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CHANGES IN THE BLOOD PICTURE OF WHITE MICE EXPERIMENTALLY INFECTED WITH VARIOUS SPECIES OF ASCARIDS

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Abstract. The blood picture was studied in white mice experimentally infected with *Ascaris suum*, *Toxocara cati*, and *Toxascaris leonina*. In mice infected with *A. suum*, maximum number (17 %) of eosinophiles occurred on day 28 p.i. In mice infected with *T. cati*, the eosinophilia increased already from the first day after infection, reaching the maximum (26 %) on day 21 p.i. In mice infected with *T. leonina*, the eosinophilia increased from day 7 to day 28 p.i. and a slightly increased number of eosinophiles persisted during the whole experiment.

One of the most frequent clinical symptoms of tissue helminthoses is the change in the blood picture of host, particularly a high and long-lasting eosinophilia manifested in the increase of eosinophilic leucocytes — granular white blood cells which can be easily stained with eosin. This phenomenon, so-called "Loeffler's eosinophilic syndrom" is an important diagnostic sign of the parasitary diseases.

The migration of various species of ascarids in their paratenic hosts has been studied in our laboratory since 1976 (Prokopič and Klabanová 1980, Figallová and Prokopič 1981, Prokopič and Figallová 1982 a, b). The changes in the blood picture were observed in experimental animals.

MATERIAL AND METHODS

The methods of collection and cultivation of ascarid eggs and of mouse infection were described in the paper by Prokopič and Klabanová (1980). Infective eggs of *Ascaris suum* (2 000 eggs per host) were used for the infection of 75 white mice at the age of 10—12 weeks, weighing 33.4 g on the average. Infective eggs of *Toxocara cati* (2 500 eggs per host) were used for the infection of 45 white mice at the age of 12 weeks, weighing 33.1 g on the average. The same dose (2 500 eggs per host) of *Toxascaris leonina* eggs was used for the infection of 50 white mice at the age of 12 weeks, weighing 33.9 g on the average.

The blood was collected after Pokorný (1958) on days 1, 2, 3, 4, 7, 10, 14, 17, 21, 28, 35, 42 and 49 p.i. The leucocytes were counted by a common hematological method in Bürker's counting chamber. The blood smears were stained after Pappenheim by May-Grünwald and Giemsa-Romanovský stains giving the eosinophilic granules a brown-black to light red colour.

RESULTS

The blood smears of healthy control laboratory mice from our breed contained on the average 56 % of lymphocytes, 36 % of neutrophilic segments and 1.3 % of eosinophiles. The remaining portion consisted of basophiles, monocytes and plasmatic cells. The number of eosinophiles in the blood of infested mice was as follows.

In mice infected with *A. suum*, a marked increase in the number of eosinophiles (6 %) was observed on day 21 p.i. (Figs. 1 E_1). The maximum number of eosinophiles (17 %) was detected on day 28 p.i. and then a sudden drop occurred. The nematodes

of this species accomplish the migration of "tracheal type", i.e., a majority of *A. suum* larvae leave the paratenic host on day 21 p.i., after migration through the liver and lungs. On day 28 p.i., no *A. suum* larvae were present in the organs of experimental mice.

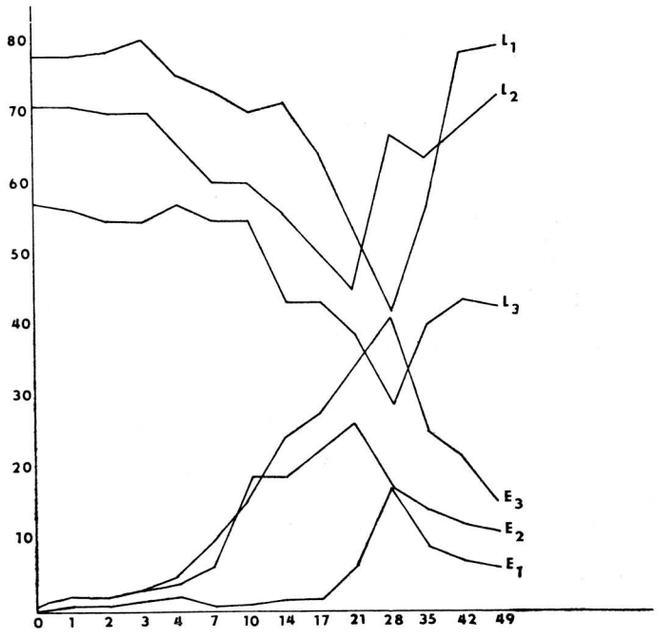

Fig. 1. Number of eosinophiles: E_1 — in *A. suum* infection, E_2 — in *T. cati* infection, E_3 — in *T. leonina* infection. Number of lymphocytes: L_1 — in *A. suum* infection, L_2 — in *T. cati* infection, L_3 — in *T. leonina* infection. Abscissa — days p.i. ordinate —% of blood elements;

In mice infected with *T. cati*, a slight increase in the number of eosinophiles was observed from the first day p. i. (Fig. 1 E_2), but a marked increase occurred only on day 7 p.i. The maximum number of eosinophiles (26 %) was detected on day 21 p.i. and it was by 9 % higher than in the previous species. At this time, the larvae of *T. cati* are dispersed in the whole body of the paratenic host, they accomplish the migration of "somatic type" and are deposited in the tissue of the paratenic host for a relatively long time.

