

1 **ELECTRONIC SUPPLEMENTARY MATERIAL**

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3 **Brood parasitism by brown-headed cowbirds and the**  
4 **expression of sexual characters in their hosts**

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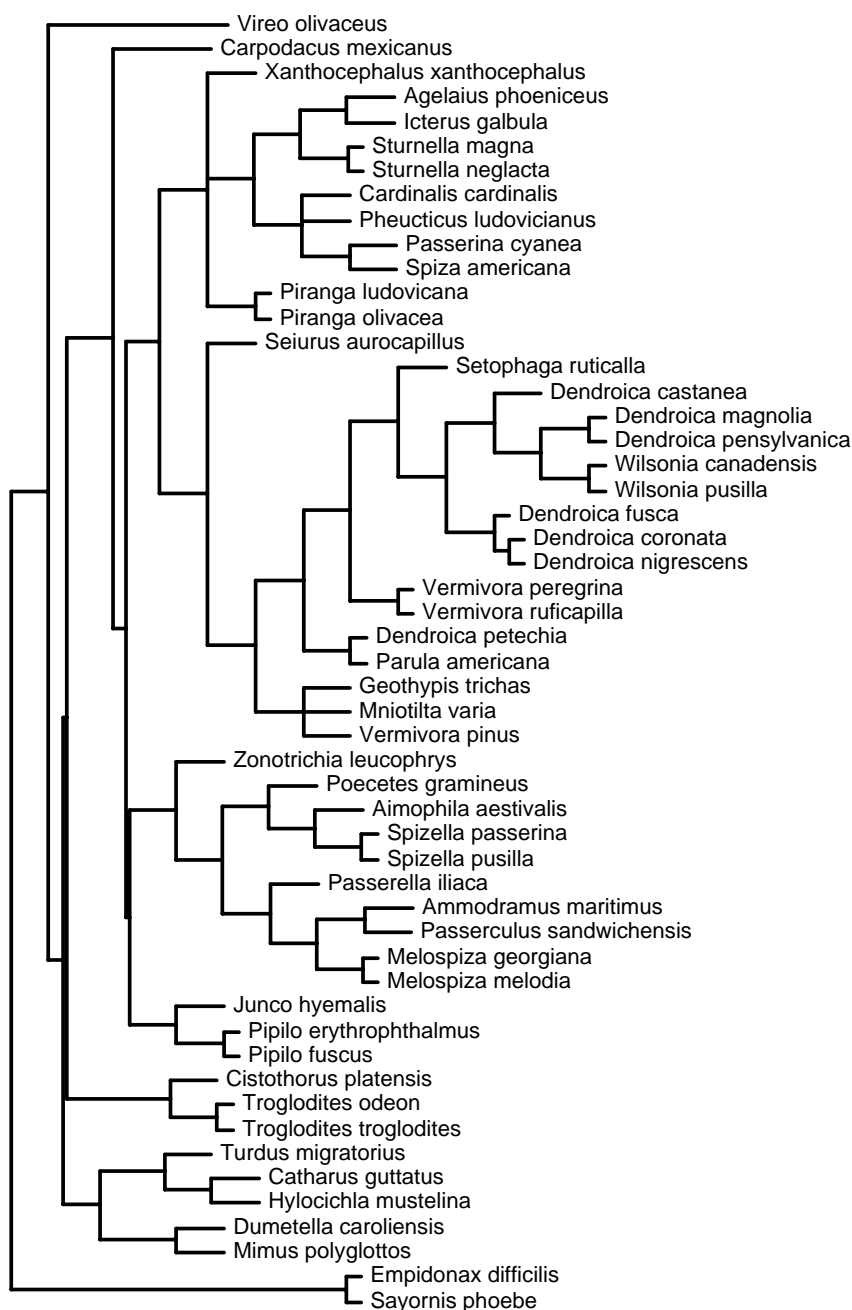
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***MS # OEC-RB-2004-0646***

LÁSZLÓ ZSOLT GARAMSZEGI AND JESÚS MIGUEL AVILÉS

1 Appendices

2 **Appendix 1.** Phylogeny of passerine birds used for the comparative analyses of brood  
3 parasitism. The scale is given in the bottom left corner. For sources, see Materials and  
4 methods.



