STUDY OF THE DIVERSITY OF ECTOPARASITIC FAUNA IN GAME-RELATED GALLIFORMES IN THE NORTHERN REGION OF THE REPUBLIC OF MOLDOVA

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Abstract. This paper focuses on the study of the ectoparasite fauna diversity in game poultry species from the Northern Zone of the Republic of Moldova, which is an important fundamental and, especially, applied issue. Some of these species serve as hosts for various ectoparasite species and as vectors for these parasites, which are dangerous both to humans and domestic animals. The ectoparasite study conducted on wild game birds in the northern part of the Republic of Moldova revealed a diverse range of ectoparasites across several species. The pheasant (*Phasianus colchicus*) hosted a wide variety of ectoparasites from several families: Philopteridae (7 species), Menoponidae (3 species), Ceratophyllidae (2 species), Dermanyssidae (2 species). The quail (*Coturnix coturnix*), from different natural and anthropogenic habitats, hosted 14 species of ectoparasites: Philopteridae (7 species), Menoponidae (3 species), Ceratophyllidae (2 species), Dermanyssidae (2 species). The partridge (*Perdix perdix*) hosted 11 species of ectoparasites: Philopteridae (6 species), Menoponidae (3 species), Ceratophyllidae (1 species), Dermanyssidae (1 species). The guinea fowl (*Numida meleagris*) hosted 12 species of ectoparasites: Philopteridae (5 species), Menoponidae (3 species), Ceratophyllidae (2 species), Dermanyssidae (1 species). The comprehensive ectoparasitological results show that the biological phenomenon of polyparasitism is permanent in these wild game bird populations, although its structure is continuously dynamic, both quantitatively and qualitatively.

Keywords: ectoparasites, game poultry species, ectoparasitic associations.

Rezumat. Studiul diversității faunei ectoparazitare la galinaceele de interes cinegetic din Zona de Nord a Republicii Moldova. Lucrarea vizează studiul diversității faunei ectoparazitare la galinaceele de interes cinegetic din Zona de Nord a Republicii Moldova, ce constituie o problemă importantă fundamentală şi, mai ales, aplicativă, deoarece unele specii din ele servesc ca gazde ale diverselor specii de ectoparaziţi şi ca transmiţători ai acestora, care sunt periculoase atât pentru om, cât şi pentru animalele domestice. Studiul ectoparaziților la păsările sălbatice de interes cinegetic din zona de nord a Republicii Moldova a relevat o diversitate de ectoparaziți pe mai multe specii. Fazanul (*Phasianus colchicus*) prezintă o gamă largă de ectoparaziți din mai multe familii: Philopteridae (7 specii), Menoponidae (3 specii), Ceratophyllidae (2 specii), Dermanyssidae (2 specii). La prepeliță (*Coturnix coturnix*) din diferite biotopuri naturale și antropizate găzduiește 14 specii de ectoparaziți: Philopteridae (7 specii), Menoponidae (3 specii), Ceratophyllidae (2 specii), Dermanyssidae (2 specii). La potârnichea (*Perdix perdix*) adăpostește 11 specii de ectoparaziți: Philopteridae (6 specii), Menoponidae (3 specii), Ceratophyllidae (1 specie), Dermanyssidae (1 specie). Bibilica (*Numida meleagris*) găzduiește 12 specii de ectoparaziți: Philopteridae (5 specii), Menoponidae (3 specii), Ceratophyllidae (2 specii), Dermanyssidae (1 specie). Rezultatele ectoparazitologice complexe arată că fenomenul biologic de poliparazitism este permanent în aceste populații de păsări sălbatice de interes cinegetic, dar structura acestuia este în continuă dinamică, atât din punct de vedere cantitativ, cât și calitativ.

Cuvinte cheie: ectoparaziți, galinacee de interes cinegetic, asociații ectoparazitare.

INTRODUCTION

The study of parasitic fauna in wild birds of hunting interest is of major importance, as these birds carry on or within their bodies a wide range of parasitic organisms, including mallophagans, fleas, mites, etc., and can even maintain these parasite reservoirs. Of particular importance are gamasid mites such as *Dermanyssus gallinae* and certain species of mallophagans (*Menopon gallinae*, *Eomenacanthus stramineus*), which may also parasitize domestic birds, acting as carriers and vectors of pathogenic agents such as *Borrelia anserina*, the human St. Louis encephalitis virus, *Pasteurella multocida*, and thus contribute to the emergence of cholera outbreaks, avian mycoplasmosis, etc.

