

Appendix 1: Origin of samples for genetic analysis; museum acronyms of voucher numbers: MTD C= Senckenberg Natural History Collections Dresden, Germany; SNSG= Senckenberg Natural History Collections Görlitz, Germany; ZMB= Museum für Naturkunde Berlin, Germany; ZFMK= Zoologisches Forschungsmuseum Alexander Koenig, Bonn Germany; NME= Naturkundemuseum Erfurt, Germany; BMNH= Natural History Museum at Tring, UK; ZMUC= Zoological Museum of the University of Copenhagen, Denmark; NHMC= Natural History Museum of Crete, Irakleio Greece; ANSP= Academy of Natural Sciences of Drexel University, Philadelphia USA; ANMH= American Museum of Natural History, New York USA; Oulu T= University of Oulu, Finland; \*= sequence of respective marker derived from a different individual (GenBank); <sup>1)</sup> GenBank sequence from ALSTRÖM *et al.* (2008); <sup>2)</sup> GenBank sequence from OLSSON *et al.* (2013); <sup>3)</sup> sequences from two different individuals were used in the multi-locus alignment; <sup>4)</sup> we sampled the same individual like SCHWEIZER & KIRWAN (2014) and generated a consensus sequence from the overlapping fragments.

#### Samples used for multi-locus analysis

sample no	species	country	region	voucher	cytb	16S rRNA	COI	fib7	myo2
100178	<i>Emberiza affinis</i>	Nigeria		BMNH 1976.2.1	KP877712	-	EU847699*	-	-
MAR5927	<i>Emberiza aureola ornata</i>	Russia	Vladivostok area		KP877778	KP877660	KP877696	KP877832	KP877870
MAR6625	<i>Emberiza bruniceps</i>	Iran	Khorasan	ZMUC 137739	KP877782	KP877664	KP877700	KP877836	KP877874
GenBank <sup>1)</sup>	<i>Emberiza buchanani</i>	Kazakhstan			EU325757	-	JQ174760*	-	-
GenBank <sup>1) 2)</sup>	<i>Emberiza cabanisi</i>	Cameroon			EU325767	-	-	-	JX515372
MAR6627	<i>Emberiza caesia</i>	Turkey			KP877784	KP877666	JQ174762*	KP877837	KP877875
MAR696	<i>Emberiza calandra</i>	Germany	Thuringia		KP877792	KP877669	KP877702	KP877839	KP877878
GenBank <sup>1)</sup>	<i>Emberiza capensis capensis</i>	South Africa	Cape Province		EU325765	-	-	-	JX515375
MAR1473	<i>Emberiza chrysophrys</i>	Russia	Amur Oblast		KP877719	-	KP877675	KP877809	KP877844
MAR2586	<i>Emberiza cia cia</i>	Germany	Rhineland-Palatinate	MTD C61448	KP877723	KP877635	KP877679	KP877813	KP877848
MAR3346	<i>Emberiza cia flemingorum</i>	Nepal	Humla District	NME 04/035	KP877725	KP877636	KP877680	-	KP877849
NHMC 80.4.193.11	<i>Emberiza cineracea</i>	Greece	Lesbos	NHMC 80.4.193.11	KP877806	KP877672	KP877705	KP877841	KP877882
MAR655	<i>Emberiza cioides</i>	aviary		MTD C55352	KP877780	KP877662	KP877698	KP877834	KP877872
MAR5569	<i>Emberiza cirlus nigrostriata</i>	France	Corsica		KP877767	KP877654	KP877693	KP877828	KP877866
MAR3479	<i>Emberiza citrinella</i>	Germany	Mecklenburg-Vorpomm.		KP877727	KP877638	KP877682	KP877815	KP877851
MAR4475	<i>Emberiza elegans elegans</i>	Russia	Kutusovka, S Khabarovsk		KP877742	KP877642	KP877685	KP877818	KP877856
MAR702	<i>Emberiza elegans elegantula</i>	China	Shaanxi	MTD C56734	KP877797	KP877671	KP877703	KP877840	KP877880
MAR662	<i>Emberiza flaviventris</i>	aviary		MTD C53594	KP877781	KP877663	KP877699	KP877835	KP877873
MAR1246	<i>Emberiza fucata</i>	Russia	Primorskiy Kray		KP877716	KP877631	KP877674	KP877808	KP877843
MAR4952	<i>Emberiza godlewskii yunnanensis</i>	China	Sichuan	MTD C62973	KP877762	KP877652	KP877690	KP877826	KP877865

