

Mite fauna of dust from passenger trains in Glasgow

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SUMMARY

The mite fauna of dust from cloth-covered seats of four passenger trains and bedding from a British Rail linen store in Glasgow was investigated; 22 samples containing 4488 mg of dust from a total surface area of 5.5 m² were taken. Sixteen samples were positive for mites and 33 specimens belonging to 10 species were found. The most common species were *Dermatophagoides pteronyssinus* (Trouessart), *Glycyphagus domesticus* (De Geer), *G. destructor* (Schrank) and *Euroglyphus maynei* (Cooreman). The species composition bore considerable resemblance to that of house dust (although the density of mites was far lower) and the mites have probably been transported from homes via clothing and pets. Only five intact specimens, which may have been alive at the time of sampling, were found. The dust from trains consisted mostly of particles of soot. Very few skin scales, the food source of house dust mites, were detected. The small numbers of intact mites found and the absence of an identifiable food source make it unlikely that permanent populations of mites survive in upholstered seats on trains.

INTRODUCTION

The mite fauna of house dust has been extensively studied since Voorhorst *et al.* (1967) identified the European House Dust Mite, *Dermatophagoides pteronyssinus* as responsible for the production of allergens associated with atopic asthma. However, very little information exists on house dust mites in dust habitats outside the home. Such studies would be useful because they would contribute to a better understanding of how house dust mites colonize homes.

The aims of this study were to discover whether mites were present in upholstered seats of passenger trains and if they were, how similar was the species composition to that of house dust, and also whether there were sufficient numbers to indicate the presence of a permanent population. Dust from public transport vehicles has apparently not previously been examined for mites.

MATERIALS AND METHODS

A total of 16 dust samples were taken from upholstered seats of two Diesel Multiple Units (DMUs) at Cokerhill Depot and two Electric Multiple Units (EMUs) at Polmadie Depot, Glasgow. All four trains had been in commission for approximately 20 years, operating on routes in the Strathclyde region. A further six samples were taken from clean blankets and pillows that had been stored for

a year, and freshly laundered sheets from the linen store at Glasgow Central Station. All samples were taken in the first week of June 1983.

Sampling was carried out as described by Colloff (1986) after the methods of Sesay & Dobson (1972). Dust was collected into polythene tubes using a portable industrial vacuum pump. The surfaces of four seats per sample were vacuum cleaned using a ziz-zag sampling pattern of twenty 1 m long sweeps taken in 1 min. This resulted in a coverage of 0.25 m²/min. using a vacuum hose nozzle with an internal diameter of 12.5 mm. Samples were sieved to remove large particles of grit and fibre. Aliquots of 50 mg of the dust were placed in glass petri dishes to which was added about 10 ml of lactic acid and a few drops of aqueous lignin pink solution. The mixture was heated at 40 °C for 3 h to clear and stain any mites present. The samples were scanned twice under a stereo-binocular microscope and the mites removed with a fine sable brush, washing in distilled water, mounted in gum chloral and examined and identified under a compound microscope. Mites were classified as damaged or intact as an assessment of whether they were alive or dead at the time of sampling (Arlian, Bernstein & Gallagher, 1982).

The materials present in each sample were identified as far as possible and recorded. No attempt was made to quantify the various constituents present.

RESULTS

A total of ten mite species were found. The most common was the European House Dust Mite, *Dermatophagoides pteronyssinus* which represented 46% of all mites found. Other mites regularly associated with the house dust environment were found including *Glycyphagus domesticus* (12%), *G. destructor* (9%), *Euroglyphus maynei* (9%) and *Tarsonemus fusarii* (3%). Of the other species present, *Tyrophagus putrescentiae* is associated with stored foods especially those with a high protein and fat content, *Bakerdania tarsalis* has been found in the soil and in nests of small mammals such as moles, *Tydeus interruptus* has been found in grain debris, *Phauloppia lucorum* is found in lichens and mosses on stones and trees, and *Haemogamasus pontiger* is a predator of astigmatid mites and is frequently found in warehouses and granaries.

Over twice as many mite specimens were found in DMUs as in EMUs. The former vehicles also had a far higher species diversity (9 species) than the latter (5 species). Why such differences existed is not known. Only one specimen, a female *D. pteronyssinus* from a blanket, was found in the linen store.

The dust from the train samples had extremely high levels of soot particles, forming by far the main constituent. Artificial and natural fibres were also present in large amounts, as were particles of grit. Small fragments of open cell foam rubber were also abundant. Human skin scales, the main food material of house dust mites, were present in very small amounts, although Clark (1974) pointed out that skin scales sampled from the air of the London Underground system may have become coated in carbon dust and were thus unidentifiable. Also present were small amounts of pollen and a few graminaceous seeds. The dust from the linen store consisted almost entirely of natural fibres. Only in dust from the blankets were human skin scales detected.

Table 1. *Species list of mites found in dust from passenger trains and train bedding in Glasgow*

Sampling locality...	Corkerhill (DMUs)	Polmadie (EMUs)	Glasgow Central (Linen store)	Percentage distribution
Species list				
Astigmata				
<i>Dermatophagoides</i>	8	6	1	46
<i>pteronysinus</i> (Trouessart)				
<i>Glycyphagus domesticus</i> (De Geer)	3	1	—	12
<i>G. destructor</i> (Schrank)	2	1	—	9
<i>Euroglyphus maynei</i> (Cooreman)	1	2	—	9
<i>Tyrophagus putrescentiae</i> (Schrank)	1	—	—	3
Prostigmata				
<i>Bakerdania tarsalis</i> (Hirst)	2	—	—	6
<i>Tydeus interruptus</i> Thor	1	—	—	3
<i>Tarsonemus fusarii</i> Cooreman	1	—	—	3
Cryptostigmata				
<i>Phauloppia lucorum</i> (C.L.K)	—	1	—	3
Mesostigmata				
<i>Haemogamasus pontiger</i> (Berlese)	2	—	—	6
Total intact mites	4	1	0	
Total damaged mites	17	10	1	
Total mites	21	11	1	
No. samples	8	8	6	
No. samples negative for mites	1	0	5	
Total weight of dust (mg)	1784	2448	256	
No. mites/100 mg dust	1.2	0.5	0.4	

DISCUSSION

Due to the problems and constraints of sampling dust from trains within British Rail depots, only four trains could be examined. This number is hardly representative of the total rolling stock of the British Isles. It was not possible to sample mattresses on Inter-City sleeper services, but since the mattresses are covered in plastic it is likely that mite numbers would be very low.

The mite fauna of the trains and train bedding was extremely impoverished in terms of numbers: the mean number of mites/100 mg of dust in 74 homes in Glasgow was 119 (Colloff, 1985). However, many of the species commonly found in houses were present. Of the species listed in Table 1, only *Phauloppia lucorum* and *Bakerdania tarsalis* have not previously been recorded in house dust in Glasgow (Colloff, 1985), although the former species is occasionally found in homes (Hughes, 1976).

It is suggested that the mites have been deposited on the seats in the trains via the clothing of passengers and from their pets. Hewitt *et al.* (1973) found mites of similar species to those recorded here in the clothing of over 73% of patients with histories of skin disorders (although the incidence was somewhat lower amongst a control group of normal volunteers). Also *D. pteronyssinus*, *G. domesticus*

and *G. destructor* have all been recovered from samples of dog hair combings (Colloff, unpublished observations).

In view of the very small number of intact mites found and the paucity of potential food material, it is unlikely that permanent populations of mites can survive in upholstery or bedding from trains. The risk to hypersensitive persons of inhaling mite derived allergens during train journeys must therefore be regarded as very low.

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