Furthermore, gamasid mites (*Dermanyssus gallinae*) have been found to carry *E. coli*, *Bacillus cereus*, *Pseudomonas* spp., *Staphylococcus* spp., *Streptococcus* spp., *Micrococcus* spp., and *Corynebacterium* spp., confirming the presence of hyperparasitism—a phenomenon in which a parasite may itself become a host for another parasite (ARNASTEIKSKENE et al., 1970; NESTEROV, 2010; RUSU et al., 2021).

The common pheasant (*Phasianus colchicus* L.), along with other wild game birds, plays a key role in maintaining natural reservoirs of parasites that are common to wildlife, domestic animals, and even humans. In this context, the study of their parasitic fauna is of special significance, both theoretically and practically. Understanding the parasitic fauna of game birds is especially important in order to prevent the spread of parasitic agents not only among other wild and domestic animals but also to humans (GOLDOVA, 2006; ERHAN, 2020; RUSU, 2020).

In the context of avian game fauna in the Republic of Moldova, the common pheasant (*Phasianus colchicus* L.) represents the most important bird species due to its population size, wide distribution, and hunting potential. An analysis of the pheasant population dynamics over recent years in Moldova reveals a trend of increasing acclimatization, thanks to comprehensive protection measures and ongoing restocking efforts from specialized breeding farms. In the spring of 2018, the breeding stock of pheasants was estimated at approximately 42,000 individuals, with an annual growth rate of 75–90%. Despite these figures, the pheasant population continues to grow by only 13–18%

annually, with a marked decrease noted during the cold season. Multiple measures aimed at increasing game animal populations may prove insufficient, as parasitic diseases not only hinder growth and development but also contribute to mortality (SENNER, 1983; HUDSON, 1996; LUNGU-BUCȘAN et al., 2015; SAVIN, 2019).

Similarly, the quail (*Coturnix coturnix*) population in 2018 in Moldova was estimated, at the start of the nesting period, at an average density of around 40 quails per 100,000 hectares, with a total exceeding 160,000 individuals. By autumn, the local population was projected to reach approximately 400,000 quails (SAVIN, 2013).

Gastrointestinal parasites identified in pheasants (*Phasianus colchicus* L.) are considered a major cause of productivity loss, illness, and even mortality. Both domestic and wild game birds often exhibit associated polyparasitism (ERHAN et al., 2001; GHERMAN et al., 2003; RUSU et al., 2020; RUSU, 2021).

The prevalence and intensity of infestations in game birds can be influenced by several factors, such as the distribution of intermediate and complementary hosts, age, sex, infestation rate, number of eggs and infective larvae, etc. It has been found that game birds are more vulnerable in their first year of life, during which mortality may reach as high as 90%, due to the combined effects of infectious and helminth-specific parasitic diseases (TODERAȘ et al., 2019; RUSU, 2023).

In recent years, complex research and analysis of infestation levels in the main game species and their role in the formation and maintenance of parasitic agent reservoirs in both natural and anthropized habitats—as well as their importance in the infection of domestic animals—have not been conducted in the Republic of Moldova.

MATERIALS AND METHODS

For the identification of various species of endoparasites in wild game birds (pheasants, guinea fowls, quails) from different natural biotopes in the northern region of the Republic of Moldova. Biological samples were also collected from domestic birds (chickens, turkeys) from various private households in the studied area.

Currently, several methods are known for collecting ectoparasites from birds. One of the known methods for manual collection of ectoparasites from small mammals and dead or hunted birds, according to DUBININA (1971), involves collecting the ectoparasites with the help of tweezers and a scalpel.

This procedure requires a large amount of work, is cumbersome, and does not allow for the complete collection of ectoparasites because, after the host bird's death, most ectoparasite species leave it in search of another living host. Additionally, the method cannot be applied when examining rare and endangered species, the hunting of which is prohibited. Another known method for prophylaxis and treatment of ectoparasites in chickens is described in the short-term Patent MD 408 Z 2012.03.31, which involves combating ectoparasites in chickens using an extract from the dried aerial parts of Dalmatian chamomile (*Pyrethrum cinerariifolium* Trev.), in a 3.0% aqueous solution (Ectogalimol preparation), administered to the birds by spraying at a dose of 50 ml per bird, in two doses, with a 14-day interval, while preventive measures are carried out by spraying the birds in a single dose of 50 ml per bird (RUSU et al., 2021).

