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Source: Journal of Wildlife Diseases, 33(3) : 638-641

Published By: Wildlife Disease Association

URL: <https://doi.org/10.7589/0090-3558-33.3.638>

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## Blood Parasites of Passerine Birds from Central Spain

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**ABSTRACT:** Sixteen species of passerine birds captured during a 2.5 yr period in Central Spain were examined for hematozoa. *Haemoproteus* spp., *Leucocytozoon* spp., *Trypanosoma* spp., *Plasmodium* spp., and microfilariae were observed. The most prevalent species were in the genus *Leucocytozoon*. The majority of the records are new for Spain and some represent new host records. More than one-half of the birds examined were infected with at least one parasite species. These records are similar to those reported from other areas in northern Europe and the Iberian Peninsula.

**Key words:** Avian hematozoa, *Haemoproteus* spp., *Leucocytozoon* spp., microfilariae, *Plasmodium* spp., prevalence, survey, trypanosomes.

Since the pioneering work by Orbaneja Agüero (1934), Rey Vila (1945) Covaleta Ortega and Gallego Berenguer (1946, 1950), and other studies on microfilariae (López Neyra and Medina Blanco, 1951; Jiménez Millán and López Caballero, 1975; López Caballero, 1980), there have been few subsequent studies on avian hematozoa in Spain (Cordero del Campillo, 1980; Peirce, 1981). However, this is not due to absence of infection or low prevalences in birds in the Iberian Peninsula, as the recent studies of Merilä et al. (1995), Merino and Potti (1995), and Merino et al. (1996) have shown. Herein, we present data on some passerine species that were sampled for blood parasites in Central Spain.

Birds were sampled for blood parasites in Sierra de Ayllón (La Hiruela, Madrid and El Cardoso de la Sierra, Guadalajara) in the spring 1993 to 1995, Santa María de la Alameda (Madrid) in March–April 1995, vicinity of Alcalá de Henares (Madrid) from September 1993 to January 1996, and Ventorrillo Scientific Station (Madrid) in winter 1995 (Table 1). Coordinants for

sampling sites were located between 40°38' to 41°04'N and 03°02' to 04°28'W. Blood smears were prepared from a drop of blood via brachial vein, fixed with absolute ethanol and stained with Giemsa. For some birds sampled post mortem (Table 1) blood was obtained from the heart or liver. Extracellular parasites (trypanosomes, microfilariae) and some large intracellular parasites (*Leucocytozoon* spp.) were found by scanning one-half of the symmetrical smear at 200× magnification (about 300 fields scanned, one-half being chosen at random). Although most infections with intraerythrocytic parasites were noted at 200× magnification, we checked another 20 fields at 400× (about 20,000 erythrocytes) in an area with homogeneous distribution of cells in the other one-half of the smear (the part not scanned at 200×). Subsequently, we used the oil immersion objective to count at least 2,000 erythrocytes. When low intensity infections were involved, we counted 10,000 erythrocytes under the oil immersion objective lens. When an uneven distribution of parasites or blood cells were noted, replicates of the 20 fields scanned at 400× and cell counts under the oil immersion lens were performed in different areas of the smear. The number of parasites per 2,000 erythrocytes were counted in a high intensity of infection of *Leucocytozoon* sp. (see below). All slides were examined by the same individual (S.M.). The species of parasites were identified based in host family specificity and parasite morphological characteristics (Bennett et al., 1991, 1993, 1994).

Representative slides of the blood parasites we collected were deposited in the Museo Nacional de Ciencias Naturales de

TABLE 1. Prevalence of blood parasites in birds from central Spain.

