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FAUNISTIC AND TAXONOMIC ANALYSIS OF *GALLIFORMES* HELMINTHS OF SOUTHERN UZBEKISTAN

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These days, the regular increase in the number of the world's population, the increase in human demand for food, including poultry products, has a negative effect on the objects of the animal world, which occupy an important place in natural and artificial landscapes. The increase in the number of helminth fauna, especially in natural and anthropogenic areas, is the reason for the decrease in the diversity of chickens. Therefore, determining the species composition of helminths found in chickens, substantiating their ecology, and assessing the negative impact of helminthic diseases caused by parasitic worms on the development and productivity of the poultry industry is of urgent scientific and practical importance.

For the wide development of poultry farming in the world, in addition to management and organizational activities, great attention is paid to the health of birds and the environment in which they live, the establishment of adaptation characteristics of their helminth fauna to the elements of the landscape, and the development of the poultry sector on the basis of socio-ecological principles. In this place, among other things, the helminth fauna of chickens and poultry related to various biogeocenoses and human economy was determined, the parasitic diseases caused by their life forms were studied, and modern ways of combating them were developed. It should be noted that chickens, the main representative of the bird class, have an important place in the food chain, and their biodiversity changes depending on the influence of anthropogenic and helminths, which are a component of various biocenoses.

In recent years, helminthiasis (ascariasis, heterokidosis, echinostomatidosis, rayetinosis, hymenolepidosis, capillariosis, etc.) in poultry and chickens has caused great economic damage to poultry farms in many countries, including our republic,

causing a decrease in the number of chickens, especially chicks. Accordingly, it is of great scientific and practical importance to determine the diversity of helminth species, to justify their biology and ecology, to evaluate their distribution characteristics, to develop measures to combat and prevent them.

Research on the helminth fauna of chickens, life cycles, ecology, characteristics of spread, the diseases they cause and modern methods of combating them were carried out by leading foreign scientists R.C.Anderson (2000), S.L.Mitchell (2000), R.N.Thompson, S.A.Gibson (2000) and others.

Information on the species composition, distribution, biology, ecological characteristics, diseases caused by helminths of chickens in the CIS countries, and information on their prevention and improved control measures are written in the works of E.V.Gvozdev (1958), A.N. Chertkova, A.M. Petrov (1959, 1961), N.A. Ablasov, N.T. Chibichenko (1961), I.E. Bikhovskaya - Pavlovskaya (1962), K.M. Rizhikov (1973, 1974), J.A. Agapov (1978) , K.Kennedy (1978), L.F. Borgarenko (1981, 1984, 1990), M.D. Sonin, V. Barush (1996), S.O. Movsesyan (2003).

Information on the species composition, systematics, distribution of helminths of domestic and wild birds in Uzbekistan, the damage they cause, and the fight against them can be found in the researches M.A. Sultanov (1963), A.T. Turemuratov (1962, 1963, 1964, 1965) K.A.Saparov (2016) [1-10].

However, until now, scientific studies have been devoted to the helminth fauna and the spread of parasitic diseases of domestic and wild chickens, and cannot provide detailed information on the helminth fauna and ecology of the Galliformes of Southern Uzbekistan. For this reason, it is of urgent scientific and practical importance to justify the modern state of helminth species composition, taxonomy, distribution characteristics and ecology of chickens of the Southern part of Uzbekistan.

Endohelminths parasitizing chicken-like birds in the southern regions of Uzbekistan were collected as materials for research. During 2020-2022, research was conducted at the Department of Zoology of Termiz State University and the Laboratory of Molecular Zoology of the Institute of Zoology of the Academy of Sciences of the Republic of Uzbekistan.

In order to carry out the research work, in 2020-2022, stationary research in the mountain and sub-mountain areas of the districts of the southern regions of Uzbekistan: Surkhandarya and Kashkadarya region (Termiz, Zharqorgan, Boysun, Muzrabot, Dehqonabad and Shahrisabz), 248 chickens based on the route method from river valleys of partially plain zones, 52 chicken-like birds such as partridge, 68 pheasants, 47 quails, 12 chils and analysis of helminthological materials collected from them was carried out according to generally accepted methods (Scryabin 1928, Dubinina, 1971, etc.). The most effective method of diagnosing

helminths was the method of K.I.Scriabin's "Complete and incomplete helminthological diagnosis".

