

House-dust mites and respiratory allergy: a note on the identity of *Dermatophagoides farinae* Hughes, 1961

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The work of Voorhorst and Spieksma and their colleagues (Voorhorst, Spieksma-Boezeman & Spieksma, 1964; Varekamp *et al.*, 1966; Spieksma, 1966; Voorhorst, 1966; Spieksma & Spieksma-Boezeman, 1967) has aroused widespread interest in the role of mites in respiratory allergy and especially in that of *Dermatophagoides pteronyssinus* and related species as major sources of the house-dust allergen. Following publication of the Dutch results, workers in many countries have investigated the antigenicity of *Dermatophagoides* species in relation to house-dust allergy. Among the numerous papers published on this subject during the past 6 years, several have described clinical studies using extracts either of *Dermatophagoides farinae* or of a species referred to as *Dermatophagoides culinae*.

D. farinae, which sometimes occurs in house-dust, was first described by Hughes (1961) from infested cereal products in Bristol, England, and *D. culinae* by De Leon (1963) from infested biscuit flour in Tennessee, U.S.A. De Leon considered that although it closely resembled *D. farinae*, *D. culinae* differed from it sufficiently, in respect of certain micro-morphological structures, for it to be regarded as distinct. Hughes (personal communication, 1963), however, considered that the characters used by De Leon to separate the two species showed wide intraspecific variation and were unreliable as a means of species separation. In her view De Leon's species was *D. farinae*. Fain (1967) shared this view and in his revision of the genus synonymized both species, making *D. culinae* the junior synonym. The continued use of De Leon's specific name *D. culinae*, sometimes in apposition to *D. farinae*, in a number of recent papers dealing with house-dust mite allergy has caused some confusion as to the identity or relationship of these species and requires explanation.

Since October 1963 a population of *D. farinae* (of American origin) has been continuously maintained in culture at the Pest Infestation Control Laboratory. In July 1966 a population of mites discovered in house-dust in North London by a colleague, G. E. Woodroffe, and initially identified as *D. farinae* was collected and reared in the laboratory on the same food and under the same physical conditions as the American mite. The two, however, were found to differ so widely in their rates of

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growth and development that I concluded that the populations were not con-specific but were either sibling species or some other closely related taxonomic form, e.g. race or variety, perhaps segregated by ecological or zoo-geographical differences.

Before this taxonomic problem could be resolved, interest stimulated by publication of the Dutch results (Voorhorst *et al.*, 1964) and by the preliminary findings of similar studies by British workers (Cunnington, 1967; Maunsell, 1967; Wraith, 1967; Maunsell, Wraith & Cunnington, 1968) led to numerous requests being made to this Laboratory for supplies of *D. pteronyssinus* for clinical research, which unfortunately could not be met owing to insufficient cultures of this species. We had ample supplies of cultures of *D. farinae* (American strain) and offered these as a substitute for use in preliminary studies of house-dust mite allergy, but in view of the unresolved taxonomic problem we used De Leon's specific name *D. culinae* to describe all cultures of the American strain of *D. farinae* that we distributed.

As soon as was practicable, a bio-systematic investigation of the two populations was initiated and, as a first step, a careful and detailed series of hybridization experiments carried out. The results of these experiments showed not only that each population was completely reproductively isolated from the other but that mutual attraction between opposite sexes of the different populations was also absent. While this sexual isolation was not in itself sufficient proof that separate species were present it was strong evidence for this conclusion.

At this stage a detailed micro-morphological investigation of the two forms was undertaken by my colleague, Dr D. A. Griffiths, using both light (phase contrast) and scanning electron microscopy. Simultaneously the type specimens (holotypes) of Hughes' *D. farinae* and De Leon's *D. culinae* were borrowed for similar close examination.

The conclusions of this investigation may be summarized as follows:

(i) The holotypes of *D. farinae* and *D. culinae* are con-specific and these names are, as Hughes (1963) and Fain (1967) claim, synonymous. The correct description of the species is therefore *D. farinae* Hughes, 1961 with *D. culinae* De Leon, 1963 as a junior synonym.

(ii) The laboratory populations of American origin labelled *D. culinae* (previously *D. farinae*—American strain—from which numerous cultures were supplied for clinical use) are *D. farinae* Hughes, 1961.

(iii) The laboratory population of British origin labelled *D. farinae* (house-dust, North London, 1966) differs in certain micro-morphological details from *D. farinae* Hughes, 1961. These differences coupled with the biological evidence of species separation mentioned above establishes the British strain as a discrete species new to science for which we have proposed the name *D. microceras* sp.n. A full description of this species has now been published (Griffiths & Cunnington, 1971). The two species are so similar morphologically, however, that they must be regarded as sibling species. It is probable that because of this close morphological similarity *D. microceras* has previously been misidentified as *D. farinae* by some workers.

To prevent further ambiguity or confusion it should be made clear that the species described as *D. culinae* in the following papers refers to *D. farinae* Hughes, 1961: Maunsell *et al.* (1968), Pepys, Chan & Hargreave (1968), Morrow Brown & Filer (1968), Stenius & Wide (1969), Munro-Ashman *et al.* (1970), Frankland (1970), Frankland, McEwan & Feinberg (1970) and El-Hefny & Frankland (1970). That described as *Dermatophagoides* sp. by Dasgupta & Cunliffe (1970) refers to *D. microceras* Griffiths & Cunnington, 1971.

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