

# Rates of Haematozoa Infections Among Wintering Rusty Blackbirds

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Five blood parasites are regularly encountered in avian blood.

Intracellular

*Leucocytozoon*

*Haemoproteus*

*Plasmodium*

Extracellular

*Trypanosoma*

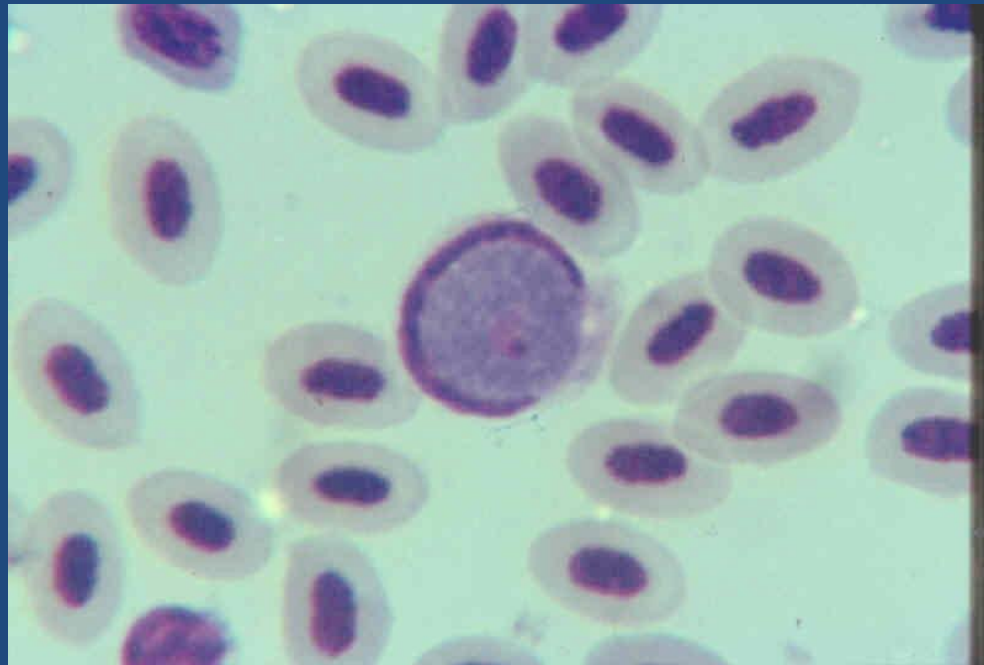
*Microfilaria*

All have life cycle that involves insect vector/host.

# *Leucocytozoon* sp.

Vectors : Blackflies (Diptera: Simuliidae).

Biting midges (Diptera: Ceratopogonidae)

