Blood Parasites of Small Mammals in Western Hungary

Dr. Zdeněk ŠEBEK
Department of Parasitology, District Station of Hygiene,
Jihlava, Czechoslovakia


ABSTRACT. Results of the examination of blood smears of 291 small mammals (Insectivora and Rodentia) are presented. Trypanosoma grosi was found in Apodemus flavicollis and A. sylvaticus, T. evotomys in Clethrionomys glareolus and Trypanosoma sp. in Sorex minutus (first host record). Hepatozoon sp. has been shown in S. araneus, H. sylvatici in A. flavicollis and A. sylvaticus, H. erhardovae in C. glareolus. Grahamellas were found to occur in A. flavicollis, A. sylvaticus, C. glareolus, M. arvalis as well as in Crocidura suaveolens and C. leucodon, the latter two being new host records.

Most blood parasites, especially Trypanosomes, of the free living terrestrial mammals in Central Europe are host-specific. The host specificity of Grahamellas is still not clear, but the possibility of the transmission of Babesia microti to the members of different small mammalian orders (SHORTT and BLACKIE, 1965) and to man (PEENEN and HEALY, 1970) has been established. This finding substantially changed the practical importance of blood parasites of free living small mammals in Central Europe as was pointed out by ŠEBEK et al. (1973).

Pathogenicity of blood parasites of small mammals for their typical hosts is usually low. Trypanosomes and Grahamellas are considered as wholly apathogenic, very low pathogenicity is evident in blood Coccidia of the genus Hepatozoon. Conversely, I am of the opinion that the pathogenicity in Babesia microti must be considered at least partial, as indicated by remarkable splenomegaly, sometimes high per cent of infected erythrocytes, and the cases of human piroplasmosis (babesiosis) in the United States of America caused by Babesia microti (BENSON et al., 1969; RISTIC, 1970; PEENEN and HEALY, 1970; ANDERSEN et al., 1974).

It is well known that some latent chronic infections with blood parasites, e.g. Bartonella, manifest themselves after weakening of the macroorganism caused by another disease or splenectomy. An infection with blood parasites appears to render host species more susceptible to bacterial or viral pathogens or can cause deterioration in the course of the primary disease.

Blood parasites of the free living small terrestrial mammals are as yet not studied in Hungary and the present communication is the first record on this.

Material and Methods

A total of 291 small free living terrestrial mammals (Insectivora and Rodentia), representing 12 species, were examined. Trappings were carried out in 7 localities: Sopron - Tómalom, Fertőboz (Com. Győr-Sopron), Gic, Városlőd, Vinye, Somhegypuszta and Tőtvázsony (Com. Veszprém). Blood smears were prepared, dried, fixed in methylalcohol and stained with Giemsa.*

* I wish to express my thanks to Ing. J. NOSEK C.Sc., who made and committed to me the preparations.
Table 1

Blood parasites found in small mammals in Hungary

<table>
<thead>
<tr>
<th>Host species</th>
<th>Number of animals examined</th>
<th>Trypanosoma grosi</th>
<th>T. evotomys</th>
<th>Trypanosoma sp.</th>
<th>Hepatozoon erhardovae</th>
<th>Hepatozoon sylvatici</th>
<th>Grahameæ sp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sorex araneus</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Sorex minutus</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Crocidura suaveolens</td>
<td>7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Crocidura leucodon</td>
<td>6</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Glis glis</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mus musculus</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Apodemus flavicollis</td>
<td>124</td>
<td>6</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>21</td>
</tr>
<tr>
<td>Apodemus sylvaticus</td>
<td>65</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>20</td>
</tr>
<tr>
<td>Clethrionomys glareolus</td>
<td>71</td>
<td>-</td>
<td>2</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>10</td>
</tr>
<tr>
<td>Pitymys subterraneus</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Microtus arvalis</td>
<td>7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>291</strong></td>
<td><strong>7</strong></td>
<td><strong>2</strong></td>
<td><strong>1</strong></td>
<td><strong>5</strong></td>
<td><strong>5</strong></td>
<td><strong>54</strong></td>
</tr>
</tbody>
</table>
Results

Results are summarized in the table. Of the 11 species examined only Apodemus flavicollis, A. sylvaticus and Clethrionomys glareolus were represented in considerable number and the incidence of blood parasites in these species was evaluated.