Table 1

Species composition of chickens studied in South Uzbekistan

Family	Species	Checked sample	Number of birds affected
Phasianidae – Pheasants	*Alectoris chukar* G.R.Gray, 1843- Partridge	52	21
	Gallus – gallus domesticus - Domestic chicken	248	178
	Coturnix coturnix Linnatus, 1758- Quail	47	19
	Phasianus colchicus Linnaeus, 1758- Pheasant	68	40
	Ammoperdix griseogularis J.E.Gray, 1830- Desert chili	12	1
In total:		**427**	**259**

Processing of parasitological material was carried out in laboratory conditions. Permanent and temporary preparations were studied using stereoscopic LOMA MB S-10, MBR-3, MBS, inverted SK2-TR (Olympus Japan), binocular VL-2200 (Olympus Japan) microscopes.

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The richness of parasitic worms of the region is explained by the variety of species and biotopes, such as domestic chicken, pheasant, partridge, and quail. 20 species of 40 types of helminths (4 types of trematodes, 6 types of cestodes and 10 types of nematodes) were recorded in chicken birds for the first time.

The fauna of helminths identified in chickens includes the following species:

Cestoda – Cestodes:

1. *Davainea proglottina* Davaine,1860.
2. *Raillietina tetragona* Molin, 1858.
3. *Raillietina penetrans* Baczynska, 1914.

4. *Skrjabinia cesticillus* Molin, 1858.
5. *Fimbraria fasciolaris* Pallas, 1781.
6. *Echinolepis carioca* Magalhaes, 1898.
7. *Sobolevicanthus gracilis* Zeder,1803.
8. *Sobolevicanthus collaris* Botsch, 1786.
9. *Tschertkovilepis setigera* Frohlich, 1789.
10. *Choanotaenia infundibulum* Bloch, 1779.
11. *Amoebotaenia sphenoides* Railliet, 1892.
12. *Tetrathyridium variabile* Diesing, 1850.

Trematoda – Trematodes:

13. *Brachylaemus fuscatus* Rudolphi, 1819.
14. *Echinostoma revolutum* Frohlich, 1802.
15. *Echinostoma miygawai* Ishii, 1932.
16. *Echinostoma phasianina* Gagarin, 1954.
17. *Echinostoma robustum* Yamaguti,1935.
18. *Echinoparyphium recurvatum* Linstow, 1873.
19. *Notocotylus attenuatus* Rudolphi, 1809.
20. *Prosthogonimus ovatus* Rudolphii, 1803.
21. *Corrigia corrigia* Braun, 1901.

Nematoda – Nematodes:

22. *Capillaria bursata* Freitas et Almeida, 1934.
23. *Capillaria obsignata* Madsen, 1945.
24. *Capillaria caudinflata* Molin, 1858.
25. *Eucoleus annulatus* Molin, 1858.
26. *Ascaridia alectoris* Gagarin, 1954.
27. *Ascaridia galli* Schrank, 1788.
28. *Heterakis gallinarum* Gmelin, 1790.
29. *Subulura suctoria* Molin, 1860.
30. *Subulura skrjabin* Semenov, 1926.
31. *Ganguleterakis macroura* Linstow, 1883.
32. *Seurocyrnea eurycerca* Seurat, 1914.
33. *Tetrameres fissispina* Diesing, 1861.
34. *Cheilospirura hamulosa* Diesing, 1851.
35. *Cheilospirura coturnicola* Semenov, 1926.
36. *Cheilospirura gruveli* Gendre, 1913.
37. *Dispharynx nasuta* Rudolphi, 1819.
38. *Dispharynx spiralis* Molin, 1858.
39. *Oxyspirura petrowi* Skrjabin, 1929.
40. *Oxyspirura schulzi* Skrjabin, 1929.