Hosts	Prevalence		Parasite species <sup>a,d</sup>				
	Infected	Examined	HP	LZ	TR	MR	PL
<b>Certhiidae</b>							
<i>Certhia brachydactyla</i> <sup>e</sup>	2	7 <sup>i</sup>			2 <sup>b</sup>		
<b>Corvidae</b>							
<i>Cyanopica cyana</i> <sup>f</sup>	9	10		9 <sup>c,1</sup>	2	1 <sup>b</sup>	
<i>Pica pica</i> <sup>f</sup>	1	1		1 <sup>1</sup>	1		
<b>Fringillidae</b>							
<i>Serinus serinus</i> <sup>e</sup>	1	1	1 <sup>c,2</sup>				
<i>Fringilla coelebs</i> <sup>e</sup>	3	4	3 <sup>3</sup>		1		
<b>Muscicapidae</b>							
<i>Phylloscopus bonelli</i> <sup>e</sup>	2	6		1 <sup>4</sup>	1		1 <sup>b,5</sup>
<i>Sylvia atricapilla</i> <sup>e,g,j</sup>	5	10	4 <sup>6</sup>	1 <sup>4</sup>			
<i>Sylvia borin</i> <sup>e,g</sup>	3	7	3 <sup>6</sup>	1 <sup>4</sup>			
<i>Erithacus rubecula</i> <sup>e</sup>	4	8	2 <sup>7</sup>	2 <sup>8</sup>			
<i>Turdus merula</i> <sup>e,f</sup>	3	3		2 <sup>9</sup>	1	1 <sup>c,10</sup>	
<i>Turdus philomelos</i> <sup>e</sup>	2	2	1 <sup>11</sup>	1 <sup>9</sup>	1	1 <sup>c,10</sup>	
<b>Paridae</b>							
<i>Parus ater</i> <sup>e</sup>	6	7 <sup>i</sup>		6 <sup>12,13</sup>	2		
<i>Parus caeruleus</i> <sup>e,j</sup>	11	16 <sup>i</sup>		9 <sup>12,13</sup>	2		
<i>Parus major</i> <sup>e</sup>	3	8 <sup>i</sup>		3 <sup>12,13</sup>	1		
<b>Prunellidae</b>							
<i>Prunella modularis</i> <sup>e,j</sup>	1	1	1 <sup>14</sup>				
<b>Sittidae</b>							
<i>Sitta europaea</i> <sup>e,h</sup>	2	4 <sup>i</sup>	1 <sup>15</sup>	1 <sup>16</sup>	1		
Total	58	95	16	37	15	3	1
Prevalence (%)	61		17	39	16	3	1

<sup>a</sup> HP = *Haemoproteus*, LZ = *Leucocytozoon*, TR = *Trypanosoma*, MR = microfilariae, PL = *Plasmodium*.

<sup>b</sup> New host record.

<sup>c</sup> New geographic record.

<sup>d</sup> Parasite species encountered in bird families and subfamilies sampled on central Spain; taxonomic sources for identification are referenced in superscripts: <sup>1</sup> *Leucocytozoon sakharoffi*<sup>a</sup>, <sup>2</sup> *Haemoproteus chloris*<sup>b</sup>, <sup>3</sup> *Haemoproteus fringillae*<sup>b</sup>, <sup>4</sup> *Leucocytozoon phylloscopus*<sup>c</sup>, <sup>5</sup> *Plasmodium relictum*<sup>d</sup>, <sup>6</sup> *Haemoproteus sylviae*<sup>c</sup>, <sup>7</sup> *Haemoproteus* sp. (unnamed), <sup>8</sup> *Leucocytozoon* sp. (unnamed), <sup>9</sup> *Leucocytozoon dubreuilii*<sup>c</sup>, <sup>10</sup> *Splendidofilaria* sp. (unidentified), <sup>11</sup> *Haemoproteus fallisi*<sup>c</sup>, <sup>12</sup> *Leucocytozoon majoris*<sup>a</sup>, <sup>13</sup> *Leucocytozoon* sp. (unnamed), <sup>14</sup> *Haemoproteus* sp. (unnamed), <sup>15</sup> *Haemoproteus sittae*<sup>f</sup>, <sup>16</sup> *Leucocytozoon* sp. (unnamed). (<sup>a</sup> Bennett and Peirce, 1992; <sup>b</sup> Burry-Caines and Bennett, 1992; <sup>c</sup> Bennett et al., 1991; <sup>d</sup> Greiner et al., 1975; <sup>e</sup> Bennett et al., 1993; <sup>f</sup> Bennett, 1989).

<sup>e-h</sup> Localities: <sup>e</sup> Sierra de Ayllón (Madrid and Guadalajara); <sup>f</sup> Santa María de la Alameda (Madrid); <sup>g</sup> Alcalá de Henares (Madrid and Guadalajara); <sup>h</sup> Ventorrillo Scientific Station (Madrid).

<sup>i</sup> Nestlings sampled (3 *C. brachydactyla*, 7 *P. ater*, 13 *P. caeruleus*, 4 *P. major*, 1 *S. europaea*).

<sup>j</sup> Birds sampled post-mortem. (one nestling of *Parus caeruleus*; 7 *Sylvia atricapilla*).