TRYPANOSOMA

Trypanosomes were found in 4 host-species: Sorex minutus, A. flavicollis, A. sylvaticus and C. glareolus. Trypanosoma grosi parasiting in A. sylvaticus and A. flavicollis is distributed in the whole Europe. It was found in the Soviet Union by GROS (cit. KRAMPITZ, 1959), in Germany (KRAMPITZ, 1959), in Czechoslovakia (ŠEBEK, 1960; 1975a), in France (LAVERAN and PETTIT, 1909), in England (ELTON et al., 1931), in Austria (MAHNERT, 1970), in Yugoslavia (ŠEBEK, 1978) and in Bulgaria (ŠEBEK, 1976). The rate of infection varies in different places, during the year and during successive years. It was observed in Germany in 2.0% of A. sylvaticus, and 0.6% of A. flavicollis examined (KRAMPITZ, 1959), in Austria (the north Tyrol) in 18.7% of A. sylvaticus and 1.2% of A. flavicollis (MAHNERT, 1970), in Czechoslovakia in 0.8% of A. sylvaticus and 1.2% of A. flavicollis (ŠEBEK, 1975a) and in Yugoslavia in 0.6% of A. sylvaticus and in 1.3% of A. flavicollis (ŠEBEK, 1976). Higher incidence in A. flavicollis (4.8%) than in A. sylvaticus (1.5%) was observed in Hungary similarly as in Czechoslovakia and in Yugoslavia, while reverse distribution was found in other countries.

The positive findings in western Hungary were from the following localities. A. flavicollis: 3, 2 and 1 specimens from Fertőboz, Sopron - Tómalom and Somhegypuszta, respectively. The infected A. sylvaticus occurred in Sopron - Tómalom.

Finding of Trypanosoma in Sorex minutus is very interesting, because this is the first record of Trypanosoma in this host species.

In Europe, Trypanosoma crocidurae has been known from Crocidura russula in France (BRUMPT - cit. KRAMPITZ, 1961) and in Germany (KRAMPITZ, 1959; 1961), from Crocidura suaveolens in Czechoslovakia (ŠEBEK, 1960). HENRY (cit. COX, 1970) found Trypanosoma sp. in Neomys fodiens in England, ŠEBEK (1975a) a Trypanosoma sp. in Sorex alpinus in Czechoslovakia. Besides, Trypanosoma soricis was described by HADWEN (cit. DÖFLEIN and REICHENOW, 1932) from a shrew of the genus Sorex in Canada.

The taxonomy of Trypanosomes in small mammals is at present not wholly clear and the determination of species only from the morphological point of view is very difficult and often impossible. This is the case with our finding of Trypanosomes in the blood of S. minutus. Morphologically this Trypanosoma is similar to T. crocidurae and also to T. evotomys. Unfortunately I did not have the description and illustration of T. soricis available for comparison. Considering the strict host specificity seen in Trypanosomes of small rodents, our finding could be identified as T. soricis rather than T. crocidurae.

The positive pygmy shrew was caught at Sopron-Tómalom.

HEPATOZOOON

Haemococcidia of the genus Hepatozoon were found in western Hungary in Sorex araneus, A. flavicollis, A. sylvaticus and C. glareolus. All these species have been known as hosts of Hepatozoon in Europe. The common shrew (S. araneus) is known as host of Hepatozoon in Czechoslovakia (ERHARDOVÁ, 1955; ČATÁR et al., 1967; ŠEBEK, 1976a). KRAMPITZ (1964) found two infected individuals of S. araneus (without exact designation of their origin). Also MAHNERT (1972) found Hepatozoon in the common shrew (S. araneus) in the north Tyrol at two occasions. It is not clear if the shrews of the genera Sorex and Crocidura may be infected with different species of Hepatozoon from small mammals or if they harbour one or more till this time undescribed specific Hepatozoon species (Krampitz, 1964).

Our S. araneus specimen in which Hepatozoon sp. was found originated from the locality Somhegypuszta.

