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Song evolution in the coal tit *Parus ater*. – J. Avian Biol. 42: 214-230.

Appendix, Tables A1-6.

Table A1. Blood, muscle, and toepad samples which were used for DNA extraction, sequencing, and analysis with corresponding haplotype, collection, and GenBank accession numbers (MAR = blood and tissue collection of J. Martens, Univ. of Mainz, Germany; MTD = Mus. für Tierkunde Dresden, Germany; NHM = The Natl. Hist. Mus., Bird Group, Tring, UK; NME = Naturkundemus. Erfurt, Germany; NMNS = Natl. Mus. Natl. Sci., Taichung, Taiwan; NMW = Naturhist. Mus. Wien, Austria; ZMB = Mus. Naturkunde Berlin, Germany).

Taxon	MAR	Specimen	Locality	Year	Tissue	GenBank[1]	Haplotype
P. a. abietum	267		Germany, Baden-Württemberg	1996	muscle	DQ217844, HQ417132, DQ466202, HQ417150	1
	526	MTD C56812	France, Pyrénées-Orientales	1997	muscle	DQ217845	2
	1120		France, Pyrénées-Orientales	1993	muscle	DQ217849	5
	1134	MTD C56806	France, Pyrénées-Orientales	1993	muscle	DQ217850	1
	3094		Czech Republic, Šumava	2003	blood	DQ217868	1
	3315		Germany, Bayern	2002		GQ331053	1
	5537	MTD C63006	Turkey, Ege Bölgesi	2006	blood	GQ331054	1
	5604		Germany, Niedersachsen	2006	muscle	GQ331055	1
	5605		Germany, Niedersachsen	2006	muscle	GQ331056	20
	6620		Germany, Niedersachsen			GQ331057	1
	6621		Germany, Niedersachsen			GQ331058	22
		MTD C62288	Germany, Sachsen		muscle	GQ331059	24
			Greece	< 2003		AF347959	29
	90231		Germany, Niedersachsen	2002	DNA	DQ217900	1
	90232		Germany, Niedersachsen	2002	DNA	DQ217901	1
		NMW 72.375	Turkey	1968	toepad	GQ331060	42
P. a. aemodius	4156		Nepal, Rasuwa Distr.	2004	blood	DQ217873, HQ417127, DQ466214, HQ417147	14

	4196		Nepal, Rasuwa Distr.	2004	blood	DQ217874	15
	90019		Nepal, Sindhu Palchok Distr.	1995	muscle	DQ217879	15
	90053		Nepal, Sindhu Palchok Distr.	1995		DQ217881	32
P. a. ater	692	MTD C52967	Austria, Salzburg	1992	muscle	GQ331061, HQ417126, JF304544, HQ417146	3
	693		Austria, Salzburg	1992	blood	GQ331062	4
	1416		Russia, Sakhalinskaya oblast	1995	muscle	DQ217851	6
	1444		Russia, Primorskiy kray	1994	muscle	DQ217852	3
	1446		Russia, Primorskiy kray	1994	muscle	DQ217853	6
	1448		Russia, Primorskiy kray	1994	muscle	DQ217854	3
	1450		Russia, Primorskiy kray	1994	muscle	DQ217855	6
	1471		Russia, Evreyskaya avtonomnaya oblast	1996	muscle	DQ217856	3
	5125		Germany, Mecklenburg-Vorpommern	2005	feather	DQ217878	6
	6619		Germany, Niedersachsen	2007	muscle	GQ331063	4
	90223		Finland	1996	DNA	DQ217895	33
	90224		Finland	1996	DNA	DQ217896	34
	90225		Finland	1996	DNA	DQ217897	35
		MTD C20476	Russia, Sakhalinskaya oblast	1906	toepad	GQ331090	27
P. a. atlas	4008		Morocco	2004	muscle	DQ217872, HQ417130, DQ466213, HQ417151	13
P. a. britannicus	5844	NHM 2006.22.1	United Kingdom	2003	muscle	GQ331064	21
	5845	NHM 2006.21.1	United Kingdom	1990	muscle	GQ331065	42
P. a. chorassanicus		NHM 1901.5.4.146	Turkmenistan	1889	toepad	GQ331066	40
		NHM 1901.5.4.149	Turkmenistan	1889	toepad	GQ331067	40
P. a. cypriotes	4561		Cyprus	2005	blood	GQ331068, HQ417131, JF304546, HQ417152	16
	4567		Cyprus	2005	blood	GQ331069	16
	4568		Cyprus	2005	blood	GQ331070	16
	4596		Cyprus	2005	blood	GQ331071	16
	4604		Cyprus	2005	blood	GQ331072	16