Collecting ectoparasites from live birds, according to the method developed by LUNCAȘU & ZAMORNEA (2007), consists of placing the live bird into a bag measuring 20-25 x 30-35 cm or 30-35 x 40-55 cm, and fixing 3-4 cotton pads soaked in a killing solution for ectoparasites under each wing. The opening of the bag is then tied around the bird's head, leaving the eyes and beak outside the bag. The bird is placed on a flat surface and kept for 5-10 minutes until the ectoparasites are immobilized, after which the bird is removed from the bag, the ectoparasites are shaken off, and they are transferred into test tubes with 70% rectified ethanol.

This method, which allows the collection of ectoparasites from live birds, has some drawbacks. One of them is the use of ether (ethoxyethane, CH3-CH2-O-CH2-CH3) as a killing solution for ectoparasites, which is volatile and evaporates quickly, acting as a toxic substance for both the personnel collecting the ectoparasites and the bird under investigation. Another drawback of this method is that live birds of various sizes are placed in polyethylene bags of dimensions 20-25 x 30-35 cm or 30-35 x 40-55 cm, which are easily and quickly damaged by the bird’s claws. Additionally, the ectoparasites collected in the bag from the bird’s body are shaken onto a sheet of white paper or a film measuring 1.5 x 1.5 m, which in field conditions can easily be carried away by the wind.

In 2021, in collaboration with colleagues from the Parasitology and Helminthology Laboratory of the Institute of Zoology of USM, an innovative biological method for collecting ectoparasites from live game birds was developed and successfully implemented. This method allows for the maintenance of the integrity of the ectoparasites, preserving their numerical and specific composition, and accurately determines the degree and specificity of infestation in birds with ectoparasites from different systematic groups, without causing harm to the health of either the person applying the method or the bird being diagnosed.

The biological method for collecting ectoparasites from live game birds involves spraying the bird with a natural extract from the dried aerial parts of Dalmatian chamomile (*Pyrethrum cinerariifolium* Trev.), in an aqueous solution (Ectogalimol preparation), at a 5% concentration, 50 ml per bird, and placing it into a nylon bag measuring 20-25 x 30-35 cm or 30-35 x 40-55 cm. The opening of the bag is then tied around the bird's head, leaving the eyes and beak outside the bag. The bird is placed horizontally on a flat surface and kept for 5-10 minutes until the ectoparasites are immobilized. Afterward, the bird is removed from the bag, the ectoparasites are shaken into a plastic basin with a white interior, with a diameter of 35-40 cm and a height of 40-50 cm, and the collected ectoparasites are transferred into test tubes with 70% rectified ethanol.

Therefore, the recommended method is not harmful to the person conducting the investigation nor to the bird being examined, because the killing solution for ectoparasites is the 5% Ectogalimol solution, which is a biologically active natural extract obtained from plant material and has high therapeutic efficacy against various species of ectoparasites in chickens (mallophages – *Cuclotogaster heterographus, Eomenacanthus stramineus, Goniocotes gallinae, Goniocotes maculatus, Goniodes dissimilis, Lipeurus caponis, Menopon gallinae, Menacanthus cornutus, Menacanthus pallidulus*; fleas – *Ceratophylus gallinae, C. hirundinis*, and gamasid mites – *Dermanyssus gallinae, D. hirundinis*). The experiments regarding the therapeutic efficacy of the Ectogalimol preparation against ectoparasites in game birds were carried out between 2016-2019 in various natural and anthropized biotopes. The plant-based preparation Ectogalimol is synthesized by the collaborators of the Parasitology and Helminthology Laboratory of the Institute of Zoology, in collaboration with the Center for Advanced Biological Technologies at the Institute of Genetics, Physiology, and Plant Protection (Patent no. 408 from 31.03.2012). The preparation is obtained using the following procedure: 500 g of dried aerial parts of Dalmatian chamomile (*Pyrethrum cinerariifolium* Trev.) were subjected to extraction with a 60% alcohol-water solution at a 1:4 ratio, using a water bath with a refrigerant for 8 hours. The procedure was repeated three times, after which the extracts were filtered, combined, and distilled to dryness in a vacuum evaporator at 50°C. This yielded 38.7 g of biologically active dry substance. The control was performed using thin-layer chromatography on "Silufol" plates with a solvent system of "chloroform:methanol" = 75:25 (v/v). Aqueous solutions with concentrations of 3.0%, 4.0%, 5.0%, and 6.0% were used for research. For example, a 7.0% solution equals 7 g of dry substance dissolved in 93 ml of non-chlorinated water.