Based on this information, it was found that the types of helminths of wild and domestic chickens in the studied area are quite diverse. 20 common parasite species (*R. penetrans, S. cestiillus, E. carioca, S. gracilis, Tsch. setigera, A. sphenoides, E. miigawai, E. robustum, B. fuscatus, C. corrigia, Cap. bursata, A. alectoris, G. macroura, S. skrjabini, S. suctoria, Seur. eurycerca, Ch. coturnicola, D. nasuta, O. petrowi and O. schulzi*) were recorded for the first time in chickens of Southern Uzbekistan.

The helminth fauna of the studied species of hen-like birds differs from each other. The number of helminths of domestic chickens from chickens presented in the districts of South Uzbekistan attracted attention due to the fact that the species composition is much higher than that of wild ones.

Helminth fauna of domestic chicken (*Gallus gallus domesticus*).

26 types of parasites were found in domestic chickens examined in Termiz district of Surkhandarya region and Shahrisabz and Dehkhanabad districts of Kashkadarya region, and they were found to belong to Cestoda, Trematoda and Nematoda classes:

The number of helminth species belonging to the cestode class was 11, the number of trematode species was 6, and the number of nematode species was 9 (Fig. 1).

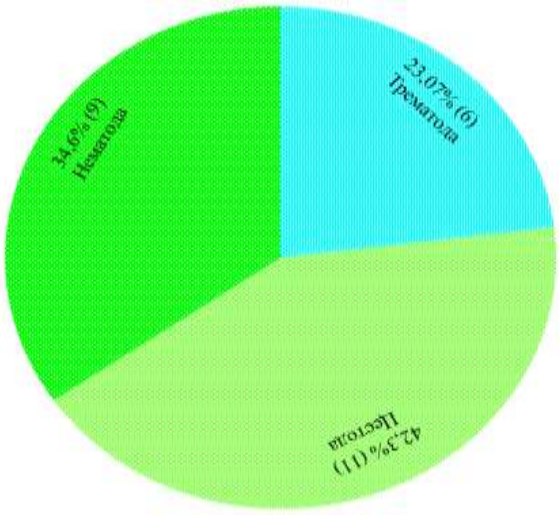

Figure 1. Number of species (%) of helminths detected in poultry by class

Data on the intensity and extent of infestation of helminths found in domestic chicken - Gallus gallus domesticus during the researches are presented in Table 2.

Table 2

Infestation of domestic chicken (Gallus gallus domesticus) with helminths

№	A type of helminth	Localization	IE %	II
1	**2**	**3**	**4**	**5**
Cestodes				

1.	*Davainea proglottina* Davaine,1860	small intestine	3,2	1-5
2.	*Raillietina tetragona* Molin, 1858	small intestine	3,2	1-32
3.	*Skrjabinia cesticillus* Molin, 1858	small intestine	7,2	5-32
4.	*Fimbriaria fasciolaris* Pallas 1781	small and large intestine	1,2	1-3
5.	*Echinolepis carioca* Magalhaes, 1898	small intestine	0.8	2-8
6.	*Sobolevicanthus gracilis* Zeder,1803	small intestine	8.4	1-5
7.	*Sobolevicanthus collaris* Botsch,1786	small intestine	2.0	4-18
8.	*Tschertkovilepis setigera* Frohlich, 1789	small intestine	1.2	2-8
9.	*Choanotaenia infundibulum* Bloch, 1779	small intestine	1.2	1-10
10.	*Amoebotaenia sphenoides* Railliet, 1892	small intestine	2.0	1-4
11.	*Tetrathyridium variabile* Diesing, 1850	small intestine	1.2	2-4
Trematodes				
12.	*Echinostoma revolutum*, Frohlich, 1802	small intestine	0.8	1-2
13.	*Echinostoma miygawai* Ishii, 1932	small and large intestine	1,2	1-3
14.	*Echinostoma robustum* Yamaguti,1935	small intestine	0,8	2-3
15.	*Echinoparyphium recurvatum* Linstow, 1873	intestinal cavity	0,8	1-2
16.	*Notocotylus attenuatus* Rudolphi, 1809	small and large intestine	0.8	2-3
17.	*Prosthogonimus ovatus* Rudolphii, 1803	ovary and sac of tissue	2	1-5
Nematodes				
18.	*Capillaria bursata* Freitas et Almeida, 1934	small intestine	3,2	3-15
19.	*Capillaria obsignata* Madsen, 1945	small and large intestine	1,2	1-8
20.	*Capillaria caudinflata* Molin, 1858	small intestine	4.0	2-7
21.	*Eucoleus annulatus* Molin, 1858	it was determined	4.4	1-2

