PRESENT STATE OF RESEARCH ON HOUSE DUST MITES (PYROGLYPHIDAE) IN THE CZECH REPUBLIC*

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OBECNY STAN BADAŃ NAD ROZTOCZAMI KURZU DOMOWEGO (PYROGLYPHIDAE) W REPUBLICE CZESKIEJ

A bstract. Systematic research on house dust mites in the Czech Republic started in the early seventies, when mite fauna of human dwellings and distribution of pyroglyphid mites were studied. Special attention was paid to old-age pensioners' homes and children's sanatoria. Pyroglyphidae were found also in the city air and in the dust of city pavements, especially in localities with high occurrence of domestic pigeons. While *D. pteronyssinus* and *D. farinae* mostly occurred in permanently inhabited flats, *Euroglyphus maynei* prevailed in recreation houses and some hospitals. Autumn increase of population density occurred in both, *D. pteronyssinus* and *D. farinae* populations, however, the number of protonymphs was remarkable higher than that of other developmental stage in *D. farinae* population. Special rearing technique was developed for the mass-culture of mites and a Czechoslovak patent was assigned to the technology of allergen preparation for the diagnostics and the desensibilization of patients with house-dust allergies.

After a group od Dutch scientists (1964-1969) had found out that house dust mites of the genus *Dermatophagoides* produced an allergen causing atopic asthma and rhinitis in susceptible persons, an extensive research on the bionomy, taxonomy and medical importance of these mites started in many countries. However, the attention was given to pyroglyphid mites in the Institute of Parasitology, Czechoslovak Academy of Sciences already in 1962, when SPIEKSMA-BOEZEMAN have sent the first samples of house dust mites for determination to Dr. K. SAMŠIŇÁK to Prague. The pertinence of these mites to the genus *Dermatophagoides* was then confirmed. The record of pyroglyphid mites from humans or human vicinity in the Czech Republic are still of earlier date. In 1958 *Dermatophagoides* mites were found in association with a case of dermatitis of unknown etiology in a neglected female patient in Prague (SAMŠIŇÁK et al. 1972). Another case associated with alopecia areata in another female patient was reported by TOMÁNEK (1960).

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Systematic research on the house dust mites was initiated in the Czech Republic ten years later, starting with faunistic studies and studies on distribution of allergogenic mites in human dwellings (SAMŠIŇÁK et al. 1972). Four species of pyroglyphid mites were determined in the dust of homes in the Czech Republic, viz. Dermatophagoides pteronyssinus (TROUESSART, 1897), D. farinae (Hughes, 1961), Hirstia domicola FAIN, OSHIMA et BRONSWIJK, 1974 and Euroglyphus maynei (COOREMAN, 1950) (SAMŠIŇÁK et al. 1978a). Both Dermatophagoides species were frequently found in horse-hair mattresses and in mattresses stuffed with card wool (wedding) or sea-weed. No mites were found in molitan mattresses (SAMŠIŇÁK et al. 1972). Pyroglyphid mites were found most often on the sides of mattresses, less often on the bottom part and least on the top side of mattresses (DUSBABEK 1979). While Dermatophagoides species occurred mostly in older buildings heated by coal stoves (DUSBABEK 1975), Euroglyphus maynei prevailed in private recreation houses inhabited periodically and in several hospitals (SAMŠIŇÁK et al. 1977, VOBRÁZKOVÁ et al. 1979, 1986). House dust mites frequently occurred in beds of old-age pensioners' homes, mostly situated in old stone buildings and monasteries, with central heating or heated by coal stoves, with high mean relative humidity (up to 62% during autumn) (DUSBÁBEK 1975, SAMŠIŇÁK et al. 1978b). On the other hand, few mites were found in children's sanatoria and mountain health resorts



Fig. 1. Structure and density changes of *Dermatophagoides farinae* population in 1 g of house dust in a Prague old-age pensioners' home during the season 1972-1973

(SAMŠIŇÁK et al. 1978b, 1985). D. pteronyssinus prevailed in homes where children suffered from eczema (SAMŠIŇÁK et al. 1978a, VOBRÁZKOVÁ et al. 1986).

