

to doses as low as 8.4 J/cm² and 7.2 J/cm². On questioning, all patients could relate their symptoms to forest work or to hobbies such as gardening or hunting in the forest. One female patient was the wife of a forest surveyor. Patch testing was performed with dried lichens in petrolatum applied on A1-test® patch (Imeco, Astra Agency Co., Sweden) and secured by porous adhesive tape (Scanpor®, Norgesplaster A/S, Oslo, Norway). The patch tests were applied in duplicate and the test sites examined at 48 h. After removal of the patch tests, one set was irradiated with UVA light (1.2 J/cm²) while the other set was covered with light-proof black paper. Afterwards both sets were left open (but the patients were wearing clothes all the time because of the winter climate). The sites were examined after 1, 2 and 3 days. In six patients a stronger reaction was produced by longwave UVR; one patient had a 3+ reaction after irradiation.

	Patch test results					
	Non irradiated			Irradiated		
	1+	2+	3+	1+	2+	3+
No. of patients reacting	9	11	0	4	5	1

Histologic examination of biopsies from positive patch test sites was typical of allergic contact dermatitis. The species of lichens isolated were: a) *Hypogymnia physodes*, containing atranorin, physodic acid and physodalic acid; b) *Hypogymnia tubulosa* containing atranorin and physodic acid; c) *Pseudovernia furfuracea* containing atranorin and physodic acid; e) *Physcia tenella* containing atranorin; f) *Parmelia sulcata* containing atranorin and salazic acid. The results indicate that lichens can cause both contact and photocontact dermatitis. The responsible allergen(s) are probably atranorin and possibly physodic acid and physodalic acid.

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Bleaching of hair by carbamide per hydrate

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In a pharmaceutical factory bleaching of all body hair was observed in three workers who had been involved in the manufacture and packing of powdered carbamide perhydrate. In 17 workers from neighbouring departments visible bleaching of all uncovered hair was noted. The hair of two women workers who had been heavily exposed was examined. Macroscopic examination revealed distal splitting of many hairs in addition to progressive bleaching of the hair of the head. The hair

gave the impression of being in strands and disordered. Microscopic examination showed club-shaped bulging of the hair shaft, cuticular defects, numerous transverse notches in the hair shaft and in some cases trichorrhexis nodosa and pili torti. In 20% dystrophies of the hair roots were found. The vellus hair, eyelashes, eyebrows and pubic hair, also light blond, showed no particular irregularities apart from occasional roughening of the cuticle.

The cost of hairdressing for the affected wo-

men increased threefold and the hair could no longer be set in cold permanent wave.

Mechanism of action

Carbamide perhydrate $O=C-NH_2 \cdot H_2O_2$ is an easily decomposing additive compound of urea and H_2O_2 . It decomposes to give urea and H_2O_2 at relative humidities above 40 %, at temperatures above 30°C or under the conditions prevailing on the skin surface. Hydrogen peroxide affects the hair in two ways through its oxygen in a nascent state:

- (1) Oxidation of the melanin into colourless compounds (Eckardt 1969)
- (2) Oxidation and decomposition of cystine and formation of cysteinic acid.

The fact that cystine accounts for 20 % of the amino acids of the hair keratin explains the damage to the hair shaft observed and the

ineffectiveness of cold wave perm solutions, because a majority of the disulphide bridges of the hair keratin are destroyed (Braun 1963, Orfanos & Ruska 1970, Orfanos & Mahrle 1971).

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Phototoxicity evoked by alpha-terthienyl

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Alpha-terthienyl is a thiophene compound belonging to a class of polyacetylenic compounds naturally occurring in many plants of the Compositae (Chrysanthemum) family (Bohlemann et al. 1973). Most of the plants commonly used for patch testing in suspected weed dermatitis contain these compounds. Many plants of this family evoke phototoxicity (Camm et al. 1975, Towers et al., in press) and we have identified some of the compounds which are responsible. One of these is alpha-terthienyl (Chan et al. 1975).

Methods and Materials

Patch test units – Patch No. 71 1½" × 2" plastic on adhesive tape. Duke Labs. Inc., South Norwalk, Conn. 06854

Light source – Westinghouse black light 20W. (F20T12/BL) six tubes. Source – skin exposure distance 30 cm

Chemical – alpha-Terthienyl isolated from *Tagetes* (marigold)

Photopatch testing

The compound, 1 % in petrolatum album, was applied to the flexure forearm skin in duplicate and covered with patches. One patch was removed at 24 h (1 d) and the site exposed to UVA for up to 20 min. The patch-covered site served as control (protected from light). 8-methoxypsoralen (xanthotoxin) 1 % in petrolatum album was also applied.

Test subjects – Volunteers were an adult white female, aged 28 years, and two adult white males, aged 50 years.

Results

Following removal of one of the patches, the treated site was exposed to UVA. Burning pain and erythema were noted at 12, 7 and 17 min respectively. In contrast, erythema was observed at the psoralen-treated sites about 48 h after UVA irradiation. To investigate the effect of field conditions, one of us (GHNT) applied alpha-terthienyl 1 % in petrolatum to the left forearm flexure under a patch, removed the patch after 12 h and exposed the skin to sun-