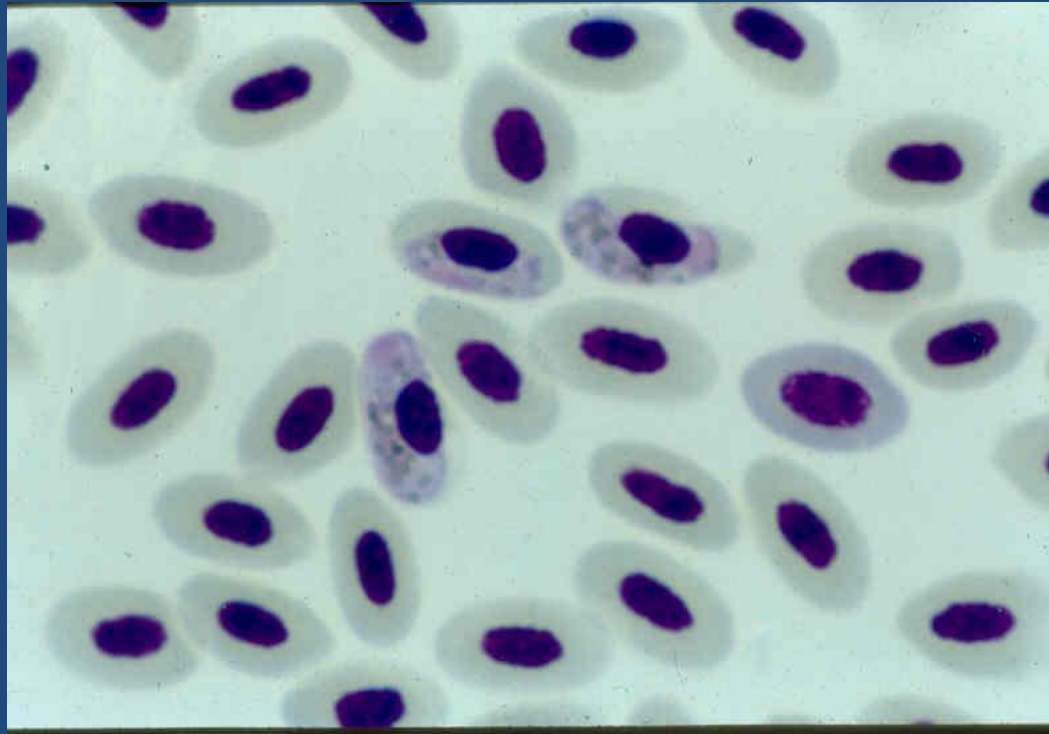


# *Haemoproteus* sp.

Vectors: biting midges (Diptera: Ceratopogonidae)  
hippoboscid flies (Diptera: Hippoboscidae).  
horse flies (Diptera: Tabanidae)

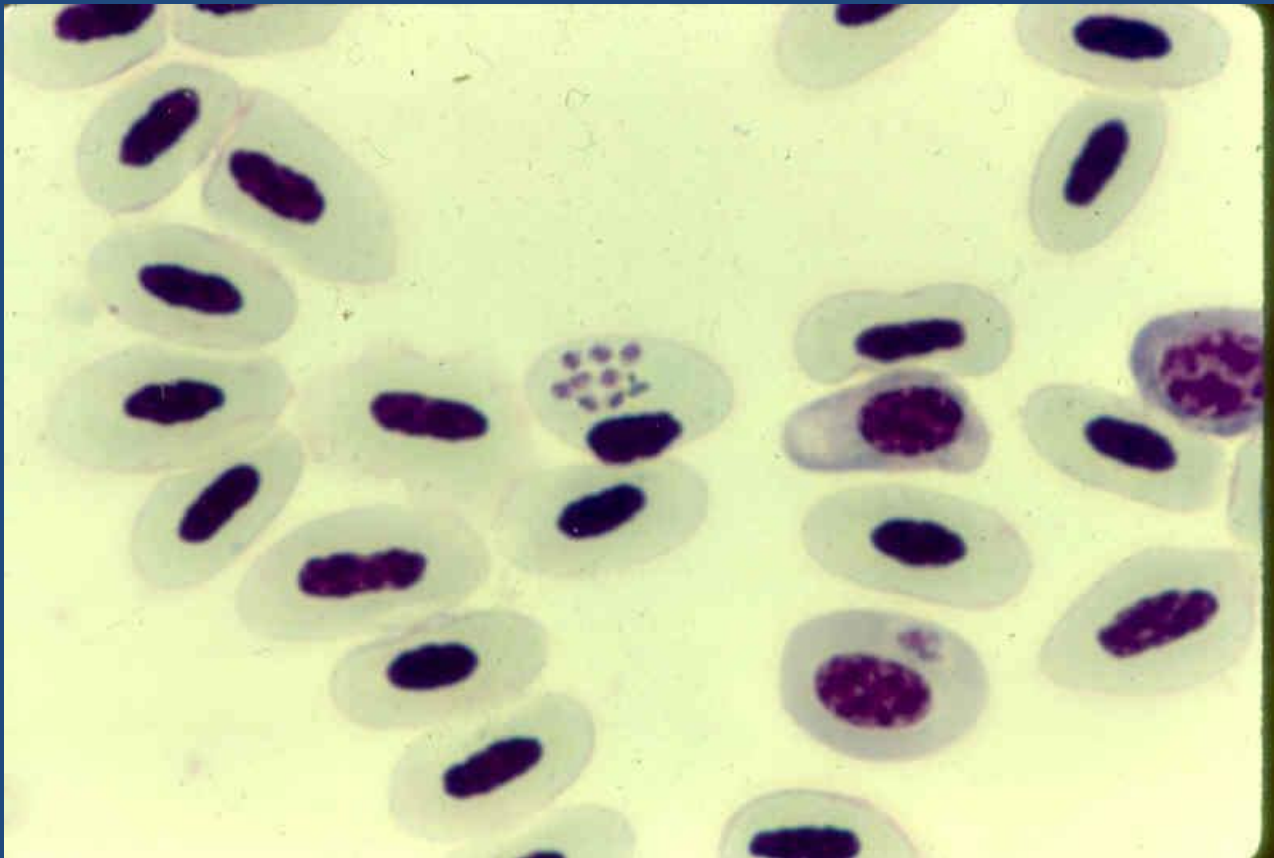
Intensity is usually high.