The systematic identification of parasitic species was performed according to the European fauna. The parasitological evaluation is based on establishing the EI (%) and II (individuals per animal) in the researched animals. The obtained results were processed statistically using Excel software.

RESULTS AND DISCUSSIONS

The research on the ectoparasitic fauna of game birds in the Northern Region of the Republic of Moldova highlighted a rich variety of ectoparasites in pheasants from the following families: **Philopteridae Family** – 7 species: *Cuclotogaster cinereus* with EI = 13.1% and II = 16.0 ex; *Cuclotogaster heterographus* with EI = 69.7% and II = 131.0 ex.; *Goniocotes chrysocephalus* with EI = 54.7% and II = 76.3 ex.; *Goniocotes microthorax* with EI = 30.1% and II = 63.2 ex.; *Goniodes colchici* with EI = 39.5% and II = 94.0 ex.; *Goniodes dissimilis* with EI = 9.6% and II = 7.0 ex.; *Lipeurus caponis* with EI = 29.0% and II = 41.0 ex.

Menoponidae Family – 3 species: *Amyrsidea perdicis* with EI = 30.5% and II = 91.0 ex.; *Menacanthus stramineus* with EI = 72.0% and II = 107.0 ex.; *Menopon gallinae* with EI = 30.3% and II = 62.0 ex.

Ceratophyllidae Family – 2 species: *Ceratophylus gallinae* with EI = 12.2% and II = 25.0 ex.; *Ceratophylus hirundinis* with EI = 21.6% and II = 40.0 ex.;

Dermanyssidae Family – 2 species: *Dermanyssus gallinae* with EI = 54.7% and II = 74.0 ex.; *Dermanyssus hirundinis* with EI = 15.0% and II = 30.4 ex. (see Table 1).

Table 1. Diversity of the ectoparasitic fauna in game birds from the Northern Region of the Republic of Moldova.

	Parasitized host							
Specii de paraziți	**Pheasant** ***(Phasianus colchicus)***		**Quail** ***(Coturnix coturnix)***		**Partridge** ***(Perdix perdix)***		**Guinea fowl** ***(Numida meleagris)***	
	EI (%)	II (ex.)	EI (%)	II (ex.)	EI (%)	II (ex.)	EI (%)	II (ex.)
INSECTA CLASS								
Family Philopteridae								
Goniocotes microthorax (Stephens, 1829)	30,1	63,2	-	-	13,7	15,2	-	-
Cuclotogaster heterographus (Nitzsch,1866)	69,7	131,0	-	-	3,5	4,0	30,1	19,0
Cuclotogaster cinereus (Nitzsch, 1866)	13,1	16,0	86,0	238,0	-	-	-	-
Goniocotes maculatus (Taschenberg, 1882)	-	-	-	-	-	-	2,0	2,0

Goniocotes chrysocephalus (Giebel, 1874)	54,7	76,3	22,1	30,1	17,5	19,1	-	-
Cuclotogaster heterogrammicus (Nitzschin Giebel, 1866)	-	-	-	-	8,7	5,0	-	-
Goniodes astrocephalus (Burmeister, 1838)	-	-	39,3	18,0	-	-	-	-
Goniodes colchici (Denny, H. 1842)	39,5	94,0	-	-	-	-	-	-
Lipeurus caponis (Linné. 1758)	29,0	41,0	46,0	32,0	-	-	3,0	4,0
Goniocotes gallinae (De Geer, 1778)	-	-	20,5	52,1	-	-	33,7	46,0
Goniodes dissimilis (Denny, 1842)	9,6	7,0	7,1	4,0	1,7	1,0	5,0	10,5
Goniodes dispar (Burmeister, 1838)	-	-	19,5	15,7	79,1	147,0	-	-
Family Menoponidae								
Amyrsidea perdicis (Denny, 1842)	30,5	91,0	-	-	29,7	39,0	23,0	25,0
Menacanthus abdominalis (Piaget, 1880)	-	-	39,4	6,0	-	-	-	-
Menacanthus stramineus (Nitzsch, 1818)	72,0	107,0	42,1	54,0	81,3	79,1	28,2	21,7
Menopon gallinae (Linnaeus, 1758)	30,3	62,0	63,0	61,0	184,0	31,5	43,6	55,7
Eomenacanthus stramineus (Nitzsch, 1818)	-	-	-	-	-	-	-	-
Menacanthus cornutus (Schomer, 1913)	-	-	-	-	-	-	-	-
*Menacanthus pallidulus (*Neumann, 1912)	-	-	-	-	-	-	-	-
Fleas								
Family Ceratophyllidae								
Ceratophylus gallinae (Schrank, 1803)	12,2	25,0	43,5	54,0	-	-	37,9	56,2
Ceratophylus hirundinis (Curtis, 1826)	21,6	40,0	37,1	46,0	37,1	46,0	27,3	41,0
Parasitiform mites								
Family Dermanyssidae								
Dermanyssus gallinae (De Geer, 1778)	54,7	74,0	55,1	66,5	-	-	30,3	42,1
Dermanyssus hirundinis (Dugès, 1834*)*	15,0	30,4	43,1	52,1	41,7	75,1	31,7	15,6
	Parasitized host							
Specii de paraziți	Pheasant *(Phasianus colchicus L.)*		Quail *(Coturnix coturnix)*		Partridge *(Perdix perdix)*		Guinea fowl *(Numida meleagris)*	

