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ALLERGOGENOUS MITES (ACARI: PYROGLYPHIDAE) IN PRIVATE RECREATION HOUSES

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Abstract. The bed fauna of periodically inhabited dwellings markedly differs from the bed fauna in town apartments, both in quantity—a higher number of mites, and quality—an important dominance of the species *Euroglyphus maynei* which makes up 70.4 % of mites in country cottages, but only 28 % in town apartments used by the owners of such recreation houses. In other apartments it is very rare. There differences are explained by the specific regime of humidity and temperature in the periodically inhabited rooms. The patients' worsening condition is apparently caused by quantitative changes.

Cases of allergic affliction with a marked worsening of the health condition of patients sensitive to the house dust after their return from private country cottages and bungalows (henceforth recreation houses) are interesting, but inadequately elucidated yet. These houses are usually situated in a perfectly preserved natural environment. Within the investigations of these cases we also dealt with the bed fauna of such houses and compared it with the bed fauna in the town apartments inhabited by the owners of the said recreational houses.

MATERIAL AND METHODS

We selected four recreation houses which we examined at one-month intervals throughout the year.

1. A wooden bungalow with wood-panelled inside walls. It was situated in a lovely natural environment in Central Bohemia, in the vicinity of a fishpond. It was inhabited during the summer, on weekends in the winter. Two beds were examined—a couch with sea grass upholstery and a bed with a straw mattress, which the owner replaced with old sea grass mattresses after our first examination in January.

2. An older wooden bungalow with inside wood panelling. It was less taken care of, was situated in a garden belonging to a country cottage in NE Bohemia, used for summer vacation only. House dust samples were collected from a couch with sea grass upholstery.

3. A brick-walled country cottage dating from the 19th century, covered with plastered and whitewashed walls inside. It was situated in the urban area of a small town in NE Bohemia with the bungalow mentioned in item 2 located in its garden. It was inhabited by a family during summer vacations and on weekends, one member of the family using it throughout major part of the year. The mattrasses used there were padded with sea grass.

4. A wooden country cottage, built at the beginning of 19th century, with simple timbering, newly plastered and whitewashed inside walls and furnished in the twenties of this century. It was situated in the covered urban area of a small town in NE Bohemia and surrounded by a large garden. The couch examined had horsehair upholstery. All four recreation houses were heated with coal.

House dust was regularly collected every month from the mentioned houses and analysed by modified flotation method (Samšiňák et al. 1974a). A total of 65 samples were collected from recreation houses and 51 samples from apartments and examined on the presence of mites. Due to a very specific microclimate of the said houses, namely as far as humidity was concerned, thermohygrographs were installed in them.

RESULTS AND DISCUSSION

The microclimate in a closed small recreation house is of a quite different character than the microclimate in a regularly inhabited apartment. The thermohygrographs showed that after leaving and closing the recreation house the inside temperature changes very gradually and evenly. The humidity, which is always above the standard norm in the inhabited space, is rising as gradually and evenly. The mean relative humidity in apartments is about 30 %, in recreation houses 75 %. After the dwelling space is aired and inhabited again the humidity is rapidly falling. In winter, after the rooms are inhabited and heated, the temperature rapidly rises and is accompanied by an almost simultaneous fall of humidity. The process also repeats itself during a longer stay, when the temperature curve reveals a regular diurnal rhythm. (Fig. 1).

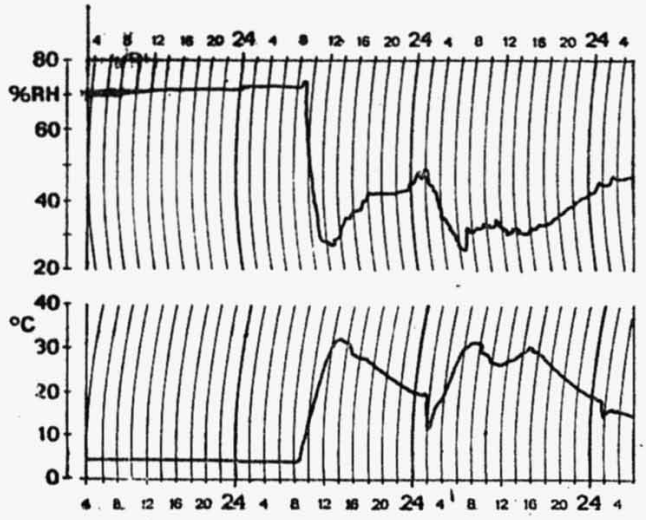

Fig. 1. A section of thermohygrograph recording made in a recreation house. After the dwelling is inhabited and heated the humidity decreases sharply. After the owner's departure the temperature is dropping and the humidity rising again until the owner's subsequent visit a week later.

