A Preliminary Notice Concerning the Collectings of Mammals, in Connection with the Researches on the Disease nephroso-nephritis haemorrhagica in Hungary

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Hungarian army physicists had been the first in Europe to show the infectious disease nephroso-nephritis haemorrhagica. This malady had been known up to now in the Far East only: in the soviet and manchurian regions of the lower reaches of the river Amur, and in Korea.

Since in the spreading of the disease almost all authors ascribe a primary role to the wild rodents, it was an indispensable task to collect and thoroughly examine them with reference also to Hungary.

Soviet workers attribute a preeminent role in the spreading of the disease to the reed vole (Microtus fortis michnoi Kastch.), indeed, they are of the opinion that where this rodent is absent the disease is also nonexistent. A certain correspondance had been found between the morbidity of the disease and the oscillations in the density of populations of Microtus fortis michnoi. It had been established, namely, that when the morbidity of the disease is high, the reed vole populations also increase, and if the morbidity be low, the population will accordingly decrease.

Acting on the request of the Military Sanitary Reasearch Institute, I had been away twice on a collecting trip to capture small mammals in an army camp, in the mountainous and woody regions of the Transdanubium. The first time on the 12—13 July, 1954; some weeks after the occurrence of the disease.

We have laid a part of our traps at the place of infection, where the pulled-down tents stood; and some also in the surrounding standing yet already relinquished tents. Another part of the traps have been put in the shrubby and untouched undergrowth, from where the animals could arrive at the tents, in the immediate vicinity of the area of infection. The traps had been hourly inspected; the animals captured had been wrapped singly in separate paper parcels to avoid the scattering away of the ectoparasites from the dead bodies. The specific composition and numbers of the animals captured was the following; 24 specimens of the yellow-necked field mouse (Apodemus flavicollis Melch.), 1 specimen of Mus spicilegus Pet., 4 specimens of the common red — backed vole (Clethrionomys glareolus Schreb.), 2 specimens of the common vole (Microtus arvalis Pall.), 3 specimens of the common shrew (Sorex araneus L.), 1 specimen of the common mole (Talpa欧洲a L.). This aggregation of animals has nothing to reveal in itself, since the species can everywhere be found in our home oak and beech forests in the hills of the Transdanubium. Of these preliminary collectings it was clear, however, that Apodemus flavicollis was present in the highest numbers in the habitat in question.
The second collecting had been in the identical place, on the 12—19 October, 1954. The military camp had, at this time, been already uninhabited, with the exception of the guards.

At the request of the military physicians, the center of the second collectings had again been the place of the infection and its immediate neighbourhood. Starting from this place, we collected in the heavy undergrowth and in the clear oak and beech woods bordering on the abandoned camp. At the same time, we examined also the buildings in the confines of the camp itself (store-rooms, kitchens, mess-halls, etc.). In one word, we have mainly trapped along the dense shrubbery and undergrowth crowding onto the very borders of the empty camp, — all favourite places of the small rodents and mammals.

The second collecting had nothing new to add to the specific list of the results of the first; the same species had again been caught. The result of the six nightly collectings are: 135 specimens of *Apodemus flavicollis*, 12 *Mus spicilegus*, 71 *Clethrionomys glareolus*, 7 *Microtus arvalis*, 4 *Sorex araneus*, 4 *Talpa europaea*, — a total of 235 specimens.

The second collecting shows again the dominancy of *Apodemus flavicollis*, with *Clethrionomys* in the second place as regards specimen numbers. Of the other species, *Mus spicilegus*, *Microtus arvalis*, *Sorex araneus* had a subordinate role, which is not surprising as their biotops do not correspond with the site of the military camp.

On the base of the above results, a daily 15 per cent capture (the daily mean of all animals being 38, caught by the use of 250 traps) agrees with the lower limits of a medium animal density. (On a territory expressly rich in animals, the daily amount of captured specimens may even reach 70—80 per cent.) This justifies the surmise, in our case, that small rodents can play the part of disease hosts even when present in small numbers only, — a conclusion contrary to former beliefs.

We have listed, at that time purely on the ground of theoretical conceptions, that the disease-spreading animals will primarily belong to species with a high specimen numbers: first of all *Apodemus*, and then *Clethrionomys*. The suspicious role of *Apodemus* had been aggravated by the fact that they will, according to our informations, tolerate easily the presence and nearness of man and are willing to move into human shelters and so, naturally, into army tents too.

The brains and kidneys of a part of the animals collected had been pathologically and histologically examined with the result that mainly *Apodemus*, but also *Clethrionomys*, specimens fall victims to the infectious and haemorrhagic inflammation of the kidneys, displaying also all characteristical alterations of the disease. In some of the specimens, the pathological processes of the kidneys had reached a stage when, by the opinion of the pathologists, the death of the animal was imminent.

According to Soviet workers, nephroso-nephritis haemorrhagica infectiosa does not cause a lethal sickness in *Microtus fortis michnoi*. This will suggest that this vole is infected since long by the virus of the disease, and its organism had adapted itself to it. By the above find of the pathologists, however, — that the death of the specimens would have set in because of the injuries sustained by the kidneys, — we have to assume that we are dealing with a very recent infection of a decidedly pathogenous effect for also the animals themselves. Until this theory is not justified by patho-histological examinations and, last
but not least, by the post mortem analysis of animals perished in the field, the
conception is also plausible that the virus of the disease infects since long the
organisms of our home rodents but that the recognition of the malady had been
made the first time in the last year.