	EI (%)	II (ex.,)	EI (%)	II (ex.,)	EI (%)	II (ex.,)	EI (%)	II (ex.,)
INSECTA CLASS								
Family Philopteridae								
Goniocotes microthorax (Stephens, 1829)	30.1	63.2	-	-	13.7	15.2	-	-
Cuclotogaster heterographus (Nitzsch, 1866)	69.7	131.0	-	-	3.5	4.0	30.1	19.0
Cuclotogaster cinereus (Nitzsch, 1866)	13.1	16.0	86.0	238.0	-	-	-	-
Goniocotes maculatus (Taschenberg, 1882)	-	-	-	-	-	-	2.0	2.0
Goniocotes chrysocephalus (Giebel, 1874)	54.7	76.3	22.1	30.1	17.5	19.1	-	-
Cuclotogaster heterogrammicus (Nitzschin Giebel], 1866)	-	-	-	-	8.7	5.0	-	-
Goniodes astrocephalus Burmeister, 1838)	-	-	39.3	18.0	-	-	-	-
Goniodes colchici (Denny, H. 1842)	39.5	94.0	-	-	-	-	-	-
Lipeurus caponis (Linné. 1758)	29.0	41.0	46.0	32.0	-	-	3.0	4.0
Goniocotes gallinae (De Geer, 1778)	-	-	20.5	52.1	-	-	33.7	46.0
Goniodes dissimilis (Denny, 1842)	9.6	7.0	7.1	4.0	1.7	1.0	5.0	10.5
Goniodes dispar (Burmeister, 1838)	-	-	19.5	15.7	79.1	147.0	-	-
Family Menoponidae								
Amyrsidea perdicis (Denny, 1842)	30.5	91.0	-	-	29.7	39.0	23.0	25.0
Menacanthus abdominalis (Piaget, 1880)	-	-	39.4	6.0	-	-	-	-
Menacanthus stramineus (Nitzsch, 1818)	72.0	107.0	42.1	54.0	81.3	79.1	28.2	21.7
Menopon gallinae (Linnaeus, 1758)	30.3	62.0	63.0	61.0	184.0	31.5	43.6	55.7
Eomenacanthus stramineus (Nitzsch, 1818)	-	-	-	-	-	-	-	-
Menacanthus cornutus (Schomer, 1913)	-	-	-	-	-	-	-	-
Menacanthus pallidulus (Neumann, 1912)	-	-	-	-	-	-	-	-
Fleas								
Family Ceratophyllidae								

Ceratophylus gallinae (Schrank, 1803)	12.2	25.0	43.5	54.0	-	-	37.9	56.2
Ceratophylus hirundinis (Curtis, 1826)	21.6	40.0	37.1	46.0	37.1	46.0	27.3	41.0
Parasitiform mites								
Family Dermanyssidae								
Dermanyssus gallinae (De Geer, 1778)	54.7	74.0	55.1	66,5	-	-	30.3	42.1
Dermanyssus hirundinis (Dugès, 1834)	15.0	30.4	43.1	52.1	41.7	75.1	31.7	15.6

