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## RESEARCH ARTICLE

# CIRCULATION OF HELMINTHS BETWEEN WILD AND DOMESTIC BIRDS IN SOUTHERN ZONES OF UZBEKISTAN

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### ABSTRACT

This article analyzes the laws of exchange of helminths between wild birds and poultry and their distribution in the southern regions. Among wild birds, the *Acridotheres tristis* and *Sturnus vulgaris*, *Turdus merula* and others have the greatest number of common parasitic worms with domestic birds. As well as, we have analyzed that 23 species of definitive hosts among wild and domestic birds, 12 species of intermediate, additional and reservoir hosts consisting of representatives of invertebrates and vertebrates are involved in the circulation of various parasitic worms in biocenoses.

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## INTRODUCTION

The rich bird fauna of Uzbekistan, inhabiting various landscapes with characteristic natural conditions, determines a wide variety of species composition of their helminths. Numerous wild birds, often changing their habitats, contribute to the reservation and spread of helminths. They transfer them to the territory of various poultry farms, participating in the formation of foci of invasions here.

## MATERIALS AND RESEARCH METHODS

In order to study the law of the exchange of helminths in wild and domestic birds, found in mountainous, foothill, as well as tugai and anthropogenic zones of southern territories of Uzbekistan, and based on the above information, helminthological studies were carried out in 2018-2020 years. In the course of the research, we used the generally accepted methods in helminthology: "Method of complete helminthological autopsy" (Scriabin, 1928), "Parasitological study of birds" (Dubinina (1972).

## RESULTS AND DISCUSSION

According to our own research and literature data, among the parasitic helminths in wild and domestic birds of Uzbekistan,

53 species are common, of which 23 species are causative agents of serious helminthiases and cause significant damage to poultry farms of the republic [1, 2, 3, 4]. Of the common types of helminths, 28 species parasitize domestic chickens, and 33 species parasitize domestic ducks, and 6 species damage turkeys. Among wild birds, the *Acridotheres tristis* and *Sturnus vulgaris*, *Turdus merula* and others have the greatest number of common parasitic worms with domestic birds (Table 1). The extensiveness of the invasion of birds by individual species of parasitic worms was 12-28%, the intensity of invasion ranges from 1.8-274.1 individuals. Features of seasonal dynamics are associated with the presence in nature of intermediate hosts of helminths, which mainly include beetles – (*Dila laevicollis*, *Gonocephalum pubiferum*, and *Tenebrio molitor*), wood lice (*Porcello scaber*, *P. laevis*, *P. fedtshencae*, and *Armadillum vulgare*), earthworms (*Allolobophora fassiensis*, *A. calliginosa*, *Eisenia rosea*) and some other representatives of invertebrate fauna. High rates of infestation with helminths were recorded in the Indian starling and black crow (extensiveness of invasion 70.7 – 92.4%, intensity of invasion 9.4 – 17.6 individuals). Recently, the process of synanthropization of some wild birds was noted. In search of food of anthropogenic origin, they have become regular visitors to poultry farms, which leads to an increase in parasitic diseases in poultry farms. The main role in the spread and maintenance of helminthic invasion belongs mainly to synanthropic birds, including the Indian

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Table 1. Community of helminths of wild and domestic birds Uzbekistan

Species of helminthes	Wild birds	Domestic birds
<b>Cestoidea</b>		
<i>Raillietina echinobothrida</i>	<i>Streptopelia orientalis</i> , <i>Alectoris chukar</i>	chicken
<i>Raillietina weissi</i>	<i>Columba eversmanni</i> and <i>Columba livia</i>	chicken
<i>Scriabinia cesticillus</i>	<i>Columba eversmanni</i> and <i>Columba livia</i>	chicken
<i>Choanotaenia constricta</i>	<i>Acridotheres tristis</i>	chicken
<i>Choanotaenia infundibulum</i>	<i>Phasianus colchicus</i> , <i>Acridotheres tristis</i>	chicken
<i>Raillietina frontina</i>	<i>Columba livia</i> , <i>Phasianus colchicus</i>	chicken
<i>Echinolepis carioaca</i>	<i>Acridotheres tristis</i> and <i>Sturnus vulgaris</i>	chicken
<i>Sobolovitaenia sobolovi</i>	<i>Acridotheres tristis</i>	chicken, duck
<i>Cloacotaenia megalops</i>	<i>Anas crecca</i> , <i>Anas acuta</i>	duck
<b>Trematoda</b>		
<i>Ehinosnotoma revolutum</i>	<i>Anas crecca</i> , <i>Anas acuta</i>	duck, goose
<i>Ehinstoma transfretanum</i>	<i>Fulica atra</i> , <i>Anas crecca</i> , <i>Anas acuta</i>	chicken, duck
<i>Bilharziella polonica</i>	<i>Chroicocephalus ridibundus</i> , <i>Anas crecca</i>	duck
<i>Prosthogonimus ovatus</i>	<i>Phasianus colchicus</i> , <i>Sturnus vulgaris</i> , <i>Alectoris chukar</i>	chicken, duck
<i>Notocotylus attenuatus</i>	<i>Spatula clypeata</i> , <i>Mareca penelope</i>	duck
<b>Acanthocephala</b>		
<i>Polymorphus magnus</i>	<i>Anas crecca</i> , <i>Fulica atra</i>	duck
<i>Polymorphus minutus</i>	<i>Anas acuta</i>	duck
<i>Prosthorrhynchus transverses</i>	<i>Turdus merula</i> , <i>Corvus corone</i> , <i>Upupa epops</i>	chicken
<b>Nematode</b>		
<i>Ascaridia galli</i>	<i>Phasianus colchicus</i> , <i>Columba livia</i> , <i>Alectoris chukar</i> , <i>Coturnix coturnix</i>	chicken
<i>Heterakis gallinarum</i>	<i>Streptopelia orientalis</i> , <i>Alectoris chukar</i>	chicken
<i>Capillaria obsignata</i>	<i>Upupa epops</i> , <i>Corvus corone</i> , <i>Acridotheres tristis</i> , <i>Phasianus colchicus</i>	chicken
<i>Amidostomum filicae</i>	<i>Anas crecca</i> , <i>Fulica atra</i>	duck
<i>Dispharynx nasuta</i>	<i>Corvus corone</i> , <i>Upupa epops</i> , <i>Turdus merula</i> , <i>Coturnix coturnix</i>	chicken
<i>Tetrameres fissispina</i>	<i>Anas crecca</i> , <i>Anas acuta</i>	duck

