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STUDIES ON THE HELMINTHIC FAUNA IN GAME SPECIES FROM REGIONS WITH VARIOUS LANDSCAPE CHARACTERIZATION

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Summary

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The helminthic fauna of game species originating from East Bulgaria including the Ludogorie region was studied. On the basis of egg counting technique, diagnostics of parasite larvae and the morphology of imago forms, 11 gastrointestinal, 5 pulmonary nematode genera and 2 trematode genera were detected. The commonest nematodes were gastrointestinal (with 61.85% extensity of invasion) and pulmonary ones (with 44.67% extensity of invasion). A considerable part of studied nematodes were common for studied regions and host species. The extensity of invasion and the generic composition of helminthic populations were similar for game species inhabiting a given geographic locality.

Key words: environment, game, helminthic fauna

INTRODUCTION

The information about parasitic fauna of wild and domestic animals is significant from both medical and economical points of view and is important for solving problems related to control and prophylaxis of parasitic diseases. With the creation of state game preserves (SGP), where red deers, fallow deers, mouflons and does are bred on a restricted area, favorable conditions for the development of parasitic fauna and for a species-abundant helminthocenosis were created. At the same time, the helmintological status of game is poorly studied. In Bulgaria, there are data for several regions mainly for does. In does from the Voden game preserve, 15 helminthic species were reported (Osicovski, 1965), in does from the Strandja, Rila and Rodopi mountains – 30 helminthic species, in does from North Bulgaria – 12 species (Janchev, 1965; 1967; 1973) and in does from Southeastern Bulgaria – 12 helminthic species (Genov, 1968). In other studies upon the incidence and the species composition of helminths in does from the regions of Rodopi mountain, Stara Planina mountain and Northeastern Bulgaria – 28 species belonging to 8 families were found up (Bratanov *et al.*, 1987).

The red deers and fallow deers are not studied enough. In 17 red deers from East Bulgaria and 17 fallow deers from the Voden game reserve, 15 and 14 helmin-

thic species were reported respectively (Jancev, 1976; 1979). There are no data about the species composition of parasites in mouflons. Recently, the helminthic status of game is controlled by egg diagnostics that gives little information for the generic affiliation of nematode populations (Todev *et al.*, 2001; Todev, 2002). There are no data about the dynamics of helminthic fauna and the influence of ecological factors upon parasitic biocenosis.

The aim of the present studies was to determine the helminthic status of game, inhabiting regions with various ecological and geographic characteristics, to follow out the impact of the environment upon the composition of biocenosis and to establish the helminthic species, common for game species from the Cervidae and Bovidae families and domestic animals.

MATERIALS AND METHODS

Mouflons, fallow deers and red deers from various geographic regions were studied out. Two hundred and ninety three coprological samples from different SGP were analysed: 40 from the Sherba SGP (Stara Planina mountain), 78 from the Ropotamo SGP (Strandja mountain), 136 from the Zhenda SGP (eastern part of the Rodopi mountain), 14 – from the Izvora SGP (western part of the Rodopi mountain) and 25 – from the Palamara SGP (in the hill region Ludogorie). The following methods for helminthological diagnostics were applied: the method of Füleborn, the serial sedimentation, the method of Vaida and Berman for diagnostics of parasitic larvae. The gastrointestinal and pulmonary nematodes were determined according to the nomenclature of Thienpont *et al.* (1979) and Kotelnikov (1984). Six mouflons were necropsied for determination of the species of found parasites.

RESULTS AND DISCUSSION

Species-related characterization of helminthic fauna

The helminthological analysis of the 293 faecal specimens obtained from mouflons, fallow deers and red deers as well as of imago forms obtained after the necropsy of mouflons revealed helminths from 18 genera, belonging to 11 families. A considerable part of game helminthic fauna consisted of Nematoda representatives (Tables 1 and 2). A high extensity of invasion (EI) was observed for the *Gongylonema* genus. The latter is described in domestic ruminants (Daskalov *et al.*, 1960) as well as in Cevidae (Jancev, 1976; Genov, 1971). A consistent presence was characteristic for genera from the *Haemonchus* genus, that was detected in the helminthic fauna of all hosts and regions. This genus is observed by Jancev (1973) in does from the Pirin mountain and in domestic ruminants by Daskalov (1963). The extensity of invasion (EI) of the *Oesophagostomum* genus from the Trichonematidae family in mouflons from studied SGP was high (Table 2). Species from this genus are described by Jancev (1973, 1976, 1979) in does, red deers and fallow deers in different regions in Bulgaria.