Madrid (Madrid, Spain; Accession numbers MNCN 35.01/5 to MNCN 35.01/16, MNCN 33.03/1 to MNCN 33.03/4 and MNCN 11.02/11). The terms prevalence and intensity are defined by Margolis et al. (1982). Bird taxonomy follows Howard and Moore (1991).

Results of our study are listed in Table 1. The majority of the records are new

geographic records for Spain and three are new host records.

*Leucocytozoon* spp. were the most common blood parasites we collected. In contrast, Bennett et al. (1982b) indicated that *Haemoproteus* spp. were the most prevalent blood parasites of birds on a world-wide basis. Although this might be biased by the presence of nestlings in our sample

and by the high prepatent period for *Haemoproteus* spp. (Merino and Potti, 1995), when only adult birds are considered *Leucocytozoon* spp. remained as the most prevalent parasites (Table 1). In contrast, Merino and Potti (1995) reported 1% prevalence of *Leucocytozoon muscicapa* in a breeding population of pied flycatchers (*Ficedula hypoleuca*) from Sierra de Ayllon. However, the intensities of infections with *Leucocytozoon* spp. in our study are normally very low. Only one bird showed a high parasitaemia; 133 parasites per 2,000 erythrocytes were found in a nestling blue tit (*Parus caeruleus*).

There are some differences in hematozoan prevalence between birds sampled post mortem and those sampled alive; perhaps because we obtained blood from different organs in dead birds and from peripheral blood in living birds (see Fedynich et al. 1995). This may be especially relevant in the sample of *Sylvia atricapilla* since seven dead birds are included. Three of these birds were infected by *Haemoproteus sylvae*; two of three living birds were infected, one each by *Leucocytozoon* sp. and *H. sylvae*.

The data presented here and those of Merilä et al. (1995) and Merino and Potti (1995) showed a high prevalence of blood parasites in birds from Spain. This is similar to that reported in birds from Scandinavian by Bennett et al. (1982a) who hypothesized a temporal decrease in prevalence of blood parasites in birds in western Europe based on a review of the literature. This may be the result of the changing host-vector-habitat relationships due to altered or lost habitat in much of Europe since the 1930's. Low prevalences of hematozoa in birds from Spain were sampled from agriculturally changed habitats (Tella et al., 1996, Blanco et al., 1997). In addition, Merilä et al. (1995) showed that greenfinches (*Carduelis chloris*) had high prevalences of hematozoa in relatively unaltered habitats in Spain and Scandinavia, while birds from central Europe and other areas located near large human popula-

tions had low prevalences of hematozoa. Although our data do not support the proposed temporal decrease in hematozoan prevalence in birds from Spain, a larger sample than that obtained to date and from different habitats is necessary to confirm this hypothesis.

Thanks are extended to I. Noguera and M. Herrera for assistance in the field, to S. Cano for identification of microfilariae and submission of some samples. L. M. Carrascal submitted the samples from Ventorrillo Scientific Station. This work was partially supported by DGICYT (project PB91-0084-C03-03) to J. Potti and by a grant from Spanish Education Ministry (EX96 0050826715) to S. Merino.

#### LITERATURE CITED

- BENNETT, G. F. 1989. New species of haemoprotozooids from the avian families Paridae and Sittidae. *Canadian Journal of Zoology* 67: 2685-2688.
- , M. A. BISHOP, AND M. A. PEIRCE. 1991. The species and distribution of the haemoprotozooids of the avian family Muscipidae *sensu latu* (Passeriformes). *Journal of Natural History* 25: 23-43.
- , R. A. EARLE, AND M. A. PEIRCE. 1993. The Leucocytozoidae of South African birds. The Muscipidae *sensu latu*. *South African Journal of Zoology* 28: 81-87.
- , AND M. A. PEIRCE. 1992. Leucocytozoids of seven old world passeriform families. *Journal of Natural History* 26: 693-707.
- , ———, AND R. A. EARLE. 1994. An annotated checklist of the valid avian species of *Haemoproteus*, *Leucocytozoon* (Apicomplexa: Haemosporida) and *Hepatozoon* (Apicomplexa: Haemogregarinidae). *Systematic Parasitology* 29: 61-73.
- , F. THOMMES, J. BLANCOU, AND M. ARTOIS. 1982a. Blood parasites of some birds from the Lorraine region, France. *Journal of Wildlife Diseases* 18: 81-88.
- , M. WHITEWAY, AND C. WOODWORTH-LYNAS. 1982b. A host-parasite catalogue of the avian Haematozoa. Memorial University of Newfoundland Occasional Papers in Biology 5, Memorial University of Newfoundland, Newfoundland, Canada, 240 pp.
- BLANCO, G., S. MERINO, J. L. TELLA, J. A. FARGALLO, AND A. GAJON. 1997. Hematozoa in two populations of the threatened chough *Pyrrhocorax pyrrhocorax* in Spain. *Journal of Wildlife Diseases*, 33 in press.
- BURRY-CAINES, J. R., AND G. F. BENNETT. 1992.