As many as 80% of erythrocytes can be infected.



# *Plasmodium* sp.

Vectors : mosquitoes (Dipter: Culicidae).  
biting midges (Diptera: Ceratopogonidae)



# Trypanosoma sp.

Vectors: mosquito (Diptera: Culicidae)  
hippoboscid flies (Diptera: Hippoboscidae).

Trypanosomes are flagellated protozoa that exist extracellularly in the blood.



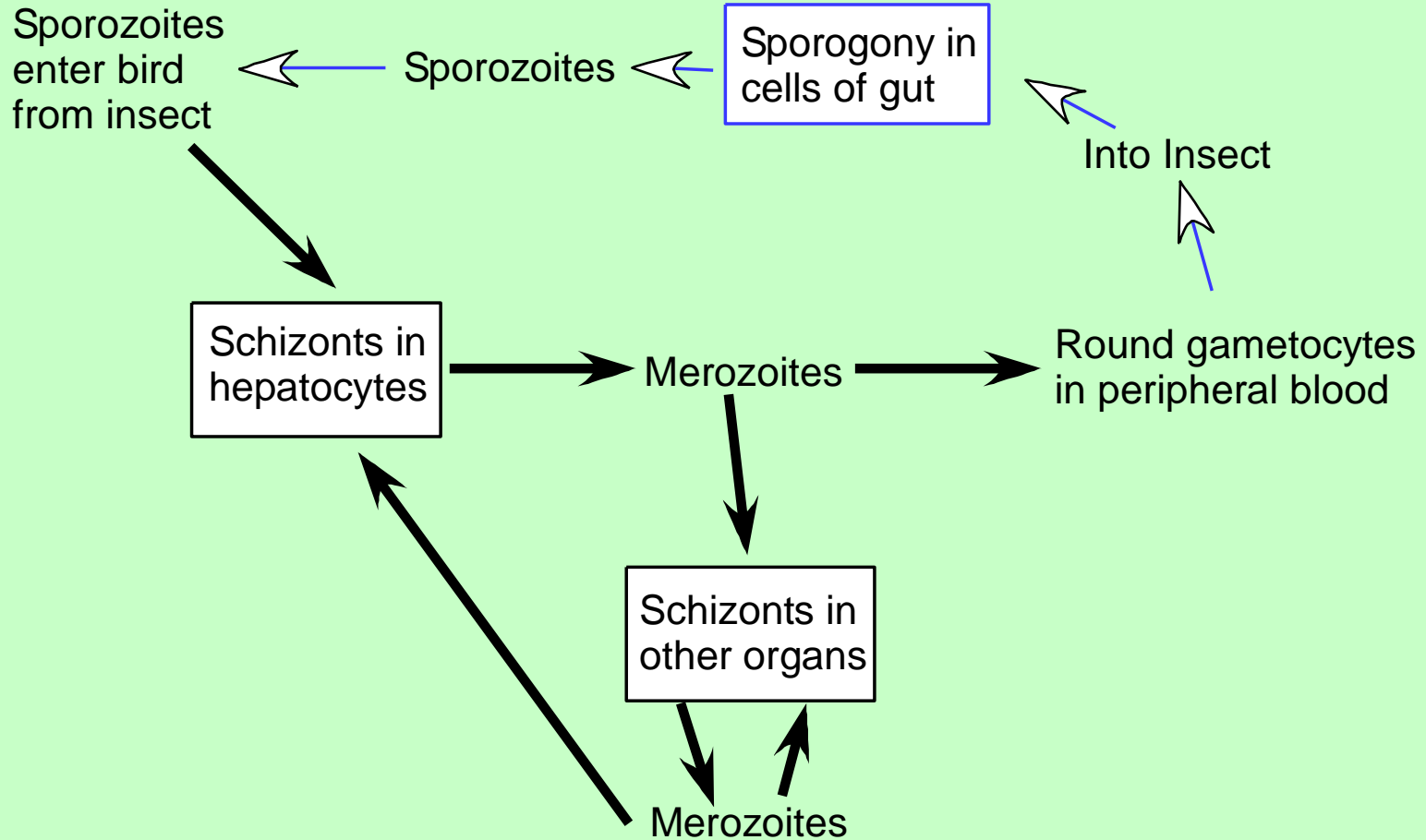
# Microfilarial larvae

Vector: mosquito (Diptera: Culicidae)