Population structure and dynamics of the *D. farinae* (Figs 1 and 2) and of mixed population of *D. farinae* and *D. pteronyssinus* were studied by DUSBABEK (1975, 1979). No essential differences were observed in the seasonal dynamics of



Fig. 2. Percentile comparison of the structure of *Dermatophagoides farinae* population and its fluctuations throughout the season 1972-1973 in a Prague old-age pensioner's home. The dominance of protonymphs and decrease of portion of adults during the winter months is apparent

D. farinae and D. pteronyssinus populations and the highest population density of both species was recorded from June to August, but till December in several cases in D. farinae. The occurrence of protonymphs prevailed in the population of D. farinae. The number of protonymphs was several times lower in the population of D. pteronyssinus than that of other developmental stages. The determining factor in the occurrence of pyroglyphid mites in the house dust seems to be the frequency of optimal values of relative humidity, i.e. values ranging from 60 to 80% R.H. The amplitude of temperature changes and frequency of their fluctuation is obviously more important than absolute values of temperature. A distinct increase of mite population density in mattresses was observed only in the period, when the monthly mean relative humidity in rooms was higher than 47-50% concerning *D. farinae*, and 60-65% concerning *D. pteronyssinus*.

The studies on pyroglyphid mite occurrence in the city air and in the dust of city pavements confirmed the presence of D. pteronyssinus and E. maynei in both samples of dust, from stations of the air pollution sanitary inspection and from city pavements mostly in places with high occurrence of domestic pigeons (VOBRÁZKOVÁ and SAMŠIŇÁK 1981, SAMŠIŇÁK and VOBRÁZKOVÁ 1983, 1985).

The studies on house dust mite taxonomy, especially the taxonomic position of D. scheremetewskyi BOGDANOV, 1864 reached the conclusion that TRAVER'S (1951) synonymy of D. pteronyssinus (TROUESSART, 1897) with D. scheremetewskyi was correct (SAMŠIŇÁK et al. 1982). However, as the name D. pteronyssinus is well-established in both the medical and applied zoology literature, the proposition was given to the International Commission for Zoological Nomenclature to include the name D. pteronyssinus in the list of valid names (nomina conservanda) with D. scheremetewskyi as its synonym.

Special attention was paid to the rearing techniques of house dust mites in the laboratory (VOBRÁZKOVÁ 1979). This effort resulted in the development of mass-rearing techniques and the regular supply to the Institute of Sera and Vaccines in Prague (SEVAC) of the whole culture and pure mites for preparation of diagnostic and desensibilizating antigens for diagnostics and treatment of mite allergies. The procedure of the allergen preparation was covered by a Czechoslovak patent.

APPENDIX

List of species of mites (Acari) found in house dust in the Czech Republic (after DUSBÁBEK 1975 and SAMŠIŇÁK et al. 1978a, b)

Family Pyroglyphidae

Dermatophagoides farinae HUGHES, 1961 Dermatophagoides pteronyssinus (TROUESSART, 1897) Euroglyphus maynei (COOREMAN, 1950) Hirstia domicola (FAIN, OSHIMA et BRONSWIJK, 1974)

Family Acaridae

Acarus farris (OUDEMANS, 1905) Tyrophagus putrescentiae (SCHRANK, 1781) Acotyledon sp. Sancassania sp. Schwiebea menzeli (TÜRK et TÜRK, 1957) Thyreophagus entomophagus (LABOULBENE, 1852) Calvolia sp. Gohieria fusca (OUDEMANS, 1902) Chortoglyphus arcuatus (TROUPEAU, 1879) Glycyphagus domesticus (DE GEER, 1778)