## BROOD PARASITISM AND SEXUAL SIGNALS OF HOSTS

1 **Appendix 2.** Brood parasitism by brown-headed cowbirds (PAR, frequency of nests  
 2 parasitized, %), song type repertoire size (SONG), syllable repertoire size (SYL), song  
 3 duration (DUR), song interval (INT), male plumage brightness (MPL) female plumage  
 4 brightness (FPL) body mass (BODY, in grams), migration (MIGR) suitability for  
 5 cowbird parasitism (SUIT), habitat preference (HAB), research effort (RES) and relative  
 6 distributional overlap with the cowbird (DIST) in passerine birds of North America. See  
 7 main text for sources of data.  
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Species	PAR	SONG	SYL	DUR	INT	MPL	FPL
<i>Agelaius phoeniceus</i>	21.75	4	3	1.25	14	5	1
<i>Aimophila aestivalis</i>		20	2	0.55	10	1	1
<i>Ammodramus maritimus</i>	16.32	4	3	1	4.4	1	1
<i>Cardinalis cardinalis</i>	55.73	9	1	1.8	6.9	5	2
<i>Carpodacus mexicanus</i>	21.10	4	1.3	1.9	4.9	4	1
<i>Catharus guttatus</i>	8.70	13	4	1.59	3.71	1	1
<i>Cistothorus platensis</i>	0.00	110	66	1.5	2.1	1	1
<i>Dendroica castanea</i>		2	2	1	5	3	2
<i>Dendroica coronata</i>	21.06	2	1.9	1.5	11.1	4	2
<i>Dendroica fusca</i>	33.33	2	3.2	1.5	4.4	5	3
<i>Dendroica magnolia</i>	6.99	2	3.1	0.9	8.3	4	2
<i>Dendroica nigrescens</i>	21.42	2	4	1.4		4	3
<i>Dendroica pensylvanica</i>	20.72	5	3.5	1.3	7.1	3	2
<i>Dendroica petechia</i>	42.43	12	3.7	1.3	7.1	6	4
<i>Dumetella carolinensis</i>	22.00	1000	100	0.27	0.19	1	1
<i>Empidonax difficilis</i>	6.20	3	3	2	7	2	2
<i>Geothlypis trichas</i>	28.10	1	4.9	1.9	5.6	4	1

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Species	PAR	SONG	SYL	DUR	INT	MPL	FPL
<i>Hylocichla mustelina</i>	46.94	18	4	1.56	3.04	1	1
<i>Icterus galbula</i>	4.04	6.5	10.7	1.4	10.6	5	3
<i>Junco hyemalis</i>	39.00	5	1	1.4	4.5	3	2
<i>Melospiza georgiana</i>	14.93	3	3.5	2		1	1
<i>Melospiza melodia</i>	33.25	9	5	2.62	6.07	1	1
<i>Mimus polyglottos</i>	4.00	1000	100	3.06	1.1	2	2
<i>Mniotilta varia</i>	20.90	2	3.6	2	6.3	4	4
<i>Parula americana</i>		2	2.7	1.6	5.3	3	2
<i>Passerculus sandwichensis</i>	1.03	1	5	2.25	6.3	1	1
<i>Passerella iliaca</i>		1	7	2.2		1	1
<i>Passerina cyanea</i>	30.64	1	9	2.2	8.59	6	1
<i>Pheucticus ludovicianus</i>		19	10	3.7	10.5	5	1
<i>Pipilo erythrophthalmus</i>	36.40	7	1	0.83	4.39	5	2
<i>Pipilo fuscus</i>		6	1	1.52	10.4	1	1
<i>Piranga ludoviciana</i>	49.27	1000	5			6	2
<i>Piranga olivacea</i>	51.80	1000	5.5	2.75	9.5	6	2
<i>Poocetes gramineus</i>	15.22	6	6.6	2.7		1	1
<i>Sayornis phoebe</i>	11.67	2	2	0.4	1.7	2	2
<i>Seiurus aurocapillus</i>	45.39	1	3	2.7	4.8	2	2
<i>Setophaga ruticilla</i>	35.88	4	1.6	0.9	5.3	5	3
<i>Spiza americana</i>	59.13	1	2	1.5		4	3
<i>Spizella passerina</i>	38.93	1	1	2.61	6.79	3	3
<i>Spizella pusilla</i>	22.00	1	2	3		1	1
<i>Sturnella magna</i>	21.08	70	5	1.28		3	3
<i>Sturnella neglecta</i>	22.00	8	8	2	8	3	3
<i>Troglodytes aedon</i>	0.14	1000	6	1.7		1	1