Out of the total of 14 species of ectoparasites identified in pheasant (*Phasianus colchicus* L.), only one species – 7.1% (*Goniodes colchici*) is specific to pheasant (*Phasianus colchicus* L.), while 10 species – 71.4% (*Cuclotogaster cinereus, Goniocotes chrysocephalus, Goniodes dissimilsis, Lipeurus caponis, Menacanthus stramineus, Menopon gallinae, Ceratophylus gallinae, Ceratophylus hirundinis, Dermanyssus gallinae, Dermanyssus hirundinis*) are common to quail (*Coturnix coturnix*), 9 species – 64.3% (*Cuclotogaster heterographus, Goniocotes chrysocephalus, Goniocotes microthorax, Goniodes dissimilsis, Menacanthus stramineus, Menopon gallinae, Ceratophylus hirundinis*, and *Dermanyssus hirundinis*) are common to partridge (*Perdix perdix*), 10 species – 71.4% (*Cuclotogaster heterographus, Goniodes dissimilsis, Lipeurus caponis, Amyrsidea perdicis, Menacanthus stramineus, Menopon gallinae, Ceratophylus gallinae, Ceratophylus hirundinis, Dermanyssus gallinae, Dermanyssus hirundinis*) are common to guinea fowl (Numida meleagris), and 8 species – 57.1% (*Cuclotogaster heterographus, Goniodes dissimilsis, Lipeurus caponis, Menopon gallinae, Ceratophylus gallinae, Ceratophylus hirundinis, Dermanyssus gallinae, Dermanyssus hirundinis*) are common to domestic chicken (*Gallus gallus domesticus* Linnaeus, 1758) (Fig. 1).

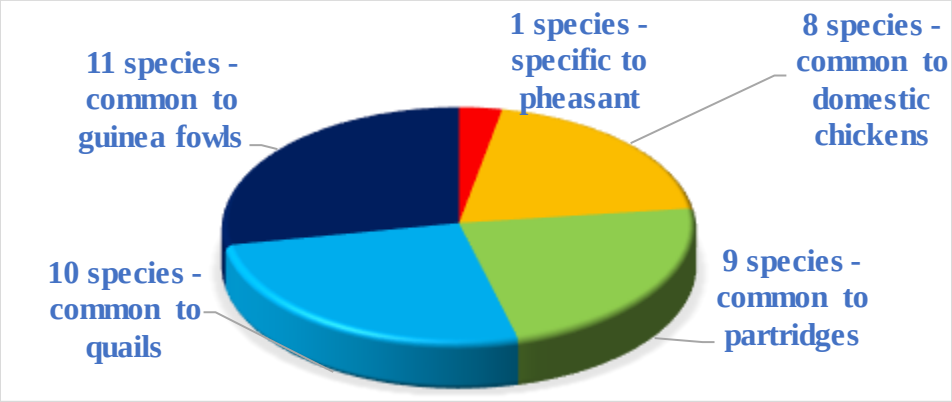

Figure 1. Specificity of the ectoparasite species identified in pheasant (*Phasianus colchicus* L.).

Ectoparasite fauna study on Quail (Coturnix coturnix) from Various Natural and Anthropogenic Habitats in the Northern Zone of the Republic of Moldova. The study of the ectoparasite fauna of quail (*Coturnix coturnix*) in various natural and anthropogenic habitats in the Northern Zone of the Republic of Moldova allowed us to identify 14 species of ectoparasites:

- **Family Philopteridae** – 7 species (*Cuclotogaster cinereus* with EI-86.0% and II-238.0 ex., *Goniocotes chrysocephalus* with EI-22.1% and II-30.1 ex., *Goniodes astrocephalus* with EI-39.3% and II-18.0 ex., *Goniodes dispar* with EI-19.5% and II-15.7 ex., *Goniodes dissimilis* with EI-7.1% and II-4.0 ex., *Goniocotes gallinae* with EI-20.5% and II-52.1 ex., and *Lipeurus caponis* with EI-46.0% and II-32.0 ex.)
- **Family Menoponidae** – 3 species (*Menacanthus abdominalis* with EI-39.4% and II-6.0 ex., *Menacanthus stramineus* with EI-42.1% and II-54.0 ex., and *Menopon gallinae* with EI-61.0% and II-184.0 ex.)
- **Family Ceratophyllidae** – 2 species (*Ceratophylus gallinae* with EI-43.5% and II-54.0 ex. and *Ceratophylus hirundinis* with EI-37.1% and II-46.0 ex.)
- **Family Dermanyssidae** – 2 species (*Dermanyssus gallinae* with EI-55.1% and II-66.5 ex. and *Dermanyssus hirundinis* with EI-43.1% and II-52.1 ex.) (Table 1).