	4605		Cyprus	2005	blood	GQ331073	16
	4608		Cyprus	2005	blood	GQ331074	17
P. a. eckodedicatus	1876	MTD C59782	China, Gansu	1999	muscle	DQ217859, HQ417129, DQ466206, HQ417149	7
	1880	MTD C59783	China, Gansu	1999	muscle	DQ217860	7
	3242	MTD C62482	China, Yunnan	2002	muscle	DQ217869	11
	3280	MTD C62481	China, Sichuan	2002	muscle	DQ217870	7
	4934		China, Shaanxi	2005	muscle	DQ217876	7
	6902	MTD C63551	China, Ningxia	2008	muscle	GQ331075	23
	6903	MTD C63552	China, Ningxia	2008	muscle	GQ331076	23
			China, Sichuan	< 2003		AF347958	30
P. a. gaddi		ZMB 27.670	Iran	1927	toepad	GQ331077	40
		ZMB 27.671	Iran	1927	toepad	GQ331078	38
		NHM 1933.2.16.84	Iran	1919	toepad	GQ331079	39
		NMW 33.543	Iran, Golestān Province	1903	toepad	GQ331080	40
P. a. hibernicus		MTD C30439	Ireland	1930	toepad	GQ331081	25
		NMW 33.550	Ireland	1911	toepad	GQ331082	1
P. a. insularis	90228		Japan, Hokkaido	2003	DNA	DQ217898	36
	90229		Japan, Hokkaido	2002	DNA	DQ217899	37
P. a. kuatunensis	5724	MTD C63553	China, Jiangxi	2006	muscle	GQ331083	23
P. a. ledouci		NMW 84.923	Tunisia	1912	toepad	GQ331085	41
P. a. martensi	90101	ZFMK 2006.43	Nepal, Parbat Distr.	1995	muscle	DQ217885	14
	90132		Nepal, Mustang Distr.	1995	muscle	DQ217888	15
P. a. martensi x melanolophus	90156	ZFMK 2006.46	Nepal, Myagdi Distr.	1995	muscle	DQ217889	14
	90163	ZFMK 2006.49	Nepal, Myagdi Distr.	1995	muscle	DQ217890	14
	90165	ZFMK 2006.48	Nepal, Myagdi Distr.	1995	muscle	DQ217891	10
	90166	ZFMK 2006.51	Nepal, Myagdi Distr.	1995	muscle	DQ217892	14
P. a. melanolophus	2918	NME 04/074	Nepal, Humla Distr.	2001	muscle	DQ217867, HQ417128, JF304545, HQ417148	10
	3324	NME 03/068	Nepal, Humla Distr.	2002	muscle	DQ217871	12
	6615	NME 08/005	Nepal, Jumla Distr.			GQ331086	12

			Nepal	< 2003		AF347960	31
P. a. michalowskii		MTD C42589	Azerbaijan	1911	toepad	GQ331087	40
P. a. moltchanovi		ZMB 43.1353	Ukraine	1902	toepad	GQ331088	1
		ZMB 70.683	Ukraine	1958	toepad	GQ331089	1
P. a. phaeonotus		MTD C8571		1884	toepad	[2]	2
		NMW 33.542	Iran, Ilam	1898	toepad	GQ331091	40
P. a. ptilosus		NMNS T-4986	Taiwan	1999	DNA	GQ331092	28
		NMNS T-5097	Taiwan	1999	DNA	GQ331093	28
P. a. rufipectus	2878		Kyrgyzstan	2001	muscle	DQ217863	8
	2879		Kyrgyzstan	2001	muscle	DQ217864	9
P. a. sardus	5560		France, Corse	2006	blood	GQ331094	18
	5568		France, Corse	2006	blood	GQ331095	18
	5578		France, Corse	2006	blood	GQ331096	19
	5586		France, Corse	2006	blood	GQ331097	18
	5600	MTD C63005	France, Corse	2006	muscle	GQ331098	19
P. a. vieirae		MTD C28496	Spain	1922	toepad	GQ331099	26
		NMW 45.051	Spain	1928	toepad	GQ331100	2
P. rubidiventris beavani	90055	ZFMK	Nepal, Sindhu Palchok Distr.	1995	muscle	DQ217882, HQ417120, –, HQ417140	
P. rubidiventris rubidiventris	2920	NME 2001/27	Nepal, Humla Distr.	2001	muscle	DQ217866, HQ417122, –, HQ417142	
P. rubidiventris whistleri	731		China, Shaanxi	1997	blood	DQ217846, HQ417125, DQ466199, HQ417145	
P. rufonuchalis	90131		Nepal, Mustang Distr.	1995	blood	DQ217887, HQ417124, DQ466200[3], HQ417144	
P. venustulus	2033		China, Sichuan	2000	blood	DQ217861, HQ417121,	

						–, HQ417141	

[1]If several accession numbers given, then order is cyt *b*, 16S, control region, fib7.