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Species	PAR	SONG	SYL	DUR	INT	MPL	FPL
<i>Troglodytes troglodytes</i>	0.00	21	47	6.3	5.6	1	1
<i>Turdus migratorius</i>	0.00	13		1.93	2.28	4	3
<i>Vermivora peregrina</i>		1	4.5	2.9	3.6	3	2
<i>Vermivora pinus</i>	33.75	2	2	2.6		5	4
<i>Vermivora ruficapilla</i>	17.75	1	2.7	1.9	5.9	4	3
<i>Vireo olivaceus</i>	56.45	43	2	0.35	1.42	2	2
<i>Wilsonia canadensis</i>	31.97	5	12.1	1.5	4.2	5	4
<i>Wilsonia pusilla</i>	20.76	3	2	1.2	4	5	4
<i>Xanthocephalus xanthocephalus</i>	0.01	2	3	2.75	46	5	3
<i>Zonotrichia leucophrys</i>	15.33	1	4	1.9	11	3	3

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### 2 **Appendix 2.** continued

Species	BODY	NEST	SUIT	HAB	RES	DIST
<i>Agelaius phoeniceus</i>	41.5	11	1	3	402	3
<i>Aimophila aestivalis</i>		10	1	2		2
<i>Ammodramus maritimus</i>	17	9.5	1	3	12	3
<i>Cardinalis cardinalis</i>	43.9	10	1	2	60	3
<i>Carpodacus mexicanus</i>	21.4	15	2	2	157	3
<i>Catharus guttatus</i>	31	13	1	1	22	1
<i>Cistothorus platensis</i>	9	13	3	3	17	3
<i>Dendroica castanea</i>		12	1	1	6	1
<i>Dendroica coronata</i>	12.2	13	1	2	40	1
<i>Dendroica fusca</i>	9.5		1	1	6	1
<i>Dendroica magnolia</i>	8.5	9	1	2	12	1
<i>Dendroica nigrescens</i>	7.9		1	2	6	1
<i>Dendroica pensylvanica</i>	9.4	11	1	2	19	2

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Species	BODY	NEST	SUIT	HAB	RES	DIST
<i>Dendroica petechia</i>	9.2	11	1	2	91	2
<i>Dumetella carolinensis</i>	36.9	11	1	2	47	3
<i>Empidonax difficilis</i>	10	17	1	1	5	2
<i>Geothlypis trichas</i>	9.9	9.5	1	2	41	3
<i>Hylocichla mustelina</i>	47.4	13	1	1	79	2
<i>Icterus galbula</i>	33.2	13	1	2	19	2
<i>Junco hyemalis</i>	18.8	12	1	2	182	1
<i>Melospiza georgiana</i>	17	12	1	3	33	2
<i>Melospiza melodia</i>	20.5	10	1	2	252	2
<i>Mimus polyglottos</i>	48.5	13	1	2	54	3
<i>Mniotilta varia</i>	10.6	10	1	1	16	3
<i>Parula americana</i>		11	1	1	11	2
<i>Passerculus sandwichensis</i>	19.5	11	1	3	105	1
<i>Passerella iliaca</i>		10	1	2	24	1
<i>Passerina cyanea</i>	14.1	11	1	2	58	2
<i>Pheucticus ludovicianus</i>		11	1	2	7	3
<i>Pipilo erythrophthalmus</i>	39.3	9	1	2	22	3
<i>Pipilo fuscus</i>		10	1	2	4	3
<i>Piranga ludoviciana</i>	28.1	11	1	1	7	2
<i>Piranga olivacea</i>	28.6	15	1	2	11	2
<i>Poocetes gramineus</i>	24.9	11	1	3	22	2
<i>Sayornis phoebe</i>	19.8	16	3	2	32	2
<i>Seiurus aurocapillus</i>	19.4	9	1	1	86	3
<i>Setophaga ruticilla</i>	8.1	9	1	2	56	3
<i>Spiza americana</i>	24.6	8.5	1	2	31	3
<i>Spizella passerina</i>	12.3	11	1	2	30	3

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Species	BODY	NEST	SUIT	HAB	RES	DIST
<i>Spizella pusilla</i>	12.5	7.5	1	2	44	3
<i>Sturnella magna</i>	76	12	1	3	21	2
<i>Sturnella neglecta</i>	89.4	12	1	3	35	3
<i>Troglodytes aedon</i>	10.9	15	3	2	146	2
<i>Troglodytes troglodytes</i>	8.9	18	3	1	106	1
<i>Turdus migratorius</i>	77.3	15	2	2	123	2
<i>Vermivora peregrina</i>		11	1	2	13	1
<i>Vermivora pinus</i>	8.4	9	1	2	5	2
<i>Vermivora ruficapilla</i>	8.6	11	1	2	9	2
<i>Vireo olivaceus</i>	16.7	12	1	2	42	3
<i>Wilsonia canadensis</i>	10.2		1	1	11	2
<i>Wilsonia pusilla</i>	7.7	11	1	2	16	1
<i>Xanthocephalus xanthocephalus</i>	49.3	11	1	3	42	2
<i>Zonotrichia leucophrys</i>	29.4	9.5	1	2	296	1

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- 1 **Appendix 3.** Pair-wise correlation among traits involved in the study of avian brood  
 2 parasitism caused by the brown-headed cowbird. Pearson correlation coefficients.

