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Reports on airborne dermatoses are mainly published in the context of occupational settings. Hence, in recent years, dermatologists and also occupational physicians have become increasingly aware of the airborne source of contact dermatitis, resulting mainly from exposure to irritants or allergens. However, their occurrence is still underestimated, because reports often omit the term ‘airborne’ in relation to dust or volatile allergens. For the present update, we screened the journals ‘Contact Dermatitis’ (July 2000 to December 2006); ‘Dermaitis’, formerly named ‘American Journal of Contact Dermatitis’; ‘La Lettre du Gerda’ (January 2000 to December 2006); and also included relevant articles from other journals published during the same period. This resulted in an updated list of airborne dermatitis causes.

Key words: airborne; allergic contact dermatitis; contact urticaria; irritant contact dermatitis; occupational; photo-allergic contact dermatitis.

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Contact dermatitis is defined ‘airborne’ on the basis of: (i) the presence in the environment of dust, droplets, or volatile causative agents; (ii) the clinical symptoms; (iii) the history of the patient and the follow-up; and (iv) the results of epicutaneous tests.

The nature of airborne reactions can be various, among which irritant, allergic, photoallergic, phototoxic, and contact urticarial, being the most common; some agents may induce more than 1 type of reaction and sometimes 1 dermatitis may mask another 1, such as for example, in the case of rosacea and airborne dermatitis in a farmer (1).

Reports on airborne dermatoses are mainly published in the context of occupational settings (2–8). Hence, in recent years, dermatologists and also occupational physicians have became increasingly aware of the airborne source of contact dermatitis, resulting mainly from exposure to irritants or allergens. Airborne contacts are still greatly underestimated although, because reports often omit this term in relation to dust or volatile allergens (9, 10). In some cases although, the responsible agents have been isolated by means of chemical analysis or direct microscopic study of the air or materials in the air (11). The different routes of exposition and relation to the clinical picture are sometimes misunderstood as well (12, 13).

The role of aeroallergens as a cause of allergic contact dermatitis or ‘allergic contact dermatitis-like’ atopic dermatitis is controversial. Occasionally, inhalation of pollens, dusts, and animal hair causes either flare-up of atopic dermatitis, or an apparent superimposed contact dermatitis; in some instances, the airborne allergens may produce positive patch-test reactions (i.e. with dermatophagoides, 14).

For the present update, we screened the Contact Dermatitis (July 2000 to December 2006); the Dermatitis, formerly named American Journal of Contact Dermatitis, and La Lettre du Gerda (January 2000 to December 2006); and also included relevant articles from other journals published during the same period. Table 1 gives the lists (that do not pretend to be exhaustive) with the airborne causes of dermatoses that we could retrieve. For previous reviews on this subject, we refer to Huygens and Goossens (2) and Lachapelle (10), the latter regarding irritant contact dermatitis.

Most of the allergens identified were in an occupational setting, if not the references are indicated with asterisk (Table 1). As in other recent reviews (2, 15, 16) plants represent a very important cause, particularly the Asteraceae (Compositae) family, for which recent advances in investigation of the clinical
Table 1. Causes of airborne dermatosis