		from the mucous membrane of the esophagus, from the oral cavity.		
22.	*Ascaridia galli* Schrank, 1788	small intestine	71.0	1-20
23.	*Heterakis gallinae* Gmelin, 1790	small and large intestine	2.0	3-10
24.	*Tetrameres fissispina* Diesing, 1861	glandular stomach	11.2	1-7
25.	*Cheilospirura hamulosa* Diesing, 1851	under the muscular stomach	5.2	1-11
26.	*Dispharynx spiralis* Molin, 1858	intestine, muscular stomach subcutaneous	3.6	1-20

178 (71%) of 248 hens examined helminthologically were infected with parasitic worms.

Cockroach is a helminth fauna of Alectoris chukar.

It was found that 21 of the 52 checked copies were infected with helminths. The extent of infestation was 42.3%. In the affected partridges, 14 types of parasitic worms were identified, which were found to belong to cestodes, trematodes and nematodes:

When we divided the identified 14 types of helminths into numerical classes, it was noted that 3 types belong to the class of cestodes, 2 types of trematodes, and 9 types of nematodes (Fig. 2).

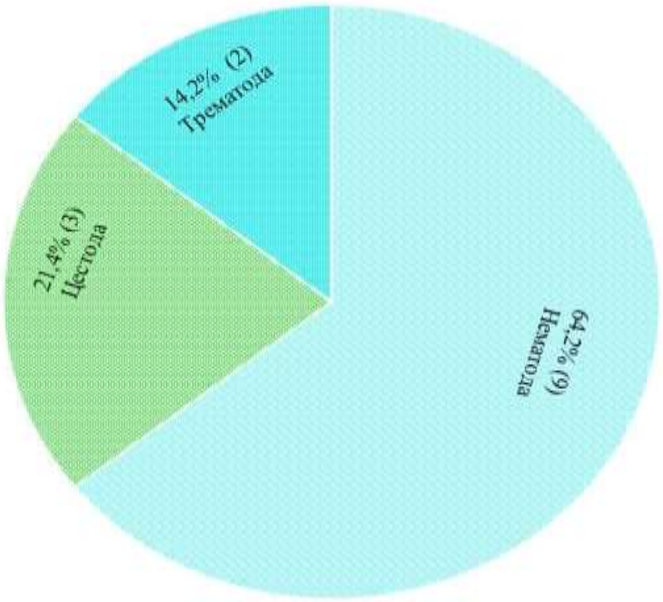

Figure 2. The number of species (%) of helminths identified in the cuckoo by classes

The helminth species with the recorded intensity of infestation vary from 1 copy to 14 copies (Table 3).