The lung strongylidae were found out all over with a high EI (44.67%). Four genera from the Protostronhylidae family were detected. From them, *Mullerius* and *Cystocaulus* were dominating whereas *Protostrongylus* and *Neostrongylus* were observed only in several areas. Those genera were observed in domestic ruminants as well. The *Neostrongylus* genus was observed for the first time in game species in Bulgaria. The *Dictyocaulus* genus was observed only in the Izvora SGP. In previous studies of his, Jancev

Table 1. Extensity of invasion (%) with some helminthic genera taken as a whole in the studied game species from 5 state game preserves with various geographic characterizations. The data are obtained by analysis of coprological samples from fallow deers, red deers and mouflons

Helminths	Total , %	Ludogorie Palamara SGP	Stara Planina mountain Sherba SGP	Strandja mountain Ropotamo SGP	Eastern Rodopi mountain Zhenda SGP	Western Rodopi mountain Izvora SGP
Strongyloidea	61.85	96	55.00	64.10	55.14	78.57
Gongylonema	23.02	24	13.15	17.95	25.74	50.00
Nematodirus	5.50	4	–	3.85	8.10	7.14
Trichuris	2.06	4	2.56	–	2.20	7.14
Protostrongylus	44.67	40	52.94	25.64	57.32	85.71
Dictyocaulus	2.14	–	–	–	–	42.85
Dicrocoelium	24.74	–	2.56	7.70	42.64	50.00
Paramphistomum	1.37	–	5.26	–	1.50	–

SGP = state game preserve.

Table 2. Extensity of invasion (%) of helminthic genera in fallow deers, red deers and mouflons game from 3 state game preserves with various geographic characterizations. The data are obtained by analysis of coprological samples

Genera	Total %	Strandja mountain Ropotamo SGP		Eastern Rodopi mountain Zhenda SGP		Western Rodopi mountain Izvora SGP	
		mouflons n=25	fallow deers n=32	mouflons n=112	fallow deers n=21	mouflons n=12	fallow deers n=2
Haemonchus	24.15	36	8.33	23.21	28.57	41.67	–
Ostertagia	11.60	20	8.33	5.36	–	50	50
Trichostrongylus	3.90	12	8.33	2.68	–	–	–
Cooperia	1.75	–	–	–	–	4.00	–
Nematodirus	6.75	12	3.12	8.04	9.52	8.33	–
Oesophagostomum	24.63	72	2.83	17.86	19.04	41.55	100
Chabertia	4.35	12	–	2.68	9.52	–	50
Bunostomum	3.40	–	–	6.25	–	–	–
Trichuris	1.93	–	–	2.68	–	–	50
Gongylonema	27.45	28	21.90	27.68	19.04	50.00	–
Capillaria	1.47	–	–	2.68	–	–	–
Protostrongylius	48.95	8	21.90	59.82	52.38	91.70	50
Dictyocaulus	2.94	–	–	–	–	50.00	–

SGP = state game preserve; n = number of analysed coprological samples.

(1965, 1967, 1973) detected *Dictyocaulus eckerti* in 20% and 17.5% of examined does from Northeastern Bulgaria and Stara Planina mountain respectively, whereas Genov (1968) – in 9.05% of does from Southeastern Bulgaria. In wild ruminants, inhabiting areas in Strandja mountain, *Mullerius*, *Cystocaulus* and *Dictyocaulus* representatives have been observed (Moutafov *et al.*, 1989). The fact that in our studies no *Dictyocaulus* spp. were observed in East Stara Planina and Strandja mountain cold be due to the decrease in the population density of this genus with time.

The trematode helminthic fauna in studied game was rare. A significant incidence was observed in *Dicrocoelium* genus. The *Paramphistomum* genus was detected occasionally in separate specimens and definite regions (Tables 1 and 2).

Fig. 1. shows the incidence of gastrointestinal strongylidae in different regions and host species in percentages. High EI percentages were observed in mouflons from the Ropotamo (88%) and Izvora (75%) SGPs as well as in red deers in the Izvora (100%) and Palamara (96%) SGPs. There were no significant differences in the parasitic status of Cervidae and Bovidae game families from the Sherba and Zhenda SGP neither between fallow deers and red deers from the Ropotamo SGP. Those data evidenced that the EI and the generic affiliation of studied game inhabiting one and the same region was similar.

Within the period of the study of game helminthic fauna, we succeeded to collect adult worms only in mouflons from the areas of Eastern and Western Rodopi mountain. The following helminthic species were observed: *Nematodirus spathiger* (Railliet, 1896), Railliet et Hanry, 1909; *Trichostrongylus vitrinus* Looss, 1905; *Chabertia ovina* (Fabricius, 1878), Railliet and Hanry, 1909; *Ostertagia leptospicularis* Asadov, 1953; *O. circumcincta* (Stadelman, 1894), Ranson, 1907; *Cooperia oncophora* (Raillet, 1898), Ranson, 1907. Those species were detected in does from Jancev (1965, 1967, 1973) in the Rodopi, Strandja and Stara Planina mountains while *O. leptospicularis* was

