

Supplementary material

Appendix 1

Table A1. Samples with vouchers and sequences with GenBank accession numbers used in this article (AMNH=American Museum of Natural History, SYSb=Sun Yat-sen University, SCIEA=South China Institute of Endangered Animals). GenBank accession numbers in bold indicate sequences yielded in this study.

Taxon	Locality	Sample ID/Voucher	No. of samples	COI	Cytb	ODC	Myo
<i>C. pectoralis ballioni</i>	Aksu, Xinjiang, China	SYSb024	1	KU973742	KU973766	KU973805	KU973785
	Nalati Grassland, Xinyuan, Xinjiang, China	SYSb1087/IOZ64459	1	KU973743	KU973767	—	KU973786
	Hogasangkhok Ravine, Varzob Region, Tajikistan	SYSb1088/IOZ63178	1	KU973745	KU973769	KU973807	KU973788
	Hogasangkhok Ravine, Varzob Region, Tajikistan	SYSb1089/IOZ63189	1	KU973746	KU973770	KU973808	KU973789
	Hogasangkhok Ravine, Varzob Region, Tajikistan	SYSb1090/IOZ63190	1	KU973747	KU973771	KU973809	KU973790
	Hogasangkhok Ravine, Varzob Region, Tajikistan	SYSb1091/IOZ63198	1	KU973748	KU973772	KU973810	KU973791
	Kazakhstan	Sangster et al. (2010)	1	—	HM633321	HM633739	HM633603
The Tian Shan Observatory, Kazakhstan	SYSb462	1	KU973744	KU973768	KU973806	KU973787	
<i>C. p. tschebaiewi</i>	Xiadawuxiang, Maqen, Qinghai, China	SYSb540/IOZ54456	1	KU973732	KU973755	KU973797	KU973779
	Baima Snow Mountain, Deqin, Yunnan, China	SYSb770	1	KU973733	KU973756	KU973798	—
	Fugong, Nujiang, Yunnan, China	SYSb771/KIZ-GLGS0218	1	KU973734	KU973757	KU973799	KU973780
	Lushui, Nujiang, Yunnan, China	SYSb772/KIZ-GLGS5006	1	KU973735	KU973758	KU973800	KU973781
	Yulong Snow Mountain, Lijiang, Yunnan, China	SYSb773/KIZ-YL07191	1	KU973736	KU973759	KU973801	KU973782
	Meri Snow Mountain, Deqin, Yunnan, China	SYSb774	1	KU973737	KU973760	KU973802	—
	Meri Snow Mountain, Deqin, Yunnan, China	SYSb775	1	KU973738	KU973761	—	—
	Meri Snow Mountain, Deqin, Yunnan, China	SYSb776	1	KU973739	KU973762	—	—
	Balang Shan, Wenchuan, Sichuan, China	SYSb861	1	—	KU973763	—	—
	Tuolin Temple, Zanda, Ngari, Tibet, China	SYSb1085/IOZ64458	1	KU973740	KU973764	KU973803	KU973783
	Shergyla Mountain, Nyingchi, Tibet, China	SYSb1086/IOZ64457	1	KU973741	KU973765	KU973804	KU973784
<i>C. p. confusa</i>	Laghep, Sikkim, India	SYSb1551-1553/AMNH (S79598-S79600)	3	—	Available from authors	—	—
<i>Calliope</i>	Lianhua Shan, Gansu, Zhuoni, China	SYSb2545/SCIEA (S03542)	1	KU973753	KU973777	KU973815	1

<i>calliope</i>	Laoting, Hebei, China	SYSb (1524-25,1527-28)	4	KU973749 —973752	KU973773 —973776	KU973811 —973814	KU973792 —973795
	Japan	Sangster et al. (2010)	1	—	HM633316	HM633735	HM633598
<i>Calliope</i>	Jiuding Shan, Deyang, Sichuan, China	SYSb463/IOZ-PA20130516	1	KU973754	KU973778	KU973816	KU973796
<i>pectardens</i>	Sichuan, China	Sangster et al. (2010)	1	—	HM633320	HM633738	HM633602
<i>Calliope</i>							
<i>obscura</i>	Shaanxi, China	Sangster et al. (2010)	1	—	KC967092	KC967094	KC967096
<i>Tarsiger</i>							
<i>johnstoniae</i>	Taiwan, China	Sangster et al. (2010)	1	—	HM633391	HM633801	HM633672

Table A2. Amplification and sequencing primers and annealing temperature (Ta) of PCRs used to in this article.