[2]We could only sequence 188 bp from this toepad sample, which is too short to be accepted by GenBank, but this stretch is identical to haplotype 40.

[3]From different specimen.

Table A2. Recordings used as song playbacks (Sonagram refers to Fig. 3, SDB to the ID in J. Martens' sound archive), number of experiments (No.), and mean intensity of behavioral response to the playback (Pb.) and the following control playback (Ctrl.), respectively.

Playback	Sonagram	Taxon	Year	SDB	Recording locality	Recordist	No.	Pb.	Ctrl.
1	a	*P. a. abietum*	1996	303	Germany, Baden-Württemberg, Grafenhausen	J. Martens	12	2.75	2.50
2	b	*P. a. melanolophus*	1976	301	India, Kashmir, Pahalgam	J. Martens	13	1.85	3.23
3	c	*P. a. melanolophus*	1976	301	India, Kashmir, Pahalgam	J. Martens	20	1.15	2.45
4	d	*P. a. melanolophus*	1976	301	India, Kashmir, Pahalgam	J. Martens	14	1.36	2.43
5	e	*P. a. martensi*	1974	311	Nepal, Mustang Distr., Thakkhola	J. Martens	21	1.14	2.10
6	f	*P. a. martensi*	1974	310	Nepal, Mustang Distr., Thakkhola	J. Martens	12	2.00	3.08
7	g	*P. a. martensi*	1974	309	Nepal, Mustang Distr., Thakkhola	J. Martens	16	0.81	2.25
8	h	*P. a. martensi*	1974	308	Nepal, Mustang Distr., Thakkhola	J. Martens	13	1.38	2.62
9	i	*P. a. aemodius*	1973	307	Nepal, Rasuwa Garhi Dist., Gosainkund	J. Martens	15	1.00	2.27
10	k	*P. a. aemodius*	1973	306	Nepal, Sindhu Palchok Dist., Ting Sang La	J. Martens	14	0.93	2.86
11	l	*P. a. aemodius*	1973	306	Nepal, Sindhu Palchok Dist., Ting Sang La	J. Martens	15	1.47	2.87
12	m	*P. a. aemodius*	1973	304	Nepal, Ramechap Dist., Chordung near Jiri	J. Martens	13	1.38	3.00
13	n	*P. a. aemodius*	1973	305	Nepal, Dolakha Dist., Thodung Those	J. Martens	16	1.56	2.69
14	s	*P. a. ptilosus*	2007	MD4_25	Taiwan, Alishan	M. Päckert	22	1.68	2.82
15	t	*P. a. ptilosus*	2007	MD5_18	Taiwan, Alishan	M. Päckert	22	2.14	2.91
16	u	*P. a. ptilosus*	2007	MD5_9	Taiwan, Alishan	M. Päckert	15	1.47	3.07
17	v	*P. a. ptilosus*	2007	MD4_26	Taiwan, Alishan	M. Päckert	14	0.21	3.43
18	w	*P. a. kuatunensis*	2006	20290	China, Jiangxi	J. Martens	9	1.06	2.89
19	x	*P. a. kuatunensis*	2006	20303	China, Jiangxi	J. Martens	4	1.75	3.75
20	o	*P. a. eckodedicatus*	2002	1162	China, Sichuan	J. Martens	8	2.75	3.13
21	p	*P. a. eckodedicatus*	2002	1306	China, Sichuan	J. Martens	8	0.69	2.88
22	q	*P. a. eckodedicatus*	2002	1323	China, Yunnan	J. Martens	7	0.29	2.71
23	r	*P. a. eckodedicatus*	2005	2080	China, Shaanxi	J. Martens	8	3.38	3.50

Table A3. Genetic distances (uncorrected, under the GTR+Γ model, and retrieved from the BEAST tree (Ma)), song divergence, morphometric differences (the latter two Euclidean distances between principal components), and geographic distances (km) between midpoints of the respective breeding range for all pairs of mitochondrial lineages (MiLi) of the coal tit (numbers correspond to those introduced in Table 1).