Table 3

Partridge - (Alectoris chukar) damage by helminths

№	A type of helminth	Localization	IE %	II
Cestodes				
1.	*Echinolepis carioca* Magalhaes, 1898	small intestine	6.3	2-8
2.	*Choanotaenia infundibulum* Bloch, 1779	small intestine	8.3	1-10
3.	*Amoebotaenia sphenoides* Railliet, 1892	small intestine	3.8	1-4
Trematodes				
4.	*Brachylaimus fuscatus* Rudolphi, 1819	small intestine	2.9	1-4
5.	*Corrigia corrigia* Braun, 1901	small intestine	3,8	2-6
Nematodes				
6.	*Capillaria obsignata* Madsen, 1945	small and large intestine	3.8	1-8
7.	*Capillaria caudinflata* Molin, 1858	small intestine	3.8	2-7
8.	*Ascaridia alectoris* Gagarin, 1954	small intestine	1.9	2-4
9.	*Heterakis gallinarum* Gaielin, 1790	small and large intestine	5.7	3-10
10.	*Ganguleteraksis macroura* Linstow, 1883	small intestine	5.7	2-3
11.	*Subulura suctoria* Molin, 1860	cecum	3.8	3-11
12.	*Seurocyrnea eurycerca* Seurat, 1914	under the muscular stomach	34.6	3-21
13.	*Cheilospirura coturnicola* Semenov, 1926	glandular stomach	5.7	1-12
14.	*Oxyspirura schulzi* Skrjabin, 1929	eyeball	11.5	1-8

Desert partridge - helminth fauna of Ammoperdix griseogularis. As a result of examination of 12 specimens of desert partridge in the biogeocenoses of the southern regions of Uzbekistan, 4 types of helminths were recorded in only 1 bird (Table 4). The extent of infestation with helminths was 8.3%. The identified species belong to the cestode and nematode classes:

Echinolepis carioca Magalhaes, 1898.

Choanotaenia infundibulum Bloch, 1779.

Ganguleterakis macroura Linstow, 1883.

Subulura suctoria Molin, 1860.

When we divided these identified helminth species into classes, 2 species entered the cestode class and 2 species entered the nematode class (Fig. 3).

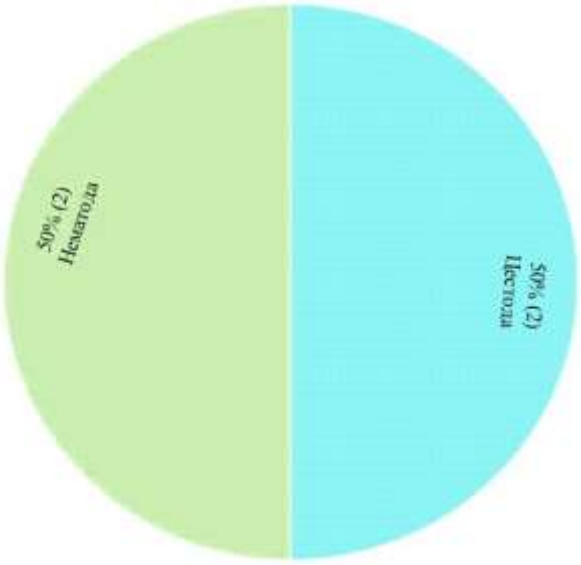

Figure 3. Number of species (%) of helminths identified in desert partridge by class

The species we recorded in wild chickens are simple parasites (Table 4). Invasion intensity of helminths was 1-3 copies.

Table 4

Desert partridge - helminth fauna of *Ammoperdix griseogularis*

№	A type of helminth	Localization	IE	ИИ
Cestodes				
1	*Echinolepis carioca* Magalhaes, 1898	small intestine	6.3	2-8
2	*Choanotaenia infundibulum* Bloch, 1779	small intestine	8.3	1-10
Nematodes				
1	*Ganguleterakis macroura* Linstow, 1883	small intestine and cecum	5.7	2-3
2	*Subulura suctoria* Molin, 1860	cecum	4.4	3-11

Quail is the helminth fauna of Soturnix coturnix. Information about the helminth fauna of quail in Uzbekistan M.A. Limited to Sultanov's research, 14 parasitic worms were found, belonging to cestodes (6 species) and nematodes (8 species).

19 copies of helminths were found when 47 copies of common quail were dissected in the southern regions of Uzbekistan, the total infestation of the examined birds was 44.2%. Invasion intensity varied from 1 copy to 18 copies (Table 4). In a detailed study of the morphology of the found helminths, the following 12 types of parasites were identified:

Class Cestoda includes 5 species belonging to 4 genera. It was noted that the Nematoda class consists of 7 species belonging to 7 genera. (Figure 4). Species of the genera Choanotaenia, Ascaridia, Heterakis were recorded in wild and domestic chickens of Uzbekistan.

