roots of *Saussurea lappa* (India) | Perfumes | Costunolide<br>Dihydrocostunolide<br>Dehydrocostunolactone | Sesquiterpenic lactones | Facial dermatitis |
| Oils or other Derivatives Of pyrethrum | *Pyrethrum* (chrysanthemum of Kenya, Congo) | Agriculture<br>Insecticide | Pyrethrosin | Sesquiterpenic lactones | Contact dermatitis<br>Asthma |

fallen sharply since 1974 and is now scarcely more than one a year (Table II). This is due to the fact that the use of this ointment has decreased considerably.

2- *Coniferyl benzoate*: Another, less conclusive example is that of allergies to balsam of Peru and benzoin. A cross allergy between balsam of Peru and benzoin is regularly observed. The chief allergen in benzoin is coniferyl benzoate; the same is probably true of balsam of Peru.

The fall in the incidence of these allergies also seems due to a decrease in use (Table III).

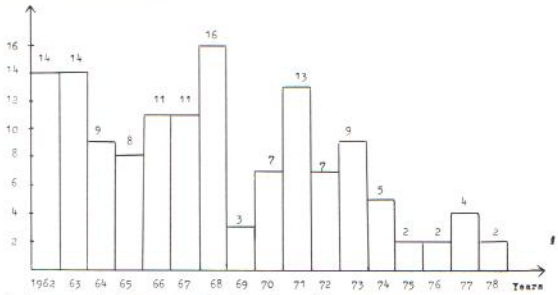
## III – DISGUISED FORMS OF ALLERGENS

Sometimes, unlike the above-mentioned cases, allergy to plant substances or their derivatives in manufactured products may be difficult to diagnose. This occurs when the ingredients are not specified on a product's packaging. Such is the case, for instance, with certain types of "hypoallergenic" adhesive plaster or testing material containing colophony (!) or some of their derivatives.

An example is "Tarpal", an adhesive plaster in

*Table II.*

Number of patients allergic to Frullania and/or Laurus nobilis or extracts thereof




1st case of allergy to Frullania at Strasbourg

respect of which some chemical investigations (3) revealed the following resin acids in 1972:

- abietic acid
- dehydroabietic acid
- palustric acid
- dextropimaric acid

A further example is French "hypoallergenic" Elastoplast concerning which, Foussereau and Lantz (4) detected methyl abietate, dehydroabietate and dextropimarate by chemical analysis. This list is not exhaustive, as Schlewer and Foussereau are supplementing the profile of colophony and detecting isodextropimaric and neoabietic acids (in the form of methyl ester). As a result, a patient allergic to colophony in ordinary english or french Elastoplast is highly likely to be intolerant to french "hypoallergic" Elastoplast (10), as may be seen from Table IV.

A third example is the presence of colophony or traces of colophony (or derivatives) in testing material (10). This presence may be the cause of pseudo-positive reactions when tests are being read.

*Table III.*

Percentage of allergies to balsam of Peru and benzoin in relation to other plant allergens

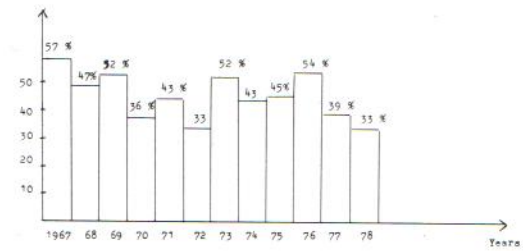



*Table IV*

| Tests<br>Patients | Colophony 10% in petrolatum | Ordinary Elastoplast | "Hypo-"allergenic" Elastoplast |
|---|---|---|---|
| CAN ... J. | ++ | ++ | ++ |
| LAG ... F. | ++ | ++ | ++ |
| FRU ... R. | ++ | ++ | ++ |
| TUN ... A. | ++++ | +++ | +++ |

## IV - VALUE OF CHEMICAL INVESTIGATIONS

This value of chemical investigations in a study of manufactured products containing plant substances seems obvious. Such investigations are useful in:

- diagnosis and prevention (examples of colophony and adhesive plaster),
- a study of cross allergies (example of sesquiterpenic lactones),
- the allergological control of medicaments.

An example concerning the allergological control of medicaments is Biogaze, whose allergenicity has been reported by various authors. At Lille, Huriez, collating 16 cases of allergy to Biogaze, reported 12 positive tests with niaouli oil and 5 with thyme oil, both of which are to be found in this medicament. Chemical investigations carried out at Strasbourg by Lantz and Foussereau revealed the presence of limonene and terpineol in these two oils (Table V).