The seasonal dynamics of mites found is given in Fig. 2 and a list of mites with relevant percentages is presented in Table 1. The following notes may be added to the respective findings:

a) *Euroglyphus maynei* (Cooreman, 1950) may be encountered in the bed fauna of normal apartment only exceptionally. The paper of Samšiňák et al. (1978) reveals that only 0.38 % of this species was present in the total number of mites found and only 1.2 % in samples examined. In the old-age homes the percentage of mites present in the total bed fauna was as low as 0.28, but it was higher in samples examined (2 %). On the other hand, the high percentage found in recreation houses (70.4 %) and in samples examined (86.1 %) is quite surprising. Another phenomenon became manifest in town apartments of the owners of private recreation houses. A marked dominance of the species *E. maynei* was also demonstrated here, representing over one quarter of the mites found and over one half in samples examined. This fact indicates that primarily man himself belongs to the important disseminators of mites of the family Pyroglyphidae, as evidenced by findings in the human hair (Traver 1951), in cut hair at the hairdresser's or barbers's (Samšiňák et al. 1972). Here may be also included findings described in connection with cases of various skin afflictions where the role of mites has not been elucidated enough so far (Bogdanoff 1864, Tománek 1960, Dubinin et al. 1956 etc.) The high mite occurrence in small recreation houses is apparently due to the higher humidity in these houses. A requirement for higher humidity is also observed in our laboratory mite colonies where the species of the genus *Dermatophagoides* are thriving at the humidity up to 80 %, while *E. maynei* requires humidity

of 85 %. The dependence on the padding material also becomes a factor here. Thus, the couch with sea grass upholstery in the house No 1 contained 42 pyroglyphids per 1 g of house dust, while the straw mattress in the bed of the adjoining room revealed only 2 pyroglyphids (examination in January). After the owner replaced the straw mattress with mattresses padded with sea grass, the mite numbers in the two sleeping places rapidly balanced, reaching in July 454 and 378 mite specimens per 1 g of pure *E. maynei* culture respectively.

b) Species of the genus *Dermatophagoides* ranked second as far as the number of specimens and the number of occupied beds are concerned. The most numerous was *D. pteronyssinus* again. Its occurrence was dealt with in our previous paper (Samšiňák et al. 1978).