Table 5

Quail is the helminth fauna of Soturnix coturnix

№	A type of helminth	Localization	IE	II
Cestodes				
1.	*Raillietina penetrans* Baczynska, 1914	small intestine	3.6	2-7
2.	*Raillietina tetragona* Molin, 1858	small intestine	4.2	1-32
3.	*Skrjabinia cesticillus* Molin, 1858	small intestine	3.6	5-32
4.	*Echinolepis carioca* Magalhaes, 1898	small intestine	6.3	2-8
5.	*Choanotaenia infundibulum* Bloch, 1779	small intestine	8.3	1-10
Nematodes				
6.	*Dispharynx nasuta* Molin, 1858	glandular stomach	4.2	1-12
7.	*Ascaridia galli* Schrank, 1788	stomach, small intestine	56	1-20
8.	*Eucoleus annulatus* Molin, 1858	mucous membrane of the esophagus, oral cavity	4.2	1
9.	*Heterakis gallinae* Gmelin, 1790	small and large intestine	6.3	3-10
10.	*Subulura suctoria* Molin, 1860	cecum	8.5	3-11
11.	*Seurocyrnea eurycerca* Seurat, 1914	under the muscular stomach	42.0	3-21
12.	*Cheilospirura coturnicola* Semenov, 1926	glandular stomach	4.2	1-12

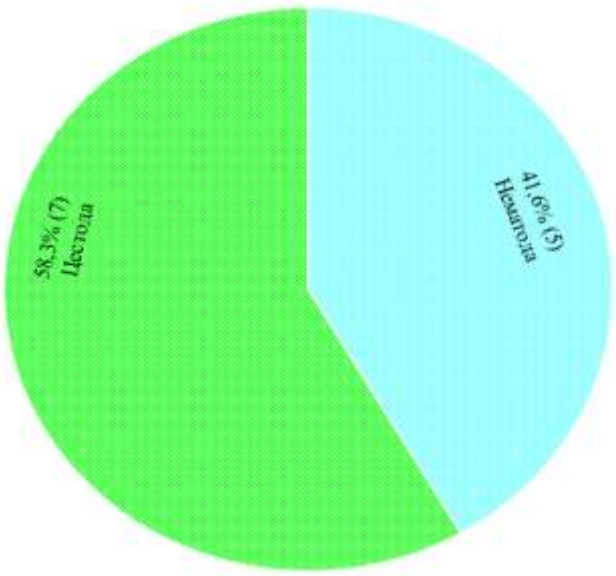

Figure 4. Number of species of helminths detected in quail by class (%)

Pheasant – helminth fauna of Phasianus colchicus. Common pheasant and its subspecies helminofauna by M.A. Sultanov learned. According to the author, he

found 10 species of parasitic worms in the pheasant, of which 3 are trematodes, 3 are cestodes, and 4 are nematodes.

When studying 68 copies of this pheasant species in the south of Uzbekistan, we noted that 40 copies were infected with helminths. Identified parasites are helminths belonging to 3 classes:

The helminth species composition of the studied pheasant in the southern region of Uzbekistan was 19 species. Nematodes (12 species) and cestodes (5 species) stood out from others due to the diversity of species. Only 2 species of trematodes were recorded (Fig. 5 and Table 6).