Microfilariae are the larval stage of a filarial nematode. This parasite is probably under reported. It shows a definite periodicity timed to the abundance of its vector.



# Leucocytozoon life cycle



(from Fallis and Desser, 1977 in Parasitic Protozoa)



Pathogenic effects on domestic and captive populations

(Bennett *et al.* 1993)

Pathogenic effects on gallinaceous birds (Atkinson 1986, 1988)

Reduced fitness of endemic island species exposed to new  
haematozoa (Warner 1968)

Lowers host condition in Red-bellied Woodpeckers but did not  
reduce host survival (Schrader *et al.* 2003)

Pathogenic to domestic turkey but no indication of impact on  
wild birds (Bennett *et al.* 1993)

No effect on body mass (15 passerine species)  
(Bennett *et al.* 1988)

“Little direct effect in causing mortality in wild avian populations

(Bennett *et al.* 1993)

Negative effect on host condition (Dawson and Bortolotti 2000)

Negative effects on reproduction (Merino *et al.* 2000)

- Apparent Contradictions?
- Pathogenicity of haemosporidians poorly known
- “Dead birds do not fly into traps/nets”  
Parasite weakened birds are undersampled

# What was previously known about Rusty Blackbird blood parasites?

Prevalence on the breeding grounds.

Grenier <i>et al.</i> 1975	83% (19/23)	North America
Bennett <i>et al.</i> 1974	100% (20/20)	Newfoundland
Clarke (1946)	0% (0/3)	Ontario

Prevalence on the winter grounds.

**No published reports.**

Williams and Bennett (1977) 13% (1/8) Maryland  
Presumably during migration.

# Prevalence of birds sampled on their breeding grounds.

Location	Year	Prevalence	Total	Birds	L	H	P	T	M
			Birds	Infected					
Maine	2007	75%	12	8	7		1	2	
VT/NH	2009	75%	8	6	6		1	1	
	2010	0%	4	0					
NB/NS	2009	40%	5	2	1		1		
	2010	78%	9	7	6			4	
Total		61%	38	23					
Alaska	2007	33%	15	5	5				
	2008	57%	21	12	11			1	
	2009	29%	7	2	2				
Total		44%	43	19					

*L = Leucocytozoon*    *T = Trypanosoma*  
*H = Haemoproteus*    *M = Microfilaria*  
*P = Plasmodium*

# Prevalence of Rusty Blackbirds on their winter grounds.

			Total	Birds					
Location	Year	Prevalence	Birds	Infected	L	H	P	T	M
Mississippi	05/06	60%	50	30	26	2		1	1
	06/07	48%	50	24	22	1	1	1	
	07/08	39%	51	20	17	2			1
Arkansas	06/07	20%	5	1	1				
Total		48%	156	75					
South Carolina	08/09	47%	43	20	18	1			
	09/10	25%	4	1	1				
Total		45%	47	21					
Kentucky	09/10	50%	20	10	10	1			
	10/11	31%	13	4	4				
	11/12	50%	2	1	1				
Total		43%	35	15					