MiLis	Unc.	Model	BEAST	Song	Morph.	Geogr.
1 2	3.6%	4.2%	4.7	2.7	4.7	1900
1 3	3.3%	3.7%	4.7	3.9	5.1	2985
1 4	2.7%	3.0%	2.4	3.5	1.5	4331
1 5	2.8%	3.1%	3.5	3.9	6.0	6898
1 6	3.3%	3.7%	3.5	4.2	10.1	9839
1 7	2.8%	3.1%	3.5	4.2	8.0	8424
1 8	3.3%	3.7%	3.5	3.6	3.3	6972
2 3	3.2%	3.5%	3.0	4.2	0.5	2134
2 4	4.1%	4.7%	4.7	2.4	6.2	3052
2 5	2.7%	2.9%	4.7	3.2	1.5	5101
2 6	3.2%	3.5%	4.7	3.7	5.4	8107
2 7	3.0%	3.3%	4.7	4.1	3.5	6902
2 8	3.2%	3.5%	4.7	3.7	2.2	5508
3 4	3.5%	3.9%	4.7	4.4	6.6	1419
3 5	4.3%	5.0%	4.7	2.9	1.4	4443
3 6	4.1%	4.8%	4.7	3.9	5.1	7099
3 7	4.3%	4.9%	4.7	3.9	3.2	5511
3 8	4.4%	5.2%	4.7	3.0	2.6	4053
4 5	3.3%	3.7%	3.5	2.6	7.4	3143
4 6	3.5%	3.9%	3.5	3.0	11.6	5683
4 7	3.6%	4.1%	3.5	3.5	9.5	4108
4 8	3.5%	3.9%	3.5	3.3	4.7	2649
5 6	2.4%	2.6%	3.2	2.0	4.2	3027
5 7	2.8%	3.1%	3.2	2.5	2.6	2398
5 8	2.4%	2.6%	3.2	2.2	3.0	1885
6 7	2.7%	2.9%	2.5	0.9	2.7	1871

6 8	2.5%	2.8%	2.5	2.2	7.1	3157
7 8	2.4%	2.6%	2.0	2.4	5.2	1459

Table A4. Means (± SD) of measured sonagraphic parameters for all mitochondrial lineages (MiLi) and the Himalayan hybrids.

Sonametric parameter	*P. ater* (n = 252)	1 NW Africa (n = 9)	2 W/S Europe (n = 74)	3 Cyprus (n = 5)	4 SW Asia (n = 10)	5 N Eurasia (n = 40)	6 China (n = 34)	7 E Himalayas (n = 44)	8 W Himalayas (n = 29)	Himalayan hybrids (n = 7)
Length of the verse	1.85±0.60	1.45±0.42	1.69±0.41	1.59±0.38	1.49±0.39	2.03±0.80	2.05±0.57	2.03±0.64	1.80±0.55	1.89±0.65
Maximum frequency of the verse	7.29±1.15	7.74±1.14	8.17±0.96	7.23±1.72	7.55±1.08	7.11±1.20	6.75±0.85	6.69±0.82	6.69±0.99	7.02±0.40
Minimum frequency of the verse	2.98±0.46	2.47±0.39	3.02±0.44	2.13±0.80	3.31±0.31	3.03±0.38	3.15±0.49	2.96±0.40	2.80±0.30	3.14±0.43
Frequency range of the verse	4.31±1.29	5.27±1.43	5.15±1.06	5.11±1.82	4.24±1.18	4.08±1.33	3.60±1.03	3.73±1.02	3.89±1.14	3.89±0.41
Mean frequency of the verse	5.14±0.60	5.10±0.47	5.59±0.52	4.68±0.98	5.43±0.54	5.07±0.59	4.95±0.46	4.82±0.40	4.75±0.46	5.08±0.36
Length of the first complete element group	0.32±0.07	0.36±0.08	0.36±0.06	0.35±0.10	0.31±0.07	0.34±0.09	0.28±0.06	0.26±0.05	0.33±0.05	0.33±0.05
Length of the element with the largest frequency range within the first complete element group	0.12±0.04	0.12±0.03	0.14±0.05	0.10±0.03	0.12±0.03	0.13±0.06	0.11±0.03	0.09±0.02	0.11±0.02	0.14±0.03
Maximum frequency of this element	6.79±1.19	7.05±1.03	7.60±1.16	6.78±1.62	6.72±1.25	6.67±1.19	6.31±0.87	6.21±0.90	6.35±1.06	6.57±0.47
Minimum frequency of this element	3.42±0.61	2.85±0.59	3.43±0.66	3.71±1.00	3.92±0.75	3.76±0.60	3.43±0.39	3.28±0.46	3.08±0.39	3.36±0.60
Frequency range of this element	3.37±1.24	4.19±1.19	4.17±1.23	3.07±0.90	2.80±1.09	2.91±1.13	2.88±0.97	2.93±0.98	3.27±1.20	3.21±0.65
Mean frequency of this element	5.11±0.72	4.95±0.59	5.52±0.72	5.24±1.27	5.32±0.88	5.22±0.76	4.87±0.47	4.75±0.52	4.72±0.53	4.97±0.43
Length of the element with the smallest frequency	0.12±0.04	0.09±0.03	0.13±0.05	0.14±0.05	0.13±0.05	0.13±0.05	0.11±0.03	0.09±0.03	0.12±0.03	0.11±0.02