Genes	Primers	Sequences(5'-3')	Ta(°C)	Length(bp)	References
COI	BirdF1	TTCTCCAACCACAAAGACATTGGCAC	56	693	Hebert et al. 2004
	BirdR1	ACGTGGGAGATAATTCCAAATCCTG			
CYTB	L14995	CTCCCAGCCCCATCCAACATCTCAGCATGATGAAACTTCG	47-55	1018	Groth 1998
	H16065	CTAAGAAGGGTGGAGTCTTCAGTTTTTGGTTTACAAGAC			
	CylF285	TCGTAGGATACGTA CTGCCC			
	CylR521	TGTTTGAGCCTGTTTCGTGT	50-55	236	This study
	CylF499	CCTACACGAAACAGGCTCAA			
	CylR718	TCATTCGGGTTTGATGTGGG			
	CylF664	AAACTTCACACCAGCCAACC			
	CylR826	GTGTAATAGAGGGGCGAGGA			
	CylF834	AACAGCGCTCACTAACCTTC			
CylR1019	CTAATACGGCTGCAAGTGGG				
Myo	MYO2	GCCACCAAGCACAAGATCCC	53-58	690	Kimball et al. 2009
	MYO3F	TTCAGCAAGGACCTTGATAATGACTT			
ODC	OD6	GACTCCAAAGCAGTTTGTCGTCTCAGTGT	53-61	663	Allen & Omland 2003
	OD8R	ATTGGTGGTGGCTTCCCTGGCTCTGAAGA			
	ODC2-F	GGTGAGCTGACAGTACCAAA			
	ODC2-R	AGCCACCACCAATATCAAGC			

Table A3. Geographic information of sound recordings used in this study.

Taxon	Locality	Latitude	Longitude	Altitude (m)	Date (yyyy/mm/dd)	Recordist	Type		Source			
							Song	Call				
<i>Calliope pectoralis ballioni</i>	Kalon, Sughd Region, Tajikistan	39°3'3.20"	68°58'54.23"	2918	2014/7/20	Chenxi Jia	+	--	This study			
							+	--	This study			
	Tian Shan Observatory, Ili-Alatau National Park, Almaty, Kazakhstan	43°3'31.92"	76°58'5.40"	2749	2009/5/11	Geoff Carey	+	--	This study			
							+	--	This study			
							+	--	This study			
							2400	2009/5/20	Ruud van Beusekom	+	--	XC43633
							2700	2011/5/14	Arend Wassink	+	+	XC156598
	Nalati Grassland, Xinyuan County, Xinjiang, China	43°4'25.64"	76°59'14.68"	3000	2007/5/15	Jan Hein van Steenis	+	--	XC29566			
							2200	2013/7/17	Thijs Fijen	--	+	XC145263
	Sayram Lake, Bole County, Xinjiang, China	44°40'20.53"	81°22'27.80"	2423	2014/6/19	Chenxi Jia	+	--	This study			
Wusu County, Xinjiang, China	43°47'15.81"	84°27'42.80"	2640	2014/5/31	Chenxi Jia	+	--	This study				
						+	--	This study				
<i>C. p. pectoralis</i>	Naltar valley, Gilgit, Gilgit-Baltistan, Pakistan	36°10'30.80"	74° 9'43.15"	2900	1998/6/3	Per Alström	+	--	This study			
							+	--	This study			

<i>C. confusa</i>	Kaziranga National Park (watch tower), Golaghat, Assam, India	26°38'4.20"	93°21'27.00"	70	2012/11/23	Mike Nelson	+	--	This study
							--	+	XC117075
							--	+	XC117076
							--	+	XC117077
							--	+	XC117078
							--	+	XC117081
							--	+	XC117116
+*	--	XC117079							
	Dibru-Saikhowa National Park, Laika Gaon, Assam, India	27°40'7.42"	95°21'44.67"	120	1998/1/3	Desmond Allen	+*	--	XC79436
<i>C. tschebaiewi</i>	Baima Snow Mountain, Deqin County, Yunnan, China	28°20'27.12"	99° 3'57.48"	4280	2008/6/8	Per Alström	+	--	This study
					2008/6/9		+	--	This study
	Road to Moxi, Kangding, Sichuan, China	29°54'00"	102°0'00"	4015	2013/5/30	Per Alström	+	--	This study
				3970			+	--	This study
				4450			+	--	This study
				4060			+	--	This study
				4360			2013/5/31	+	--
	Balang Shan, Wenchuan County, Sichuan, China	30°56'58.20"	102°52'58.44"	4280	2013/6/2	Per Alström	+	--	This study
				3800	2013/6/2	Frank Lambert	--	+	XC110848
				4020	2012/6/8	Geoff Carey	+	--	This study
				3600	2012/6/1	Frank Lambert	+	--	XC110845
				3800	2012/6/2	Frank Lambert	+	--	XC110849
	Along Road 318, Yajiang, Sichuan, China	30° 0'12.35"	100°51'44.75"	4408	2012/5/7	Chenxi Jia	+	+	This study
4217				2012/5/8	+		--	This study	

Figure A3. Shows of breath-band width difference between *Calliope pectoralis ballioni* (Left 1-2) and *C. p. tschebaiewi* (Left 3-5). Photoed by Yang Liu from IOZ, CAS, China.