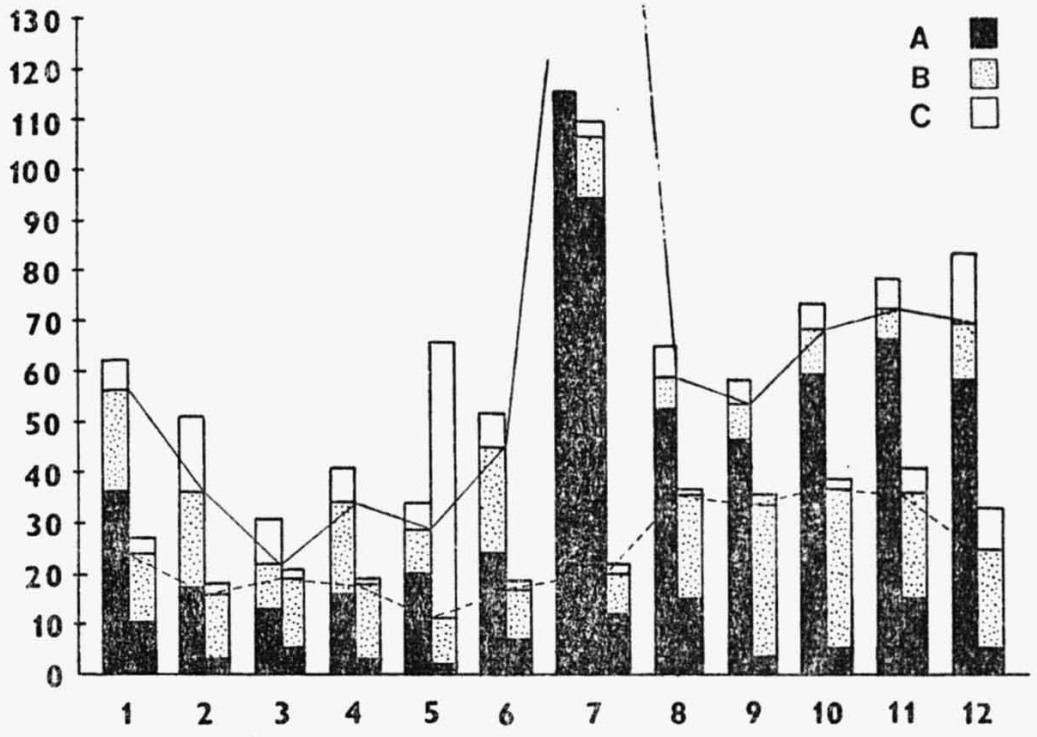

Fig. 2. Mite number found in particular months of the year. In country cottages (left column). In town apartments of cottage owners (right column). A: *Euroglyphus maynei*, B: other Pyroglyphidae, C: other mites, Solid curve: seasonal dynamics of pyroglyphids in country cottages. Broken curve: seasonal dynamics of pyroglyphids in town apartments. Abscissa: months, ordinate: number of mites in 1 g of house dust.

c) *Hirstia domicola* Fain, Oshima et Brunswijk 1974 is a recently described species and its relationship to *H. hirundinis* has not been elucidated enough yet. The specimens found, however, correspond to the description. It was regularly encountered in the house No 4., but we failed to find its source. We presumed that it might have been brought in by the half-wild cat, which used to lie on the couch from time to time. We therefore decided to analyze the sleeping places of two cats (one of which lived in the house No 4, even at a time when the cat had kittens) and of eight dogs. This analysis is given in Table 2. However, the species *H. domicola* was not found. It is worth mentioning here that in the room where the couch was placed an adult *Argas reflexus* F. was discovered in August 1978, indicating a certain relationship to birds, but no pigeons were nesting in the vicinity.

More important changes both in the quality and quantity were noted with the following species:

Table 1. Survey of mite species found in country cottages and town apartments used by same owners

Mite species	Seasonally inhabited cottages				Permanently inhabited apartments			
	Total number	%	Present in samples	Rate of occurrence	Total number	%	Present in samples	Rate of occurrence
Dermatophagoides pteronyssinus	497	13	41	63	464	28	36	70.5
Dermatophagoides farinae	50	1.3	17	26.1	220	13.1	21	41.1
Dermatophagoides sp.—develop. stages	116	3.0	13	20	151	9.0	19	37.2
Hirstia domicola	72	2.0	11	16.9	—	—	—	—
Euroglyphus maynei	2701	70.4	56	86.1	470	28.0	31	60.7
Acarus farris	5	0.1	3	4.3	2	0.1	2	3.9
Acarus siro	2	0.05	1	1.5	—	—	—	—
Tyrophagus putrescentiae	11	0.3	5	7.6	8	0.5	6	11.7
Sancassania berlesei	16	0.5	2	3.0	2	0.1	1	1.9
Acotyledon sp.—nymph	16	0.5	1	1.5	—	—	—	—
Chortoglyphus arcuatus	1	0.02	1	1.5	6	0.3	3	5.8
Gohieria fusca	63	1.6	19	29.2	6	0.3	5	9.8
Glycyphagus domesticus	31	0.8	18	27.6	37	2.2	9	17.6
Glycyphagus destructor	12	0.32	8	12.3	2	0.1	2	3.9
Glycyphagus privatus	2	0.05	1	1.5	—	—	—	—
Calvolia sp.	1	0.02	1	1.5	1	0.05	1	1.9
Vidia sp.-hypopus	1	0.02	1	1.5	—	—	—	—
Schwiebea menzeli—hypopus	4	0.1	3	4.3	1	0.05	1	1.9
Anoetus ferroniarum	2	0.04	2	3.0	—	—	—	—
Pyemotes herfsi	2	0.05	2	3.0	—	—	—	—
Scutacarus sp.	2	0.05	1	1.5	—	—	—	—
Imparipes sp. prope *atypicus*	4	0.07	2	3.0	—	—	—	—
Tarsonemus sp.	93	2.4	24	36.9	22	1.3	9	17.6
Trichotrombidium muscarum	1	0.02	1	1.5	—	—	—	—
Neotrombicula sp.	1	0.02	1	1.5	—	—	—	—
Bryobia sp.	—	—	—	—	3	0.1	1	1.9
Panonychus sp.	1	0.02	1	1.5	—	—	—	—
Cheyletus eruditus	87	2.3	32	49.2	49	2.9	14	27.4
Oribatei	28	0.7	14	21.3	16	0.95	10	19.6
Lasioseius penicilliger	1	0.02	1	1.5	—	—	—	—
Lasioseius berlesei	—	—	—	—	1	0.05	1	1.9
Ameroseius plumigerus	6	0.12	3	4.3	206	12.4	1	1.9
Proctolaelaps sp.	—	—	—	—	2	0.1	1	1.9
Blattisocius tarsalis	1	0.02	1	1.5	—	—	—	—
Paragarmania dendritica	1	0.02	1	1.5	—	—	—	—
Haemogamasus pontiger	—	—	—	—	8	0.4	1	1.9
Parasitus sp.—nymph	1	0.02	1	1.5	—	—	—	—
Mesostigmata	2	0.05	2	3.0	—	—	—	—
Total	3834	100			1677	100		