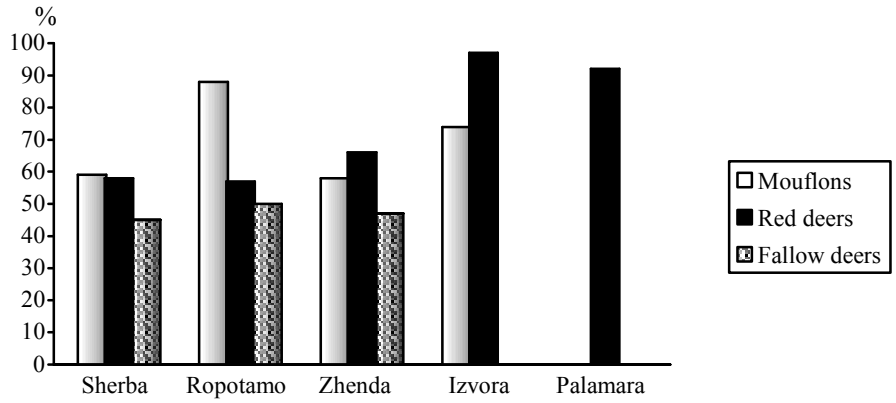

Fig. 1. Total extensity of invasion (%) with gastrointestinal Strongylata in game from 5 state game preserves with a various geographic characterizations.

found out in red deers and fallow deers (Jancev, 1976, 1979) and domestic animals (Daskalov, 1966), evidencing that the described species were common for game from the Cervidae and Bovidae families and for domestic ruminants.

Ecological and geographic characterization of the helminthic fauna

The studied game inhabited SGP in the mountainous regions of East Bulgaria and the Ludogorie – regions with different geographic characteristics. The Palamara SGP is located in the hilly-plain areas of Ludogorie, with deciduous and mixed vegetation with predominant conferious vegetation at an altitude of 350 m. The Sherba SGP comprises areas in Eastern Stara Planina with predominant deciduous forests. The Ropotamo SGP in Strandja mountain is located in a regions with deciduous forests from oaks and cerris oaks at an altitude of 300–400 m. The Zhenda SGP in the Eastern Rodopi mountain is located at an altitude of 800–1100 m whereas the Izvora SGP includes highland territories in the western part of the Rodopi mountain at 1300–1800 m with predominant coniferous vegetation.

The helminthological studies on the game inhabiting the various ecological and geographic localities showed that the animals were primarily infected with gastrointestinal and lung nematodes (Table 1). From a geographic aspect, the commonest genera were *Haemonchus, Oesophagostomum, Gongylonema, Mullerius* and *Cystocaulus*. The *Nematodirus* and *Chabertia* genera were subdominants with a low EI (Table 2). Some helminthic genera were found only in some areals. For instance, *C. oncophora* was with a low EI only in Western Rodopi mountain whereas Jancev (1973, 1976) detected this parasite in does in Strandja mountain. The *Bunostomum* and *Capillaria* genera were observed in mouflons only in the eastern, and *Dictyocaulus* – in the western part of the Rodopi mountain. The *Trichuris* genus was not observed in the Strandja mountain area and *Dicrocoelum* – in the Ludogorie region.

Tables 1 and 2 show that the major part of helminths, found via diagnostics of parasitic eggs and larvae, are usually common for the different geographic regions and game species, but the EI is different. For example, mouflons inhabiting the western part of the Rodopi mountain and the Strandja mountain were infected with *Haemonchus* and *Oesophagostomum* parasites at a higher degree. In the former location, the percentages of prevalence of the *Ostertagia*, *Gongylonema* genera and lung strongylidae were also higher.

The *Dicrocoelium* genus was highly prevalent in the helminthic fauna of game originating from both Eastern and Western Rodopi mountain whereas in the hilly and plain areas of the Ludogorie it was not present. The *Paramphistomum* genus was with a lower EI only in the Stara Planina and the Eastern Rodopi mountains.

The data presented in Tables 1 and 2 also evidence that some of the genera are not observed in the helminthic fauna of game in all five geographic regions. A big part of found genera however were common for all localities and host species, but with a different EI. Those data could be associated with the ecological and geographical features of the regions, the biology of parasites and the presence of suitable intermediate hosts, participating in the development cycle of biohelminths. The analysis of data confirmed that mouflons from all five regions of study were with a higher EI and more diverse helminthocenosis.

CONCLUSION

The performed diagnostics of parasitic eggs and larvae as well as the follow out of imago forms of parasites revealed a high EI with gastrointestinal and lung nematodes. The commonest genera were *Oesophagostomum, Haemonchus, Gongylonema, Muellerius* and *Cystocaulus;* subdominants were the *Cooperia*, *Capillaria* and *Paramphistomum*. A problematic trematodosis was dicroceliosis. The game from the areas of Western and Eastern Rodopi mountain showed the biggest degree of infection with *Gongylonema*, *Dicrocoelium* and lung strongylidae while the game inhabiting the Ludogorie region and the Western Rodopi mountain was most commonly infected with gastrointestinal stongylidae. The game species from the Cervidae and Bovidae families inhabiting one and the same geographic areas were with a similar EI and generic composition of populations. The species *T. vitrinus, N. Spathiger, C. oncophora, C. ovina, O. leptospidcularis and O. circumcincta*, observed in mouflons, were also described in does. Most of the observed helminthic genera and species were common for wild and domestic cloven-hoofed animals, thus providing evidence that the mouflon, the red deer and the fallow deer played a role in the maintenance and the distribution of parasitic infections in domestic animals as well.

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