<table>
<thead>
<tr>
<th>Allergic contact dermatitis</th>
<th>References</th>
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<tbody>
<tr>
<td>Plants, natural resins, and wood allergens</td>
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</tr>
<tr>
<td>Ambrosia deltoidea (triangle-leaf bursage)</td>
<td>(22*)</td>
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<tr>
<td>Cashew nut (family Anacardiacea)</td>
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<tr>
<td>Chamomilla recutita (German chamomile)</td>
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<td>Champignon</td>
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<td>Gaillardia</td>
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<td>Garlic</td>
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<td>Humulus lupulus</td>
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<td>Iris (lis)</td>
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<td>Latex</td>
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<tr>
<td>Laurus nobilis</td>
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<td>Machaerium schleroxylon (Santos rosewood)</td>
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<tr>
<td>Parthenium hysterophorus</td>
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<td>Piceae abies (spruce)</td>
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<td>Pinus sylvestris (Finish pine)</td>
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<td>Primula obconica</td>
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<td>Pterocarpus soyauxii Taub (Padauk wood)</td>
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<td>Triplochiton scleroxylon (Obache)</td>
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<tr>
<td>Tropical woods: Dalbergia retusa (Cocobolo wood)</td>
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<tr>
<td>Verbascum densiflorum (gordolobo)</td>
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<tr>
<td>Plastics, rubbers, and glues</td>
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<tr>
<td>Acrylates</td>
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<tr>
<td>Benzoyl peroxide</td>
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<tr>
<td>Epoxy acrylates</td>
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<td>Epoxy resin (and amines)</td>
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<td>Metals</td>
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<td>Cobalt</td>
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<td>Silver</td>
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<td>Industrial and pharmaceutical chemicals</td>
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<td>2-Amino thiophenol</td>
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<tr>
<td>p-Aminophenol</td>
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<td>Azathioprine</td>
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<td>Azithromycin</td>
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<td>α-Alkyl dimethylbenzylammonium chloride</td>
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<td>N,N-Bis[2-bromo-ethyl] aniline</td>
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<td>Budesonide</td>
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<td>2-Butin-1,4-diol</td>
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<td>Cefitofur</td>
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<td>Cyanamide and dibenzyl phosphate</td>
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<td>Cinnamal (cinnamic aldehyde)</td>
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<td>Chloroacetamide</td>
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<td>Diacetymorphine</td>
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<td>Diethylene glycol monobutyl ether</td>
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<td>Isothiazolinones</td>
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<td>Lansoprazole</td>
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<td>Meropenem</td>
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<td>Mesna</td>
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<td>Methotrexate</td>
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</table>
signs, diagnosis, and therapy have been published (17, 18*, 19*, 20, 21). Although mono- and sesqui-terpene-lactones, contained in Asteraceae, are by far the most frequently described airborne allergens in weed dermatitis, many other plant and wood allergens remain unidentified. The principal sensitizers although include phenols (Anacardiaceae), quinones (Tectona, rosewood), and terpenes (Frullania, Pinus).

Although airborne irritants are more difficult to demonstrate, they are certainly more common.
than allergic reactions (10). They include fibrous materials (such as glass fibres, rock wool, and grain dust), which give rise to mechanical dermatitis by friction, inducing both hyperkeratosis and acute dermatitis; wood and cement dust, which cause irritant reaction with lichenified dermatitis acute dermatitis; wood and cement dust, which give rise to mechanical dermatitis by friction, inducing both hyperkeratosis and acute dermatitis; wood and cement dust, which cause irritant reaction with lichenified dermatitis at the contact sites.

Conclusion

This survey provides an updated list of airborne causes of dermatoses, most often occupation-induced. Irritant and allergic dermatitis are the most common, but some causes of photoallergic reactions, the contact urticaria (syndrome), protein contact dermatitis, and erythema-multiforme-like eruptions have also been retrieved. The causes are multiple: plants, natural resins, and wood allergens; plastics, rubbers, and glues; metals; industrial and pharmaceutical chemicals; pesticides and animal feed additives, enzymes, and animal dander.

References

24. Groenewoud G C M, Jong N W, Burdorf A, de Groot H, Gerth van Wijk R. Prevalence of occupational allergy to...
73. Jappe U, Geier J, Hausen B M. Contact vitiligo following a strong patch test reaction to triglycidyl-p-aminophenol in


79. Yokota K, Michitsugu H. Occupational allergic contact dermatis from 1,6-bis (2,3-epoxypropoxy) naphthalene in a one-component epoxy coating. Contact Dermatitis 2004: 51: 154–155.


104. Antico A, Maroculli C. Occupational contact allergy to cetifiofur. A case of extensive dermatis for occupational contact allergy to cetifiofur (without cross-reactivity to other cephalosporins) is reported. Allergy 2003: 58: 957–958.


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118. Hardecastle N J, Gawrakodger D J. Occupational contact dermatitis to 1,2-benzoisothiazolin-3-one and 5-chloro-2-methylisothiazolin-3-one/2-methylisothiazolin-3-one in paint manufacturers. Contact Dermatitis 2005: 53: 115–116.


122. Yesudian P D, King C M. Occupational allergic contact dermatitis from meropenem. Contact Dermatitis 2001: 45: 53.


133. Lotti L, Difonzo E M, Fracalanci S. Photoallergic contact dermatitis from methyl chloroform (1,1,1-trichloroethane) and coupling agents HATU and HBTU. Contact Dermatitis 2006: 55: 47.


165. Kanerva L, Estlander T, Petman L, Mäkinen-Kiljunen S. Occupational allergic contact urticaria to yucca (Yucca aloifolia), weeping fig (Ficus benjamina), and spathe flower (Spathiphyllum wallisii). _Allergy_ 2001: 56: 1008–1011.


171. Rodríguez A, De Barrio M, De Frutos C, de Benito V, Baeza M L. Occupational allergy to fern. _Allergy_ 2001: 56: 89–90.


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