# SUMMARY BY REGIONS

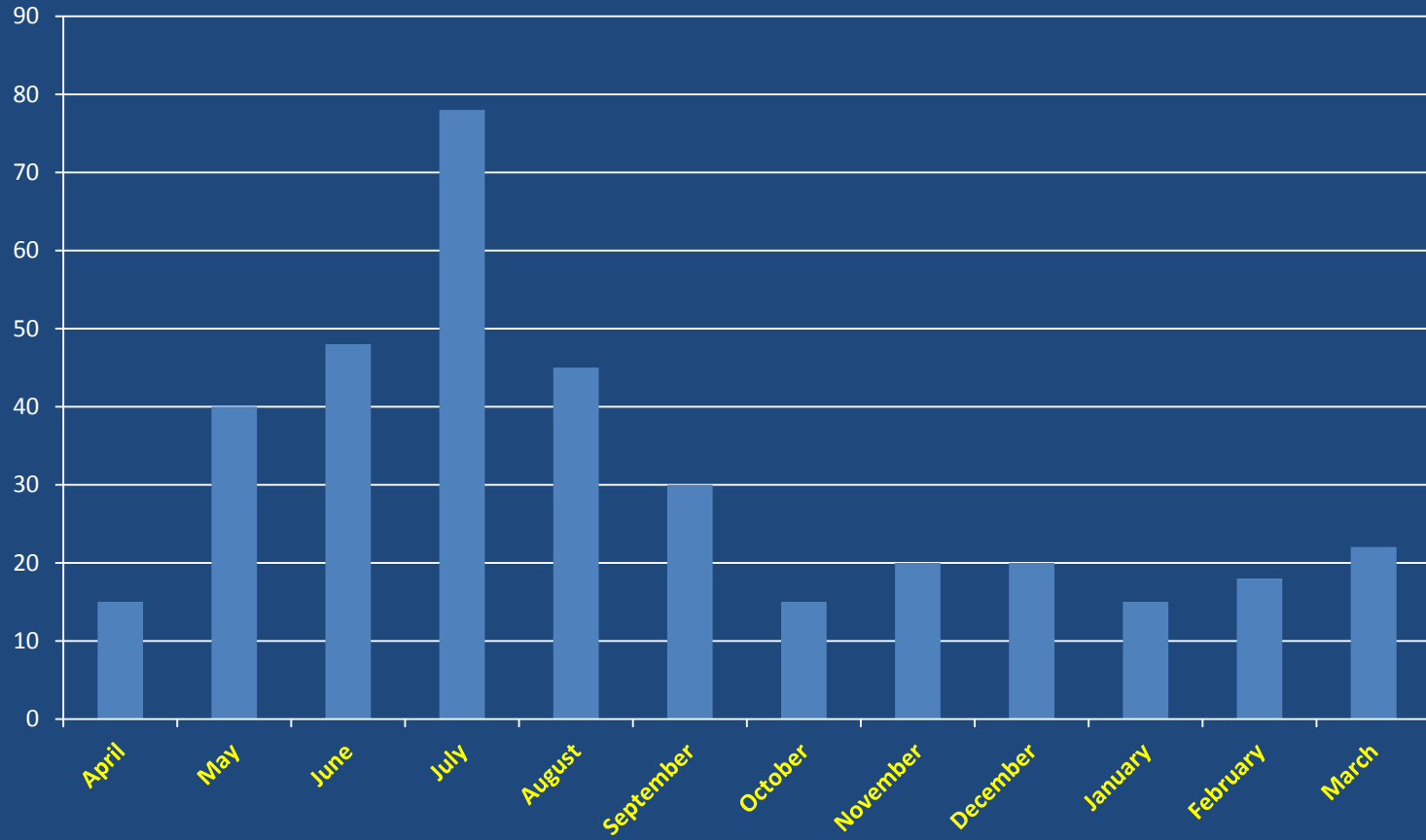
## Breeding Season Prevalence

Alaska	44%
Northeast	61% (n.s.)