An allergological study by patch tests among patients allergic to Biogaze shows that limonene is in most cases the allergen responsible for intolerance to thyme and niaouli oils (Table VI).

## V - PREVENTION

Prevention may take the following forms:

*Table V*

| Percentage of | Biogaze Thyme oil | Biogaze Niaouli oil |
|---|---|---|
| *a* pinene | 6 | 1.5 |
| *β* pinene | 3 | 1 |
| Limonene | 12 | 2 |
| Paracymene | 4.5 | 10.5 |
| Terpineol | 24 | 15 |
| X undetermined | 2.5 | 3 |

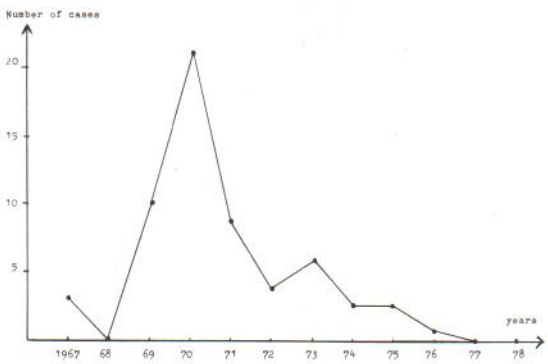
*Table VI*

| Substances | | Patients tested SCH... | LE... | SCHA... | DAN... | NE... |
|---|---|---|---|---|---|---|
| Tested at 1% | Niaouli oil | +++ | ++++ | ++++ | ++++ | ++++ |
| in alcohol | Thyme oil | +++ | ++++ | ++++ | ++++ | ++++ |
| Tested at 5% | Limonene | +++ | 0 | +++ | ++ | ++ |
| in Petrolatum | Terpineol | (+) | +++ | (+) | 0 | 0 |

1. Selection of substances at the manufacturing and consumption stages. For instance, the "epidemic" of allergy to turpentine in the Strasbourg area between 1969 and 1971 came to an end when importer switched from sylvestrus-pine turpentine to Portuguese turpentine (maritime pine containing no $\Delta^3$-carene) (Table VII).

Table VII.

*Allergy to turpentine*




2. Labelling of the ingredients of finished products, especially in the case of "hypoallergenic" products.

3. Allergological control of certain manufactured products.

4. Possibly, chemical or physico-chemical processing to remove a product's allergenicity without altering its intrinsic qualities.

## REFERENCES

1. Escande J. P., Foussereau J., Lantz J. P. & Basset A.: Le problème des fausses sensibilisations croisées dans les allergies de groupe aux allergènes végétaux, Rev. Franç. Allergol. *13:* 70, 1973.
2. Foussereau J., Lantz J. P., Escande J. P., Grosshans E. & Basset A.: L' allergie à la colophane des rondelles en polyéthylène des patch – tests, Bull. Soc. Franç. Derm. Syph. *78:* 604, 1971.
3. Foussereau J., Lantz J. P., Roth L., Escande J. P. & Basset A.: Recherche d'allergènes dans les adhésifs, Bull. Soc. Franç. Derm. Syph. *79:* 597, 1972.
4. Foussereau J., Lantz J. P. & Escande J. P.: L' allergie de groupe aux produits végétaux, Rev. Franç. Allergol. *13:* 355, 1973.
5. Foussereau J., Muller J. C. & Benezra C.: Contact allergy to Frullania and Laurus nobilis; Cross – sensitisation and chemical structure of the allergens, Contact Dermatitis *1:* 223, 1975.
6. Huriez C. & Martin P.: Conséquences pratiques des recherches d'isolement et d'identification chimiques des allergènes végétaux, Actualités allergologiques, 1974, Expansion Scientifique, Paris, 1974, 83–87.
7. Knoche H., Ourisson G., Perold G. W., Foussereau J. & Maleville J.: Allergenic component of a liverwort: a sesquiterpene lactone. Science *166:* 239, 1969.
8. Mitchell J. C., Fritig B., Singh B. & Towers G. H. N.: Allergic contact dermatitis from Frullania and Compositae, the role of sesquiterpene lactones. J. Invest. Dermatol. *54:* 233, 1970.
9. Mitchell J. C. & Dupuis G.: Allergic contact dermatitis from sesquiterpenoids of the Compositae family of plants. Br. J. Dermatol. *84:* 139, 1971.
10. Schlewer G., Chabeau G., Reimeringer A. & Foussereau J.: Etude des allergènes de type colophane et dérivés, utilisés dans des sparadraps, 1979, submitted.

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