Of the 14 species of ectoparasites identified in quail, only one species (7.1%) – *Goniodes astrocephalus* is specific to quail, while 10 species (71.4%) – *Cuclotogaster cinereus, Goniocotes chrysocephalus, Goniodes dissimilis, Lipeurus caponis, Menacanthus stramineus, Menopon gallinae, Ceratophylus gallinae, Ceratophylus hirundinis,*

Dermanyssus gallinae, *Dermanyssus hirundinis* – are common with pheasant (Phasianus colchicus), 7 species (64.3%) – *Goniocotes chrysocephalus*, *Goniodes dispar*, *Goniodes dissimilis*, *Menacanthus stramineus*, *Menopon gallinae*, *Ceratophylus hirundinis*, and *Dermanyssus hirundinis* – are common with partridge (*Perdix perdix*), 9 species (64.3%) – *Goniodes dissimilis*, *Goniocotes gallinae*, *Lipeurus caponis*, *Menacanthus stramineus*, *Menopon gallinae*, *Ceratophylus gallinae*, *Ceratophylus hirundinis*, *Dermanyssus gallinae*, *Dermanyssus hirundinis* – are common with guinea fowl (*Numida meleagris*), and 8 species (57.1%) – *Goniodes dissimilis*, *Goniocotes gallinae*, *Lipeurus caponis*, *Menopon gallinae*, *Ceratophylus gallinae*, *Ceratophylus hirundinis*, *Dermanyssus gallinae*, *Dermanyssus hirundinis* – are common with domestic chickens (*Gallus gallus domesticus* Linnaeus, 1758) (Table 1).

The study of the ectoparasite fauna in partridge (*Perdix perdix*) revealed 11 species of ectoparasites:

- **Family Philopteridae** – 6 species (*Cuclotogaster heterographus* with EI-3.5% and II-4.0 ex., *Cuclotogaster heterogrammicus* with EI-8.7% and II-5.0 ex., *Goniocotes chrysocephalus* with EI-17.5% and II-19.1 ex., *Goniocotes microthorax* with EI-13.7% and II-15.2 ex., *Goniodes dispar* with EI-79.1% and II-147.0 ex., *Goniodes dissimilis* with EI-1.7% and II-1.0 ex.)
- **Family Menoponidae** – 3 species (*Amyrsidea perdicis* with EI-29.7% and II-39.0 ex., *Menacanthus stramineus* with EI-79.1% and II-183.0 ex., and *Menopon gallinae* with EI-31.5% and II-16.4 ex.).
- **Family Ceratophyllidae** – 1 species (*Ceratophylus hirundinis* with EI-37.1% and II-46.0 ex.)
- **Family Dermanyssidae** – 1 species (*Dermanyssus hirundinis* with EI-41.7% and II-75.1 ex.) (Table 1).

In partridge (*Perdix perdix*), of the 11 species of ectoparasites identified, no species was found to be specific only to partridges. Most are common with other species of game birds and domestic poultry. Therefore, it was established that 9 species (64.3%) – *Cuclotogaster heterographus*, *Goniocotes chrysocephalus*, *Goniocotes microthorax*, *Goniodes dissimilis*, *Menacanthus stramineus*, *Menopon gallinae*, *Ceratophylus hirundinis*, and *Dermanyssus hirundinis* – are common with pheasant, 7 species (64.3%) – *Goniocotes chrysocephalus*, *Goniodes dispar*, *Goniodes dissimilis*, *Menacanthus stramineus*, *Menopon gallinae*, *Ceratophylus hirundinis*, and *Dermanyssus hirundinis* – are common with quail, 7 species (64.3%) – *Cuclotogaster heterographus*, *Goniodes dissimilis*, *Amyrsidea perdicis*, *Menacanthus stramineus*, *Menopon gallinae*, *Ceratophylus hirundinis*, and *Dermanyssus hirundinis* – are common with guinea fowl, and 5 species (35.7%) – *Cuclotogaster heterographus*, *Goniodes dissimilis*, *Menopon gallinae*, *Ceratophylus hirundinis*, and *Dermanyssus hirundinis* – are common with domestic chickens (Table 1).