In mice infected with *T. leonina*, the number of eosinophiles (Fig. A E_3) increased from day 7 p.i., the maximum (50 %) being on days 21—28 p.i. At this time the larvae are dispersed in the whole body of their host, particularly in muscles. According to Figallová and Prokopič (1981), a slightly increased eosinophilia persists even for 135 days. An indirect relationship between the number of eosinophiles and number of lymphocytes in the blood of infected mice was observed during the experiments. This means that the higher the number of eosinophiles, the lower the number of other leucocytes and vice versa (Figs. 1 E_1—E_3, L_1—L_3).

DISCUSSION

One of the symptoms of helminthoses, particularly tissue helminthoses, is the increased eosinophilia in the blood of infected animals or persons. According to Atias (1962), the helminths localized in the host tissue induce higher eosinophilia than the worms parasitizing in the digestive tract which either do not cause any eosinophilia or only a slight one. Similar results were observed also by Moretti (1963), who stated that the rate of eosinophilia depends on the number of parasites in the organism. Chandhuri and Saha (1959) observed an increased number of eosinophiles in guinea pigs infected with *T. canis;* the maximum increase (30—50 %) occurred three weeks after infection. Belyaeva (1966) recorded eosinophilia in the peripheral blood of guinea pigs during experimental ascaridosis.

In our experiments, the number of eosinophiles in the blood of infected mice varied in relation to the nematode species used for the infection. In mice infected with *A. suum*, the number of eosinophiles started to increase on day 21 p.i., maximum number (17 %) was reached on day 28 p.i. and then their number suddenly dropped. In mice infected with *T. cati*, the number of eosinophiles increased already from the first day after infection and the maximum (26 %) was reached on day 21 p.i. In case of *T. leonina*, a marked increase in eosinophile number started on day 7 p.i. and the maximum (50 %) was reached on day 28 p.i. According to Figallová and Prokopič (1981), in this species the eosinophilia persists for more than 135 days p.i.

ИЗМЕНЕНИЯ КАРТИНЫ КРОВИ У БЕЛЫХ МЫШЕЙ, ЭКСПЕРИМЕНТАЛЬНО ЗАРАЖЕННЫХ РАЗНЫМИ ВИДАМИ АСКАРИД

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Резюме. Изучали картину крови у белых мышей, экспериментально зараженных разными видами аскарид: *Ascaris suum, Toxocara cati* и *Toxascaris leonina.* У мышей, зараженных *A. suum*, наибольшее количество (17 %) эозинофилов встречалось на 28-й день после заражения. У мышей, зараженных *T. cati*, эозинофилия увеличивалась уже с первого дня после заражения и наибольшее количество эозинофилов (26 %) наблюдали на 21-й день после заражения. У мышей, зараженных *T. leonina*, эозинофилия повышалась с 7-го дня после заражения (максимум на 28-й день) и небольшое повышение эозинофилии наблюдалось в течение целого эксперимента.

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The VIIth State-Wide Dipterological Seminar

The seventh state-wide dipterological seminar was held from 8 to 10 September 1982 in Nitra, where a useful tradition had been started twelve years ago to convene regular meetings of Czechoslovak dipterologists every two years. The seminar was organized by the Chair of biology of the Pedagogical Faculty, in cooperation with the Chair of environmental conservation and microbiology of the Agricultural University in Nitra. Such dipterological seminars serve as a platform for the exchange of new information, reveal the present state of research studies on Diptera and deal with concrete measures for further advancement of this scientific field in Czechoslovakia. Similarly as in previous seminars, great attention at the recent meeting was paid to economically and parasitologically important groups of Diptera.

The seminar was attended by 54 scientists from research institutes, universities and museums. A total of 35 papers were delivered, one half of them concerning medical and veterinary dipterology (5 papers dealing with blackflies, 4 papers — with mosquitoes, 3 papers — with biting midges, and synanthropic and synbovine flies respectively, 1 paper — with horse and warble flies each). Discussed were mosquitoes occurring in Bratislava and the Danube lowland, the mosquito control in these areas, research of new repellents, the state of faunistics of blackflies in Slovakia, concrete studies on blackflies in some localities in South Bohemia, Slovakia and the Alps, and on their natural enemies, on biting midges occurring in large-scale livestock units and on species of this group of insects afflicting birds and invertebrates. The papers concerning synanthropic flies dealt with their occurrence in large-scale animal production farms, dumps and cadavers, the paper concerning horse flies discussed their occurrence in some regions of south-west Slovakia. The paper concerning warble flies dealt with their systematic classification from the aspect of the development of host-parasite relationships.

Other papers presented at the seminar were devoted to the problems of taxonomy, faunistics and ecology of various families of Diptera, mainly those of economic importance, and to the application of computation technique in their research.

Also discussed were some problems of further advancement of Czechoslovak dipterology, primarily the publication of a cataloque of Diptera of Czechoslovakia, of articles on the distribution of Diptera in Slovakia and on the improvement of the Czech and Slovak terminology of these insects. The seminar revealed the present state and development of the research of Diptera in Czechoslovakia, reflecting the considerable medical and economic importance of this insect group, particularly the development of studies on parasitic families of Diptera.

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