Variables	<i>r</i>	<i>N</i>	<i>P</i>
Brood parasitism			
Song type repertoire size	-0.08	46	0.61
Syllable repertoire size	-0.48	45	< 0.01
Song duration	-0.22	45	0.14
Inter-song interval	-0.05	37	0.77
Body mass	-0.01	46	0.93
Research effort	-0.09	46	0.56
Male plumage brightness	0.37	46	0.01
Female plumage brightness	0.19	46	0.20
Migration	-0.03	46	0.84
Suitability	-0.54	46	< 0.01
Habitat	-0.25	46	0.09
Distributional overlap	0.32	40	0.05
Song type repertoire size			
Syllable repertoire size	0.53	52	< 0.01
Song duration	-0.17	52	0.22
Inter-song interval	-0.51	43	< 0.01
Body mass	0.32	46	0.03
Research effort	0.05	52	0.75
Male plumage brightness	-0.09	53	0.53
Female plumage brightness	-0.20	53	0.16
Migration	-0.08	53	0.57
Suitability	0.27	53	0.05
Habitat	0.01	53	0.97



## BROOD PARASITISM AND SEXUAL SIGNALS OF HOSTS

Variables	<i>r</i>	<i>N</i>	<i>P</i>
Distributional overlap	0.16	40	0.32
Syllable repertoire size			
Song duration	0.15	51	0.30
Inter-song interval	-0.45	42	< 0.01
Body mass	0.12	45	0.45
Research effort	0.06	51	0.69
Male plumage brightness	-0.22	52	0.11
Female plumage brightness	-0.20	52	0.16
Migration	0.14	52	0.33
Suitability	0.29	52	0.04
Habitat	0.05	52	0.73
Distributional overlap	0.09	40	0.60
Song duration			
Inter-song interval	0.47	43	< 0.01
Body mass	-0.03	45	0.84
Research effort	0.06	51	0.69
Male plumage brightness	0.05	52	0.72
Female plumage brightness	-0.03	52	0.84
Migration	-0.13	52	0.36
Suitability	0.02	52	0.90
Habitat	-0.05	52	0.73
Distributional overlap	-0.10	39	0.56
Inter-song interval			
Body mass	-0.07	37	0.69
Research effort	-0.03	42	0.87
Male plumage brightness	0.41	43	< 0.01
Female plumage brightness	0.14	43	0.36

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Variables	<i>r</i>	<i>N</i>	<i>P</i>
Migration	-0.09	43	0.56
Suitability	-0.25	43	0.10
Habitat	0.17	43	0.29
Distributional overlap	-0.26	32	0.15
Body mass			
Research effort	0.33	46	0.03
Male plumage brightness	-0.05	46	0.74
Female plumage brightness	-0.13	46	0.41
Migration	-0.43	46	< 0.01
Suitability	-0.13	46	0.39
Habitat	0.28	46	0.06
Distributional overlap	0.26	40	0.11
Research effort			
Male plumage brightness	-0.17	52	0.24
Female plumage brightness	-0.24	52	0.09
Migration	-0.26	52	0.07
Suitability	0.24	52	0.09
Habitat	0.23	52	0.10
Distributional overlap	0.14	40	0.39
Male plumage brightness			
Female plumage brightness	0.59	53	< 0.01
Migration	0.14	53	0.32
Suitability	-0.27	53	0.05
Habitat	-0.10	53	0.46
Distributional overlap	-0.07	40	0.67
Female plumage brightness			
Migration	0.17	53	0.23

## BROOD PARASITISM AND SEXUAL SIGNALS OF HOSTS

Variables	<i>r</i>	<i>N</i>	<i>P</i>
Suitability	-0.22	53	0.11
Habitat	-0.15	53	0.27
Distributional overlap	-0.11	40	0.51
Migration			
Suitability	-0.05	53	0.70
Habitat	-0.27	53	0.05
Distributional overlap	-0.37	40	0.02
Suitability			
Habitat	0.02	53	0.88
Distributional overlap	No variation		
Habitat			
Distributional overlap	0.1	40	0.52

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