starling, which has 4 species in common with poultry, *Sturnus vulgaris* – 2, *Corvus corone* – 3, *Anas crecca* – 7, *Anas acuta* – 5, *Fulica atra* – 3, *Streptopelia orientalis* and *Streptopelia senegalensis* – 2. To concretize the role of certain bird species in the spread of helminthic infestation by certain types of helminthes, as well as some other indicators, we identified the following groups: helminthes, in the distribution of which poultry plays the main role – *Echinostoma revalutum*, *Prosthogonimus ovatus*, *Notocotylus attenuatus*, *Raillietina tetragona*, *Scriabinia cesticillus*, *Choanotaenia infundibulum*, *Ascaridia galli*, *Heterakis gallinarum*, *Capillaria obsignata*.

Helminths, in the distribution of which the dominant role belongs to wild birds, in which the main role is played by poultry – *Ehinstoma transfretanum*, *Bilharziella polonica*, *Echinolepis carioaca*, *Dicranotaenia coronula*, *Cloacotaenia megalops*.

Helminths, which are equally promoted by both domestic and wild birds – *Echinostoma revolutum*, *Prosthogonimus ovatus*, *S. cesticillus*, *Dispharynx nasuta*, *Raillietina echinobotruda*. Helminths, in the spread of which the main role belongs to human economic activity – *Echinostoma revolutum*, *Scriabinia cesticillus*, *Ascaridia galli*, *Heterakis gallinarum*, *Capillaria obsignata*. Further strengthening of anthropogenic pressure (drying up of the Aral Sea, the emergence of new reservoirs, etc.), which entailed global ecological changes in large areas, which cause changes in the habitats of many wild bird species, including migratory ones, provide prerequisites for a significant increase in the number of helminthic species, common to wild and domestic birds. These helminthes include of– *Ehinstoma transfretanum*, *Bilharziella polonica*, *Cloacotaenia megalops* and others. It is also necessary to take into account the epizootic groups of parasitic worms, which we include, the widespread pathogens of invasions. They are well adapted, most harmful to poultry farming, such as *Prosthogonimus ovatus*, *Notocotylus attenuatus*, *Raillietina echinobotruda*, *Choanotaenia*

*infundibulum*, *Ascaridia galli*, *Heterakis gallinarum*, *Capillaria obsignata*, and *Polimorphus magnus*. Pathogens of local foci of invasions are as follows *Raillietina weissi*, *Dicranotaenia coronula*, *Dilepis undula*, *Anonchotaenia globata*, *Amidostomum fulicae*, *Clinostomum complanatum*; rarely encountered invasive pathogens that pose a potential threat on *Collyriclum faba*, *Diorchis brevis*, *Vitta rustica*, *Monopylidium passerum*, *Sobolevitaenia sobolovi*. In general, the process of migration of helminthes between wild and domestic birds has recently intensified. Permanent habitats, feeding, and overnight stays of most species of wild birds are often carried in territories located in a close proximity to economically used areas and settlements. Largely, this is facilitated by social measures for the development and reclamation of new lands and other anthropogenic impacts on the natural environment. The migration of parasitic worms between wild and domestic birds is ecologically interrelated with the peculiarities of the circulation of helminthes in biocenoses, and both concepts are a single whole. The regularities of the circulation of helminthes are of no small importance for the noble biocenoses and parasitocenosis of this or that host living in these conditions and should form the basis of the biological principles of regulation of natural focal parasitic systems. In aquatic biocenoses, mainly various aquatic birds were concentrated (*Fulica atra*, *Anas crecca*, *Anas acuta*, *Phalacrocorax carbo*, *Anas platyrhynchos*, *Anser anser*) and invertebrates (aquatic crustaceans, mollusks, etc.). Meanwhile, among the surveyed birds, the bulk of them were terrestrial birds (orders - *Passeridae*, *Columbidae*, and *Galliformes*) and invertebrates (insects, woodlice, mollusks, earthworms). At the same time, the presence and biocenoses of representatives of invertebrate and vertebrate fauna creates favorable conditions for the circulation of helminthes in the natural environment between various components. The ecological analysis of these relationships in various biocenoses made it possible to substantiate the following 11 ways of circulation of the corresponding groups of parasitic worms:

Bird (Families *Phasianidae*, *Anatidae*) is a terrestrial bird environment. This pathway is the circulation of helminths of the families *Ascarididae* (*Ascaridia galli*) and *Heterakidae* (*Heterakis gallinarum*).

Bird (Family *Anatidae*) – aquatic environment – bird. This pathway is the circulation of helminths of the families *Amidostomatidae* (*Amidostomum anseris*), *Heterakidae* (*Gangulaterakis dispar*).

Bird (Families *Accipitridae*, *Sturnidae*, *Ploceidae*, *Phasianidae*, *Corvidae*) - terrestrial environment - intermediate host (earthworms, insects, murine rodents) - bird. Helminths of the families *Davainiidae* (*Raillietina echinobothrida*, *Scriabinia cesticillus*, *Davainea proglottina*), *Dilepididae* (*Choanotaenia infundibulum*, *Ch.constricta*, *Monopylidium passerum*, *Apta rustica*, *Sobolovitaenia soblottina*), *Dilepididae* (*Choanotaenia infundibulum*, *Ch. brevis*, *Passerilepis crenata*, *P. stylosa*) and *Collyriclidae* (*Collyriclum faba*).

Bird (Families *Anatidae*, *Laridae*, *Phalacrocoracidae*) - aquatic environment - intermediate host (aquatic crustaceans) - bird. Helminths of the families *Polymorphiidae* (*Polomorphus magnus*, *P. minutus*) and *Filicollidae* (*Filicollis anatus*) circulate along this path.

Bird (Families *Galliformes*, *Corvidae*) - terrestrial environment - reservoir hosts (earthworms) - bird. Helminths of the family *Syngamidae* (*Syngamidae trachea*) circulate along this path.

Bird (Families *Anatidae*, *Sturnidae*, *Phasianidae*, *Ploceidae*) - terrestrial environment - the first intermediate hosts (wood lice) are the bird, the second intermediate host (insects) is the bird. Helminths of the families *Prosthogonimidae* (*Prosthogonimus ovatus*, *P. cuneatus*), *Plagiorchidae* (*Plagiorchis arcuatus*) circulate along this path.

Bird (Family *Anatidae*) - aquatic environment - the first intermediate host (Crustacea) - the second intermediate host (fish) - bird. Helminths of the *Ligulidae* family (*Ligula intestinalis*, etc.) circulate along this path.

Bird (Family *Galliformes*) - terrestrial environment - intermediate host (molluscs) - an additional host (*Crustacea*) - a bird. The circulation of helminths of the *Dicrocoeliidae* family (*Brachylectithum donicum*, *Lyperosomum longicauda*, *L. coracii*) takes place along this path.

Bird (Families *Anatidae*, *Galliformes*, *Rallidae*) - aquatic environment - intermediate host (molluscs) - additional host (amphibians) - bird. Helminths of the family *Echinostomatidae* circulate along this path (*Echinostoma revolutum*, *Eh. Transfrenanum*, *Eh. Chlorpodis*).

Bird (Families *Anatidae*, *Podicipedidae*, *Charadriidae*) - aquatic environment - intermediate host (*Crustacea*) - reservoir host (fish) - bird. The circulation of helminths of the *Streptocaridae* family (*Streptocara crassicaudas*) takes place along this path.

Bird (Families *Podicipedidae*, *Phalacrocoracidae*, *Ardeidae*, *Accipitridae*) - aquatic environment - the first intermediate host (Crustacea) - the second intermediate host (fish) - reservoir host (predatory fish, birds, amphibians, reptiles) – bird. Helminths of the families *Anisakidae* (*Contraecaecum microcephalum*) and *Diplostomidae* (*Neodiplostomum attenuatum*) circulate along this path.

## Conclusions

Summarizing the above data, it should be noted that 23 species of definitive hosts among wild and domestic birds, 12 species of intermediate, additional and reservoir hosts consisting of representatives of invertebrates and vertebrates are involved in the circulation of various parasitic worms in biocenoses. For the circulation of this or that species of helminthic in the biocenosis, besides epizootic chain “helminthic - the final host - intermediate host” and passing into the abiotic factor, there is also the synchronism of the appearance in the external environment of a sufficient number of invasive origin and animals susceptible to invasion. As well as we can see the permanent and stable connections between the final and intermediate hosts of helminthes and other components involved in the circulation of helminthes. In general, it can be seen that the complex mechanisms of the formation of parasitic systems involve numerous members of biocenoses, each of which is an integral part of the formation of one or another composition of helminthic fauna.

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