The study of the ectoparasite fauna in guinea fowl (*Numida meleagris*) revealed 12 species of ectoparasites:

- **Family Philopteridae** – 5 species (*Cuclotogaster heterographus* with EI-30.1% and II-19.0 ex., *Goniocotes maculatus* with EI-2.0% and II-2.0 ex., *Goniodes dissimilis* with EI-5.0% and II-10.5 ex., *Goniocotes gallinae* with EI-33.7% and II-46.0 ex., Lipeurus caponis with EI-3.0% and II-4.0 ex.)
- **Family Menoponidae** – 3 species (*Amyrsidea perdicis* with EI-23.0% and II-25.0 ex., *Menacanthus stramineus* with EI-28.2% and II-21.7 ex., and *Menopon gallinae* with EI-43.6% and II-55.7 ex.)
- **Family Ceratophyllidae** – 2 species (*Ceratophylus gallinae* with EI-35.7% and II-34.0 ex., *Ceratophylus hirundinis* with EI-25.1% and II-39.0 ex.)
- **Family Dermanyssidae** – 2 species (*Dermanyssus gallinae* with EI-30.3% and II-42.1 ex., *Dermanyssus hirundinis* with EI-31.7% and II-15.6 ex.) (Table 1).

CONCLUSIONS

1. Research on the ectoparasite fauna of wild game birds in the Northern Zone of the Republic of Moldova revealed a rich diversity of ectoparasites in pheasant (*Phasianus colchicus* L.), belonging to the following families: Family Philopteridae – 7 species (*Cuclotogaster cinereus, Cuclotogaster heterographus, Goniocotes chrysocephalus, Goniocotes microthorax, Goniodes colchici, Goniodes dissimilis, Lipeurus caponis*). Family Menoponidae – 3 species (*Amyrsidea perdicis, Menacanthus stramineus, Menopon gallinae*). Family Ceratophyllidae – 2 species (*Ceratophylus gallinae, Ceratophylus hirundinis*). Family Dermanyssidae – 2 species (*Dermanyssus gallinae, Dermanyssus hirundinis*).
2. The study of the ectoparasite fauna of the quail (*Coturnix coturnix*) in various natural and anthropogenic habitats in the Northern Zone of the Republic of Moldova allowed the identification of 14 ectoparasite species: Family Philopteridae – 7 species (*Cuclotogaster cinereus, Goniocotes chrysocephalus, Goniodes astrocephalus, Goniodes dispar, Goniodes dissimilis, Goniocotes gallinae, Lipeurus caponis*). Family Menoponidae – 3 species (*Menacanthus abdominalis, Menacanthus stramineus, Menopon gallinae*). Family Ceratophyllidae – 2 species (*Ceratophylus gallinae, Ceratophylus hirundinis*). Family Dermanyssidae – 2 species (*Dermanyssus gallinae, Dermanyssus hirundinis*).
3. The study of ectoparasite diversity in partridge (*Perdix perdix*) identified 11 species of ectoparasites: Family Philopteridae – 6 species (*Cuclotogaster heterographus, Cuclotogaster heterogrammicus, Goniocotes chrysocephalus, Goniocotes microthorax, Goniodes dispar, Goniodes dissimilis*). Family Menoponidae – 3 species (*Amyrsidea perdicis, Menacanthus stramineus, Menopon gallinae*). Family Ceratophyllidae – 1 species (*Ceratophylus hirundinis*). Family Dermanyssidae – 1 species (*Dermanyssus hirundinis*).
4. The study of ectoparasite diversity in guinea fowl (*Numida meleagris*) identified 12 species of ectoparasites. Family Philopteridae – 5 species (*Cuclotogaster heterographus, Goniocotes maculatus, Goniodes dissimilis, Goniocotes gallinae, Lipeurus caponis*). Family Menoponidae – 3 species (*Amyrsidea perdicis, Menacanthus*

stramineus, Menopon gallinae). Family Ceratophyllidae – 2 species (*Ceratophylus gallinae, Ceratophylus hirundinis*). Family Dermanyssidae – 1 species (*Dermanyssus gallinae*).

5. The complex ectoparasitological results obtained from wild game bird populations in various natural habitats of the Northern Zone of the Republic of Moldova indicate that the biological phenomenon of polyparasitism is a permanent occurrence, although the structure of polyparasitism remains in continuous quantitative and qualitative dynamics.

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