## Winter Prevalence

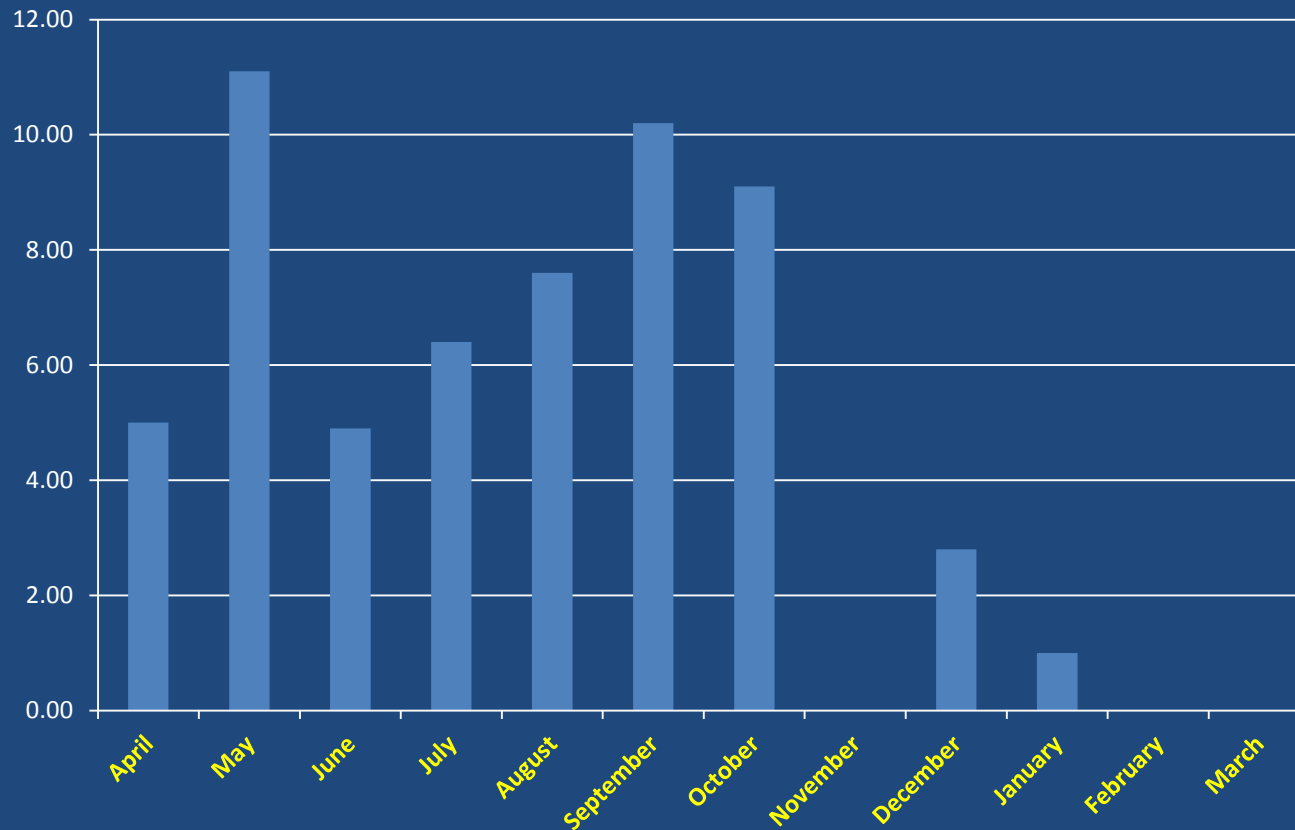
MS/AR	48%
SC	45%
KY	43%

*Leucocytozoon* prevalence . Data from central Vermont 1982-1985.  
(Barnard and Bair. 1986. J. Wildl. Dis. 22:365-374)