- The Haemoproteidae (Apicomplexa: Haemosporina) of the avian families Fringillidae and Emberizidae s.l. *Canadian Journal of Zoology* 70: 1149–1160.
- CORDERO DEL CAMPILLO, M. 1980. *Indice catálogo de Zooparásitos Ibéricos*. Ministerio de Sanidad y Seguridad Social, Madrid, Spain, 579 pp.
- COVALEDA ORTEGA, J., AND J. GALLEGUERO BERENGUER. 1946. Contribución al estudio de algunos *Leucocytozoon* de aves españolas. *Revista Ibérica de Parasitología* 6: 203–224.
- , AND ———. 1950. *Haemoproteus* aviares. *Revista Ibérica de Parasitología* 10: 141–185.
- FEDYNICH, A. M., D. B. PENCE, AND R. D., JR., GODFREY. 1995. Hematozoa in thin blood smears. *Journal of Wildlife Diseases* 31: 436–438.
- GREINER, E. C., G. F. BENNETT, M. LAIRD, AND C. M. HERMAN. 1975. Avian Hematozoa 2. Taxonomic keys and color pictorial guide to species of *Plasmodium*. *Wildlife Diseases* 68, 58 pp.
- HOWARD, R., AND A. MOORE. 1991. *A complete checklist of the birds of the world*. Academic Press, London, United Kingdom, 622 pp.
- JIMENEZ MILLAN, F., AND E. J. LOPEZ CABALLERO. 1975. Encuesta sobre parasitismo por nemátodos hemáticos y tisulares en aves españolas. *Ardeola* 21: 1111–1117.
- LOPEZ NEYRA C. R., AND M. MEDINA BLANCO. 1951. Notas helmintológicas cordobesas. *Revista Ibérica de Parasitología* 11: 23.
- LOPEZ CABALLERO, E. J. 1980. Datos sobre aves hospedadoras de Filarioideos (Nematoda: Spirurina). *Cuadernos de Ciencias Biológicas de la Universidad de Granada* 6–7: 95–106.
- MARGOLIS, L., G. W. ESCH, J. C. HOLMES, A. N. KURIS, AND G. A. SCHAD. 1982. The use of ecological terms in parasitology (report of an ad hoc committee of the American Society of Parasitologists). *The Journal of Parasitology* 68: 131–133.
- MERILÄ, J., M. BJÖRKLUND, AND G. F. BENNETT. 1995. Geographic and individual variation in haematozoan infections in the greenfinch, *Carduelis chloris*. *Canadian Journal Zoology* 73: 1798–1804.
- MERINO, S., AND J. POTTI. 1995. High prevalence of hematozoa in nestlings of a passerine species, the pied flycatcher (*Ficedula hypoleuca*). *Auk* 112: 1041–1043.
- , ———, AND J. MORENO. 1996. Maternal effort mediates the prevalence of trypanosomes in the offspring of a passerine bird. *Proceedings of the National Academy of Sciences USA* 93: 5726–5730.
- ORBANEJA AGÜERO, S. 1934. Observaciones sobre los protozoos parásitos de la sangre de aves en España. *Medicina de los Países Cálidos* 7: 257.
- PEIRCE, M. A. 1981. Distribution and host-parasite check-list of the haematozoa of birds in Western Europe. *Journal of Natural History (London)* 15: 419–458.
- REY VILA, F. 1945. Estudios sobre algunos protozoos parásitos, en especial los del género *Plasmodium*, en el hospedador vertebrado. *Revista de Sanidad e Higiene Pública* 19: 81–101.
- TELLA, J. L., M. G. FORERO, A. GAJON, F. HIRALDO, AND J. A. DONAZAR. 1996. Absence of blood-parasitization effects on lesser kestrel fitness. *Auk* 113: 253–256.

Received for publication 26 July 1996.