range within the first complete element group										
Maximum frequency of that element	5.90±1.01	6.44±1.55	6.66±1.01	5.13±1.36	6.28±0.94	5.25±0.70	5.69±0.78	5.70±0.66	5.36±0.48	5.42±0.88
Minimum frequency of that element	3.86±0.81	4.51±1.68	4.08±0.78	2.95±1.70	4.50±1.21	3.64±0.67	3.79±0.66	3.79±0.51	3.45±0.35	3.99±0.74
Frequency range of that element	2.05±0.81	1.93±0.88	2.58±0.97	2.18±1.18	1.78±0.51	1.61±0.57	1.90±0.56	1.91±0.64	1.91±0.51	1.44±0.42
Mean frequency of that element	4.88±0.82	5.48±1.55	5.37±0.76	4.04±1.42	5.39±1.05	4.45±0.63	4.74±0.66	4.75±0.49	4.40±0.33	4.70±0.79
Number of elements per verse	10.81±4.24	8.33±2.68	9.48±3.23	10.12±5.03	8.14±2.52	11.69±4.44	12.90±4.52	13.21±5.01	9.06±2.55	9.34±2.72
Verse speed	5.87±1.39	5.81±0.78	5.63±1.33	6.24±2.09	5.61±1.73	5.96±1.60	6.27±1.11	6.56±1.54	5.09±0.48	5.00±0.73
Number of elements per element group	2.17±0.36	2.58±0.47	2.23±0.42	2.50±0.50	2.10±0.32	2.28±0.44	2.03±0.17	2.06±0.23	2.02±0.09	2.00±0.00
Number of element groups per verse	5.05±1.98	3.24±0.86	4.23±1.22	4.09±1.58	3.89±1.17	5.16±1.69	6.38±2.28	6.43±2.44	4.51±1.30	4.67±1.36

Table A5. Correlation of the first two principal components (PC) with the original sonametric parameters, the highest values in bold.

Sonametric parameter	All MiLis (n = 8)		Himalayan ssp. (n = 4)	
	PC 1	PC 2	PC 1	PC 2
Length of the verse	-0.21	0.46	-0.21	-0.51
Maximum frequency of the verse	**0.93**	0.24	**0.92**	-0.26
Minimum frequency of the verse	-0.12	0.17	-0.35	-0.08
Frequency range of the verse	**0.88**	0.15	**0.90**	-0.18
Mean frequency of the verse	**0.86**	0.29	0.77	-0.30
Length of the first complete element group	0.54	-0.42	0.56	0.60
Length of the element with the largest frequency range within the first complete element group	0.45	-0.35	0.44	0.49
Maximum frequency of this element	**0.92**	0.08	**0.93**	-0.17
Minimum frequency of this element	0.05	0.10	-0.24	-0.24
Frequency range of this element	**0.87**	0.03	**0.93**	-0.05
Mean frequency of this element	0.79	0.11	0.74	-0.26
Length of the element with the smallest frequency range within the first complete element group	0.43	-0.55	0.52	0.52
Maximum frequency of that element	0.64	0.47	0.56	-0.47
Minimum frequency of that element	0.10	0.56	-0.06	-0.38
Frequency range of that element	0.70	0.03	0.66	-0.18
Mean frequency of that element	0.45	0.57	0.33	-0.50
Number of elements per verse	-0.35	**0.77**	-0.31	**-0.83**
Verse speed	-0.29	**0.67**	-0.22	**-0.71**
Number of elements per element group	0.16	0.35	0.30	-0.47
Number of element groups per verse	-0.43	**0.65**	-0.37	**-0.75**

Table A6. Correlation of the first two principal components (PC) with the original morphometric parameters, the highest values in bold (n = 8, number of MiLis).

Morphometric parameter	PC 1	PC 2
Wing length	**-0.95**	0.18
Tarsus length	-0.90	0.39
Bill length	-0.89	**-0.41**
Bill depth	**-0.95**	-0.17