MAR5770	<i>Emberiza godlewskii godlewskii</i>	China	Gansu		KP877770	KP877656	KP877695	KP877830	KP877868
GenBank <sup>1)</sup>	<i>Emberiza goslingi goslingi</i>	Nigeria			JX515341	-	-	-	JX515378
MAR557	<i>Emberiza hortulana</i>	Germany	Rhineland-Palatinate		KP877768	KP877655	KP877694	KP877829	KP877867
MAR4541	<i>Emberiza impetuani impetuani</i>	Namibia			KP877747	KP877643	KP877686	KP877819	KP877857
GenBank <sup>1)</sup>	<i>Emberiza impetuani sloggetti</i>	South Africa	Orange Free State		EU325764	-	-	-	JX515377
GenBank <sup>1)</sup>	<i>Emberiza jankowskii</i>	China	Jilin		EU325761	-	EU847694*	-	-
100092 <sup>3)</sup>	<i>Emberiza koslowi</i>	China	Jyekundu	ANSP 125848	KP877709	-	-	-	-
MAR9359 <sup>3)</sup>	<i>Emberiza koslowi</i>	China	Qinghai		-	-	KP877704	-	KP877881
GenBank <sup>2)</sup>	<i>Emberiza lathami</i>	Nepal	Nunchet	AMNH Birds DOT-5536	KJ456338	-	-	-	KJ454831
MAR1627	<i>Emberiza leucocephalos</i>	Kyrgyzstan		MTD C63035	KP877721	KP877633	KP877677	KP877811	KP877846
MAR6632	<i>Emberiza melanocephala</i>	Greece		ZMUC 132240	KP877787	KP877667	KP877701	KP877838	KP877876
MAR4884	<i>Emberiza pallasi polaris</i>	Russia	Primorskiy Kray		KP877757	KP877648	KP877689	-	KP877862
100163	<i>Emberiza polioptera</i>	Ethiopia		ZMB 2000.11463	KP877710	-	-	-	-
MAR4898	<i>Emberiza pusilla</i>	Russia	Primorskiy Kray		KP877759	KP877649	-	KP877824	KP877863
MAR4857	<i>Emberiza rustica latifascia</i>	Russia	Primorskiy Kray		KP877750	KP877644	KP877687	KP877820	KP877858
MAR3968	<i>Emberiza rustica rustica</i>	Finland	Kuhmo		KP877729	KP877639	KP877683	KP877816	KP877853
MAR4867	<i>Emberiza rutila</i>	Russia	Primorskiy Kray		KP877754	KP877646	-	KP877822	KP877860
MAR170	<i>Emberiza sahari</i>	Morocco	Marakesh		KP877722	KP877634	KP877678	KP877812	KP877847
MAR612	<i>Emberiza schoeniclus</i>	Russia	Saratower Oblast		KP877779	KP877661	KP877697	KP877833	KP877871
MAR4901	<i>Emberiza siemsseni</i>	China	Shaanxi		KP877760	KP877650	KP877690	KP877825	KP877864
100179	<i>Emberiza socotrana</i>	Yemen	Socotra	BMNH 1953.36.35	KP877713, KJ511800 <sup>4)</sup>	-	-	-	KJ511801
MAR4352	<i>Emberiza spodocephala personata</i>	Russia	Sakhalinskaya Oblast		KP877738	KP877641	KP877684	KP877817	KP877855
MAR4962	<i>Emberiza spodocephala sordida</i>	China	Gansu		KP877764	KP877653	KP877692	KP877827	-
MAR337	<i>Emberiza spodocephala spodocephala</i>	Russia	Buryatia		KP877726	KP877637	KP877681	KP877814	KP877850
MAR1597	<i>Emberiza stewarti</i>	Kyrgyzstan		MTD C63036	KP877720	KP877632	KP877676	KP877810	KP877845
GenBank <sup>1)</sup>	<i>Emberiza striolata</i>	Israel			EU325762	-	-	-	JX515386
GenBank <sup>1)</sup>	<i>Emberiza sulphurata</i>	Japan			EU325737	-	JQ174777*	-	-
GenBank <sup>1)</sup>	<i>Emberiza tahapisi tahapisi</i>	Malawi			EU325763	-	-	-	JX515389
GenBank <sup>1)</sup>	<i>Emberiza tahapisi arabica</i>	Oman			JX515352	-	-	-	JX515391
MAR700	<i>Emberiza tahapisi insularis</i>	PR Jemen	Socotra		KP877796	KP877670	-	-	KP877879
MAR5912	<i>Emberiza tristrami</i>	Russia	Vladivostok area		KP877775	KP877659	-	KP877831	KP877869
EU325734	<i>Emberiza variabilis</i>	Japan			EU325734	-	AB843493*	-	-
MAR4883	<i>Emberiza yessoensis continentalis</i>	Russia	Primorskiy Kray		KP877756	KP877647	KP877688	KP877823	KP877861
<b>outgroups</b>									
MTD101	<i>Fringilla coelebs</i>	Germany	Saxony	MTD C61071	HQ284698	HQ284765	GQ481927*	HQ284702	KF194007
MAR4859	<i>Calcarius lapponicus</i>	Russia	Primorskiy Kray		KP877751	KP877645	-	KP877821	KP877859
MTD TC591	<i>Plectrophenax nivalis</i>	captivity		MTD C63199	KP877807	KP877673	-	KP877842	KP877883
GenBank*	<i>Plectrophenax mccownii</i>	USA	Montana	BMNH (jk94-74)	EF529929	-	DQ433402*	-	-