The above pathological find is very significant. Notably, on the ground
of Soviet researches, it was known that only a vole of the Far East, *Microtus
fortis michnoi*, will catch the disease, not lethal to it. Now it transpired that, in
Hungary, the hosts of the vectors of the disease can both be *Apodemus flavicoli-
sis* and *Clethrionomys glareolus*.

Our second collectings had testified on the further interesting fact that
animals caught at a distance of 150—200 meters from the infected tents had also
been infected by the viruses of the disease. Though we are incognizant of the
radius of action of the species listed above, the animals, escaped from the traps
during our collectings and then again fortuitously recaptured at the same place
or in its vicinity, displayed a rather small range of activity and a strong
attachment to their locality. On this ground, it can justly be assumed that the
dominant members of the small mammal fauna around the camp had gener-
ally been infected, since we have found sick animals at a distance of 350—400
meters away from the camp. This again raises the question of why, in spite of
this, the disease had been limited to but a single point of the camp?

Another problem to be solved is whether the infectivity of the animals,
in a radial direction from the camp, will remain the same or will gradually cease?
Collectings made in relatively great distances will finally solve the question
whether the small mammal fauna is infected everywhere or not.

Similarly, it has to be examined what connections there be between the
animal hosts of the vectors of the disease and their biotops. In other words
whether the occurrence of a certain disease is linked up, in the case of the identi-
cal species, with certain biotops (woods, reeds, swamps, wet fields, etc.) or is
independent of such.

And, even though I take it up in this last chapter only, the possibly com-
plete detection of the life habits of the animals listed will be of the utmost
significance. We have to know, for instance, how the subterranean passages and
nests of both *Apodemus* and *Clethrionomys* are built. The exposition of the
nests are of special significance at the time of breeding, as also before and
after this period. The developmental cycle of the several mites, as suspected vectors
of the disease, will probably happen in the subterranean nests. Investigations at
the time of breeding is the more important as this is the acme of the presence
of parasites in the nests. Concomitantly with this, the idea suggests itself that
the young mice should also pathologically and histologically be examined. For,
if the suggestion comes true that the developmental cycle of the mites takes
place in the subterranean passages of the voles, the conception is evident that
the young animals will become infested with the viruses of the disease by the
bites of the mites.

The solutions of these problems are absolutely necessary for the thorough
knowledge of the mechanism of the infection. We shall try to solve them during
our collectings in the future.

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séni,
Előzetes közlemény a magyarországi nephroso-nephritis haemorrhagica infectiosa kutatásával kapcsolatos emlőgyűjtéséről

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A kórbonctani lelet azt látszik, hogy friss fertőzéssel állunk szemben. A fertőzött sátrak helyeitől 350—400 m-re fogott állatok betegek voltak. Mivel a kérdésses rágcsálók mozgási körlete kicsi, feltételezhető, hogy a tábor kisemlős faunája általában fertőzött volt. Kérdéses, hogy ennek ellenére a betegség miért korlátozódott a tábornak csak egy bizonyos pontjára.

További vizsgálatok fogják eldönteni, hogy a fertőzés helyétől kifelé indulva az állatok fertőzöttségének marad-e vagy fokozatosan megszűnik. Ugyancsak megvizsgálandó, hogy a betegséget terjesztő állat és annak biotopja között van-e valamilyen összefüggésben a betegség jelentkezésével.

Предварительный отчет о сборе млекопитающих в связи с исследованием болезни nephroso-nephritis haemorrhagica infectiosa в Венгрии

Я. Суньоги

Венгерские военные врачи констатировали в 1953 году — впервые в Европе — наличие болезни nephroso-nephritis haemorrhagica infectiosa, которая до тех пор была известна только в Восточной Азии.

Главными распространителями названной болезни являются мелкие грызуны, водящиеся на полях, среди которых — по мнению советских ученых — самую важную роль играет полевка, известная под названием Microtus fortis michanoi Kastsch.

На месте инфекции — в военном лагере, находящемся в Трансданубии — автор дважды собирал млекопитающих. Второй сбор был более значительным. Было поймано 135 экз. Apodemus flavicollis, 12 Mus spicilegus, 7 Clethrionomys glareolus, 4 Sorex araneus, 4 Talpa europaea, итого 235 экземпляров. Район оказался средней густоты в отношении водящейся на нем фауны. Одна часть собранного материала — Apodemus flavicollis, Clethrionomys glareolus — имела следы заражения болезнью nephroso nephritis haemorrhagica infectiosa. Прежде всего требовалось разрешить вопрос, какой давно измельчел данные вскрытия свидетельствовали о том, что заражение было недавним.

Зверьки, пойманые на расстоянии в 150—200 м от лагерных палаток, оказались также зараженными. Так как площадь циркуляции этих грызунов сравнительно небольшая, можно заключить, что вся фауна лагеря, состоящая из мелких млекопитающих, подвергалась заражению. Открытым остался только вопрос, почему болезнь ограничилась только одним местом лагеря.