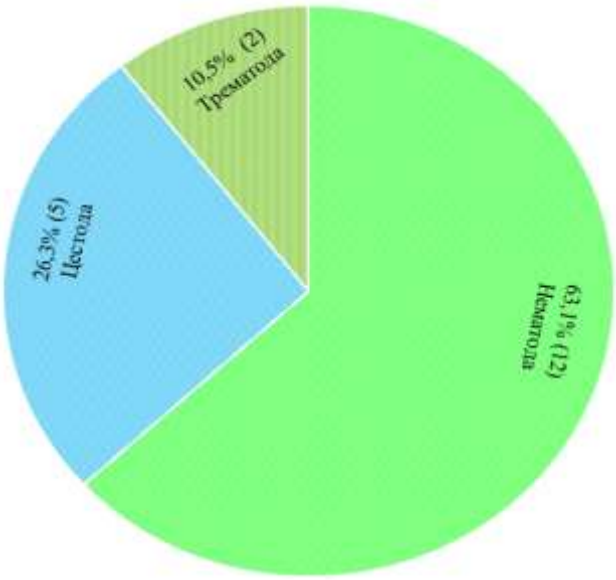

Figure 5. Number of species (%) of helminths detected in Khyrgovul by classes

Table 6

Pheasant – helminth fauna of Phasianus colchicus

№	A type of helminth	Localization	IE %	II
Cestodes				
1	*Choanotaenia infundibulum* Bloch, 1779	small intestine	8.3	1-10
2	*Skrjabinia cesticillus* Molin, 1858	small intestine	5.8	5-32
3	*Raillietina penetrans* Baczynska, 1914	small intestine	5.8	2-7
4	*Amoebotaenia sphenoides* Railliet, 1892	small intestine	3.8	1-4
5	*Tetrathyridium variabule* Diesine, 1819	small intestine	3.8	2-4
Trematodes				
6	*Echinostoma phasianina* Gagarin, 1954	small intestine	1.2	2
7	*Notocotylus attenuatus* Rudolphi, 1809	small and large intestine	2.1	2-3
Nematodes				
8	*Capillaria obsignata* Madsen, 1945	small and large intestine	5.8	1-8

9	*Capillaria caudinflata* Molin, 1858	small intestine	5.8	2-7
10	*Eucoleus annulatus* Molin, 1858	from the mucous membrane of the esophagus, oral cavity	4.2	2
11	*Heterakis gallinarum* Gmelin,1790	small and large intestine	5.8	3-10
12	*Subulura skrjabini* Semenov, 1926	small intestine and cecum	4.4	2-3
13	*Subulura suctoria* Molin, 1860	cecum	8.3	3-11
14	*Seurocyrnea eurycerca* Seurat, 1914	under the muscular stomach	25.0	3-21
15	*Tetrameres fissispina* Diesing, 1851	glandular stomach	6.3	1-7
16	*Cheilospirura gruveli* Gendre, 1913	under the muscular stomach	8.8	1-13
17	*Dispharynx nasuta* Rudolphi, 1819	glandular stomach	5.7	1-12
18	*Oxyspirura petrovi* Skrjabin, 1929	mucous membrane of the eye	4.4	2-12
19	*Ascaridia galli* Schrank, 1788	stomach, small intestine	56	1-20

In conclusion, it should be noted that the faunal diversity of helminths of wild and domestic chicken-like birds in the south of Uzbekistan is quite rich. Among the helminths recorded in wild and domestic chickens, representatives of the nematode class predominate. The second place is occupied by cestodes. The trematodes recorded in these birds are ordinary species and occupy the last place.

The main places of distribution of mentioned chicken helminths are, as it is known, the host organism - various sections of the digestive tract, with the exception of Tetrathyridium variable cestode, P.ovatus trematode, which are localized outside the digestive system.

According to the biological cycle, the helminths we have noted can be divided into two groups.

1. The biological cycle takes place without the participation of intermediate hosts, that is, proper development. This group includes the genera Ascaridia, Heterakis of nematodes.

2. The biological cycle takes place with the participation of intermediate hosts, most nematodes, all cestodes and trematodes develop in this way.

Describing the hostal specificity of chicken birds, it can be noted that, with some exceptions, the recorded helminth species have a wide specificity. In wild and domestic chickens, we recorded a large proportion of cestodes, trematodes and nematodes. Here it became known that there is mutual exchange of helminths between domestic and wild representatives of chickens. All this affects the circulation of the invasion in both natural and modified areas in the south of Uzbekistan.

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