Hepatozoon sylvatici appears to be common in A. sylvaticus and A. flavicollis throughout Europe. This species was ascertained in Czechoslovakia in A. flavicollis (ER-
HARDOVÁ, 1955; ŠEBEK, 1970) and in A. sylvaticus (ČERNÁ, 1957; ŠEBEK, 1970), in Germany also in both host-species (KRAMPITZ, 1964), in England in A. sylvaticus (COX, 1970), in Yugoslavia in A. sylvaticus and in A. flavicollis (ŠEBEK, 1976); besides, Hepatozoon belonging in all probability to the species H. sylvatici was there found also in Apodemus agrarius and in A. mystacinus (ŠEBEK, 1976). ŠEBEK et al. (1970) established H. sylvatici in Bulgaria in A. sylvaticus.

I found two infected A. flavicollis at Pinye, and another one at Somhegypuszta. The two A. sylvaticus occurred at Tómalom and at Fertőboz, respectively.

H. erhardovae is also distributed in its specific host C. glareolus probably over all Europe. It has been known from Czechoslovakia (ERHARDOVÁ, 1955; ČERNÁ, 1957; ŠEBEK, 1970), Germany (KRAMPITZ, 1964), Austria (MAHNERT, 1972), England (COX, 1970) and Yugoslavia (ŠEBEK, 1976).

In western Hungary were the positive C. glareolus caught at Tómalom (2 specimens), Fertőboz (2 specimens) and at Városolód (1 specimen).

The infection rate of small terrestrial mammals in western Hungary was not compared with that in different European countries. It is known, that Hepatozoon is frequent in the organs - lung, spleen, liver - but it is rare in the blood. Unfortunately, we had only blood smears for our examination.

GRAHAMELLA

Grahamellas are very frequent parasites of the erythrocytes of small mammals. KIKUTH (1932) reported their 34 host species, KRAMPITZ and KLEINSCHMIDT (1960) found Grahamellas in 15 species of Central- and South European small mammals. Even heavy infections with Grahamellas are known to be harmless to the host (KRAMPITZ and KLEINSCHMIDT, 1960). Taxonomy of Grahamellas is not clear as yet; most species were described only on the basis of the finding in a new host species. I agree with MAHNERT (1972) that the present state of knowledge is not adequate for their specific determination as pointed out by KRAMPITZ and KLEINSCHMIDT (1960).

Grahamellas are common to occur in A. flavicollis, A. sylvaticus, C. glareolus and Microtus arvalis as these parasites have been recorded from these hosts in Germany (KRAMPITZ and KLEINSCHMIDT, 1960), Austria (without Microtus arvalis) (MAHNERT, 1972), Czechoslovakia (ŠEBEK, 1960; 1975) and Yugoslavia (ŠEBEK, 1976). The occurrence of Grahamella from Crocidura suaveolens and C. leucodon seems to be new host record.

Percentage distribution of the infection greatly varies from place to place but the mean incidence of Grahamellas in the free living small mammals in western Hungary is high - 30.8% in A. sylvaticus, 16.9% in A. flavicollis and 14.1% in C. glareolus.

Positive specimens of C. suaveolens and C. leucodon originated from Fertőboz. Those of A. flavicollis from all the localities except Tótaványos. Infection in C. glareolus was established in Sopron-Tómalom, Fertőboz, Gic and Somhegypuszta, and the single infected M. arvalis specimen was found at Gic.

It was somewhat surprising that Babesia microti did not occur in the present material from western Hungary. In Central- and South-eastern Europe, it has been found: in Czechoslovakia in C. glareolus, M. arvalis and M. agrestis (ŠEBEK, 1975a), in Austria in S. araneus, Pitymys subterraneus, C. glareolus, M. agrestis and Microtus nivalis (MAHNERT, 1972), in Yugoslavia in Neomys anomalus, A. agrarius, A. flavicollis and in Mus musculus (ŠEBEK, 1976) and in Bulgaria in A. sylvaticus (ŠEBEK, 1976). Certainly, our negative findings in western Hungary do not testify the absence of Babesia microti in Hungary, because only a small number of small terrestrial mammals was examined.

Reference:


Received: 15 June, 1977

Dr. ŠEBEK, Z.
OÚNZ - Okresní hygienická stanice
ČS-587 25 Jihlava Vrchlického 57