*) The rate of occurrence is expressed as the percentage of the number of samples in which at least one representative of the genus or species was found.

d) *Gohieria fusca* (Oudemans, 1902) and *Chortoglyphus arcuatus* (Troupeau, 1879) are two mite species with quite similar ecological requirements and are therefore regularly encountered together (Bollaerts and Breny 1951). They rarely occur in

Table 2. Mites found in sleeping places of 8 dogs and 2 cats

Mite species	Dogs		Cats	
	Number of mites	Number of positive samples	Number of mites	Number of positive samples
Dermatophagoides pteronyssinus	11	4	4	1
Dermatophagoides farinae	2	1	—	—
Dermatophagoides nymphs	22	2	—	—
Euroglyphus maynei	21	6	7	2
Tyrophagus putrescentiae	1	1	2	1
Glycyphagus destructor	1	1	—	—
Gohieria fusca	2	1	—	—
Tarsonemus sp.	—	—	1	1
Oribatei	2	2	—	—

apartments and indicate a hygienically neglected environment (Samšiňák et al. 1974b). Their occurrence may be explained by the fact that country cottages and bungalows are not cleaned as carefully and regularly throughout the year as town apartments. The occurrence of these mites in the households of the owners of recreation houses does not exceed the mean number known so far (Samšiňák et al. 1978).

e) *Tarsonemus* sp. currently occurs in the material of organic origin.

f) *Cheyletus eruditus* (Schrank, 1781) is a predacious mite and its number increases whenever the number of other mites becomes higher, serving as its prey.

g) *Ameroseius plumigerus* Oudemans, 1930. The genus *Ameroseius* Berlese, 1903 comprises several synanthropic species. After Rack (1978) these species feed on fungi. Overpopulation of *A. plumigerus* is known in lately erected buildings where it multiplied on mouldy insulation fittings of organic origin (Rack 1963, 1968) in a similar way as *A. plumosus* Oudemans, 1902 in Czechoslovakia (Samšiňák 1958). In the USSR the species *A. plumigerus* was also found on small rodents and in their nests (Bregetova 1977). In one case we encountered the overpopulation of this species in a mouldy apartment where 1 g of house dust collected from a bed contained 206 mites. The apartment was shortly afterwards liquidated and therefore it was impossible to investigate further development of the mite overpopulation there. Its occurrence in country cottages was negligible.

h) The numerous representations of the Oribatei group found could not be identified either as genera or species. However, their precise identification would not be helpful in finding their source. These mites were paid attention to primarily from the taxonomic aspect, but no detailed analysis of the species found is included in special handbooks on the vertebrate fauna and their nests either (Bregetova 1955). Otherwise, they are considered to be typical inhabitants of soil. This opinion is supported by the data published by Gridelet and Lebrun (1974) which indicate that Oribatei are brought in the bed dust by foot wear. As for the house dust in carpets, the fauna in it may be occasionally enriched in such a manner but this can be hardly anticipated in case of the house dust from a bed. For the time being the question of the origin of Oribatei in the bed dust must be left open.