Glycyphagus destructor (SCHRANK, 1781) Glycyphagus privatus (OUDEMANS, 1903)
Dermacarus oudemansi (Türk et Türk, 1957)
Anoetus feroniarum (Dufour, 1839)
Anoetus laboratorium (Hughes, 1950)
Family Tarsonemidae Tarsonemus sp. Purmotas harfai (OUDERADIS 1936)
Tyenoles heijst (OUDEMANS, 1950)
Family Cheyletidae
Cheyletus erualitus (SCHRANK, 1781)
Family Tetranychidae Metatetranychus sp.
Family Trombiculidae
Neotrombicula sp.
Supercohort Oribatei
Micreremus brevipes (NICOLET, 1885)
Zygoribatula exilis (MICHAEL, 1888)
Punctatoribates punctum (C. L. KOCH, 1839)
Oppia sp.
Suctobelba sp.
Family Neoparasitidae
Kleemannia sp.
Family Accossidae
Melichares keegani (Fox 1947)
Melichares dentriticus (Represe 1918)
Lasioseius herlesei (OLIDEMANS 1938)
Proctolaelans sn
Family Domanyosides
Dermanussus gallings (DE GEER 1779)
Haemogamasus pontiger (BEDIESE 1001)
machioguniusus poiniger (Deklese, 1704)

REFERENCES

- DUSBÁBEK F. 1975. Population structure and dynamics of the house dust mite Dermatophagoides farinae (Acarina: Pyroglyphidae) in Czechoslovakia. Folia Parasitol. 22: 219-231.
- 1979. Dynamics and structure of mixed populations of *Dermatophagoides farinae* and *D. pteronyssinus*. In: J. G. RODRIGUES (Ed.), Recent Advances in Acarology. Academic Press, New York, San Francisco, London, Vol. 2: 173-177.
- SAMŠIŇÁK K., DUSBÁBEK F., VOBRÁZKOVÁ E. 1972. Note on house dust mites in Czechoslovakia. Folia Parasitol. 19: 383-384.
- KAŠIAKOVÁ A., VOBRÁZKOVÁ E. 1978a. Životné prostredie a analýza vzoriek domáceho prachu u pacientov s atypickým ekzémom. Bratisl. Lek. Listy 69: 528-534.

- MAKOVCOVÁ Š., ZVONÁR J., VOBRÁZKOVÁ E. 1985. Roztoče čeledě Pyroglyphidae v tatranských liečebnách respiračných chorob. I. časť. Fysiatr. Vestn. 63: 78-84.
- VOBRÁZKOVÁ E. 1983. Mites from the city pavement. Věst. Čs. Spol. Zool. 47: 118-121.
- - 1985. Mites from the city pavement. Zbl. Bakt. Hyg. I. Abt. Orig. B 181: 132-138.
- - DUBININA H. V. 1982. Contribution to the taxonomic status of Dermatophagoides sheremetewskyi Bogdanoff, 1864. Folia Parasitol. 29: 375-376.
- ŠPIČÁK V. 1977. Zeitweise bewohnte Rekreationsräume als Stellen des erhöhten Vorkommens der Pyroglyphiden. Allergol. Immunopathol. 5: 415.
- - 1978b. Investigation on the fauna of beds in flats, children's sanatoria and old-age homes. Folia Parasitol. 25: 157-163.
- TOMÁNEK J. 1960. Alopecia areata s nálezem roztoče Dermatophagoides scheremetewskyi (BOG-DANOV 1864). Čas. Lék. Českých 99: 311-312.
- TRAVER J. R. 1951. Unusual scalp dermatitis in humans caused by the mite Dermatophagoides. Proc. Ent. Soc. Wash. 53: 1-25.
- VOBRÁZKOVÁ E. 1979. Rearing and maintaining a stock of the family Pyroglyphidae in the laboratory. 3rd Symp. Allergol. Immunol. Soc. Socialist Countr., Abstr.: 242.
- KAŠIAKOVÁ A., SAMŠIŇÁK K. 1986. Analysis of dust samples from the clinical environment of children with eczema. Angew. Parasitol. 27: 53-55.
- SAMŠIŇÁK K. 1981. Roztoči z prachu velkoměsta. Zprávy Čs. Spol. Parasitol. 21: 30.
- ŠPIČÁK V. 1979. Allergogenous mites (Acari: Pyroglyphidae) in private recreation houses. Folia Parasitol. 26: 343-349.

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