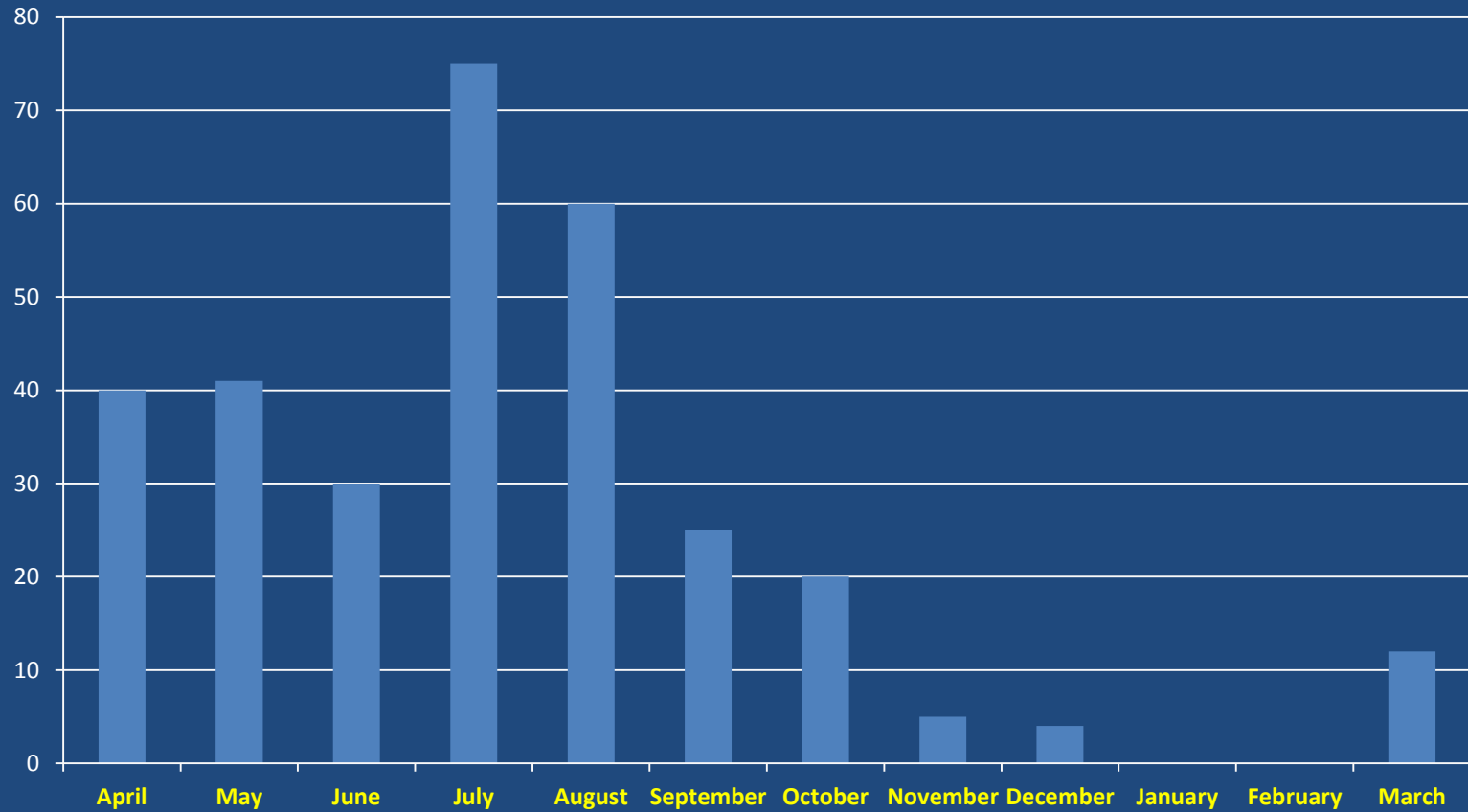




Prevalence of hematozoa in Lorraine Region, France. 1977-1980.  
(Bennett *et al.* 1982. J. Wildl. Dis. 18:81-88.)



## Prevalence of *Haemoproteus velans* in Red-bellied Woodpeckers (N. Florida)



Schrader *et al.* 2003. *The Auk* 120:130-137

# PREVALENCE OF OTHER SPECIES OVERWINTERING IN S. CAROLINA

		<b>Total</b>	<b>Birds</b>					
<b>Species</b>	<b>Prevalence</b>	<b>Birds</b>	<b>Infected</b>	<b>L</b>	<b>H</b>	<b>P</b>	<b>T</b>	<b>M</b>
<b>Redwing</b>	<b>100%</b>	<b>1</b>	<b>1</b>	<b>1</b>				
<b>Blackbird</b>								
<b>Common</b>	<b>0%</b>	<b>2</b>	<b>0</b>					
<b>Grackle</b>								
<b>Northern</b>	<b>20%</b>	<b>15</b>	<b>3</b>	<b>1</b>				<b>2</b>
<b>Cardinal</b>								
<b>TOTAL</b>	<b>22%</b>	<b>18</b>	<b>4</b>					

# Significance

Prevalence in overwintering birds is higher than was expected.

Presence of hematozoa in winter birds could indicate compromised immune system.

Pathenogenicity of hematozoa is uncertain, however, hematozoa certainly represent a physiological cost to the infected bird.

Stress is known to trigger a relapse.

## In conclusion:

Adult breeding birds show “normal” prevalence.

Winter birds appear to have higher prevalence than might be expected.

Intensity is low in these winter birds suggesting a relapse of a chronic infection, particularly *Leucocytozoon* rather than active transmission.

# Future Studies:

Assess stress levels in wintering birds

H/L ratio

corticosteroid levels

Look at prevalence in other icterids on these same winter grounds.