CONCLUSIONS

1. Examination of private small recreation houses showed considerable qualitative and quantitative differences in the bed fauna as compared with that in permanently inhabited rooms. The qualitative differences are seen in the mean values obtained during all-year investigations, of the dominance of *Euroglyphus maynei* which accounts for almost 75 % of the total number mites collected and for almost 80 % of all mites of the family Pyroglyphidae. As for the quantity, the mean number of mites in sample made up 59 specimens per 1 g house dust in recreation houses and 33 specimens in permanently inhabited rooms.

2. A marked worsening of the health condition of patients allergic to house dust mites, which becomes manifest after a stay in the recreation house, must be primarily ascribed to the higher number of mites.

3. The difference in quality and quantity is due to specific regime of both, the humidity and the temperature prevailing in the houses examined and is caused by the fact that the recreation houses are uninhabited for the major part of the year. The mite quantity also depends on the insufficient hygiene in the houses, where vacuum cleaners are rarely used and the rooms are not frequently cleaned.

4. A higher population of *E. maynei* was also found in the rooms permanently inhabited by the owners of private recreation houses. The dominance of this species (60 %) however, is not so marked here. The high occurrence of this mite in town apartments, otherwise unusual, demonstrates that the main disseminator of mites of the family Pyroglyphidae is man himself. Their relatively high occurrence in town apartments of the owners of small recreation houses indicates that the worse condition of allergic persons in small recreation houses is caused by the quantity and not the quality of mites in beds.

АЛЛЕРГОГЕННЫЕ КЛЕЩИ (ACARI: PYROGLYPHIDAE) В ЧАСТНЫХ ЖИЛИЩАХ ОТДЫХА

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Резюме. Фауна в постелях в периодически обитаемых жилищах выразительно отличается от фауны в постелях квартир, а именно в квантитативном отношении — в нахождении бóльшего количества клещей, и также в квалитативном отношении — значительном преобладании вида *Euroglyphus maynei*, который составляет 70,4 % из общего числа клещей на дачах, а 28 % в квартирах, обитаемых владельцами таких жилищ отдыха. В других квартирах этот вид встречается редко. Эти разницы обясняются специфическим режимом влажности и температуры в периодически обитаемых помещениях. Причину ухудшения состояния здоровья пациентов можно видеть в квантитативных изменениях.

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Important anniversary of Vojtech Bárdoš, M. D., D.Sc.

This year Vojtech Bárdoš, M. D., D.Sc., leading scientific worker of the Institute of Parasitology, Czechoslovak Academy of Sciences, and one of the prominent Czechoslovak virologists who has devoted the major part of his creative activities to the research of main Central European viroses with natural foci character, has celebrated his 65th birthday. His extraordinary gift for making discoveries and his sense for team work with medical entomologists and theriologists helped him accomplish a number of generally recognized priority findings, which demonstrated the importance of natural focality of some viroses in Europe and which secured him a permanent place in the world history of research of viroses transmitted by arthropods and of their localization in nature.

He was born 30 September 1914 in Trenčín where he completed his secondary school education in 1932. During his studies at the Medical Faculty, Comenius University in Bratislava he showed an early and unusual interest in bacteriology and pathologic anatomy, working at the Institute for Pathology and Anatomy affiliated to the Faculty. After graduation (1938) and a short practice as a district physician in Rimavská Sobota he founded a Bacteriology Laboratory in Prešov and organized antiepidemic service. In this period (1941—1944) he devoted his energy to malaria mapping in East Slovakia and initiated antimalaria measures and abatement programme to prevent outbreaks of spotted fever. In 1944 he took part in the Slovak national uprising and after crossing the front line became the first epidemiologist of the 1st Czechoslovak Army Corps. On 15 February 1945 he was put in charge of the hygiene and antiepidemic department at the then Board of Public Health in Slovakia. In 1952 he transferred to the newly established Institute of Epidemiology and Microbiology in Bratislava, where, in the capacity of Deputy Director he organized a virological department focused on infections of the central nervous system. In 1962 he received his Doctor of medical sciences degree from the Institute of Microbiology, Czechoslovak Academy of Sciences in Prague. In 1965 he was assigned by the Government to act as medical consultant with the World Health Organization. In 1971 he was invited by the Director of the Institute of Parasitology, Czecho-