GenBank*	<i>Calcarius ornatus</i>	USA	Montana	BMNH (jk94-187)	EF529928	-	DQ433405*	-	-
GenBank*	<i>Calcarius pictus</i>	USA	Alaska		DQ489368	-	DQ433409*	-	-
GenBank <sup>1) 2)</sup>	<i>Ammodramus humeralis</i>	Paraguay			EU325784	-	FJ027072*	-	JX515370
GenBank <sup>1)</sup>	<i>Cardinalis cardinalis</i>	USA	NY State		EU325777	-	DQ434508*	-	KC313784*
GenBank <sup>1)</sup>	<i>Dendroica virens</i>	El Salvador			EU325770	-	HM033449*	-	GU932316*
GenBank <sup>1)</sup>	<i>Junco hyemalis</i>	USA	California		EU325787	AF202809*	HM033520*	-	KC007686*
GenBank <sup>1)</sup>	<i>Passerculus sandwichensis</i>	Canada	Prince Albert Sound		EU325786	-	HM033624*	-	KC007687*
GenBank <sup>1)</sup>	<i>Sturnella superciliaris</i>	Paraguay			EU325781	-	JQ176300*	-	KC007739*
GenBank <sup>1)</sup>	<i>Zonotrichia leucophrys</i>	USA	NY State		EU325785	AF202808*	HM034022*	-	KC007685*
GenBank <sup>2)</sup>	<i>Zonotrichia albicollis</i>	-	-		KJ456513	-	HM034000*	-	KJ454941

### Own samples used for single-locus analysis, *cytb*

sample no	species	country	region	voucher	cytb	16S rRNA
MAR3966	<i>Calcarius lapponicus</i>	Finland			KP877728	
MAR4474	<i>Emberiza aureola aureola</i>	Russia	Chongeo Nur, Dauria		KP877741	
MAR4362	<i>Emberiza aureola ornata</i>	Russia	Primorskiy Kray		KP877740	
MAR6634	<i>Emberiza bruniceps</i>	Iran	Golestan	ZMUC 137735	KP877788	KP877668
MAR4334	<i>Emberiza caesia</i>	Greece	Korfu	ZFMK_ORN 63.325	KP877735	
MAR6626	<i>Emberiza caesia</i>	Greece		ZMUC 135719	KP877783	KP877665
MAR71	<i>Emberiza cia cia</i>	France	Pyrenées-Orientales	MTD C56801	KP877800	
MAR4003	<i>Emberiza cia cia</i>	Morocco	Dayet Aoua near Ifrane		KP877732	KP877640
NHMC 80.4.193.10	<i>Emberiza cineracea</i>	Greece	Lesbos	NHMC 80.4.193.10	KP877805	
MAR4872	<i>Emberiza cioides</i>	Russia	Primorskiy Kray		KP877755	
MAR6635	<i>Emberiza cirlus</i>	Spain		ZMUC 130778	KP877789	
MAR5596	<i>Emberiza cirlus nigrostriata</i>	France	Corsica		KP877769	
MAR282	<i>Emberiza citrinella</i>	Germany	Black Forest		KP877724	
MAR698	<i>Emberiza citrinella</i>	Germany	Thuringia		KP877795	
MAR5269	<i>Emberiza citrinella</i>	Germany	Saxony	SNSG A.1308	KP877765	
MAR4864	<i>Emberiza elegans elegans</i>	Russia	Primorskiy Kray		KP877753	
MAR5905	<i>Emberiza elegans elegans</i>	Russia	Primorskiy Kray		KP877772	KP877657
MAR5906	<i>Emberiza elegans elegans</i>	Russia	Primorskiy Kray		KP877773	KP877658
MAR1244	<i>Emberiza elegans elegans</i>				KP877715	KP877630
MAR703	<i>Emberiza elegans elegantula</i>	China	Shaanxi		KP877798	
MAR704	<i>Emberiza elegans elegantula</i>	China	Shaanxi		KP877799	
MAR6968	<i>Emberiza elegans elegantula</i>	China	Sichuan		KP877793	
MAR6969	<i>Emberiza elegans elegantula</i>	China	Sichuan		KP877794	

MAR6629	<i>Emberiza flaviventris</i>	Tanzania	Iringa	ZMUC 129768	KP877785
MAR6630	<i>Emberiza flaviventris</i>	Tanzania	Iringa	ZMUC 129750	KP877786
MAR4356	<i>Emberiza fucata</i>	Russia	Primorskiy Kray		KP877739
MAR5921	<i>Emberiza fucata</i>	Russia	Primorskiy Kray		KP877777
MAR4813	<i>Emberiza fucata arcuata</i>	Nepal	Myagdi District	MTD C58557	KP877748
MAR4951	<i>Emberiza godlewskii yunnanensis</i>	China	Sichuan	MTD C62972	KP877761 KP877651
MAR4953	<i>Emberiza godlewskii yunnanensis</i>	China	Sichuan	MTD C62974	KP877763
MAR5771	<i>Emberiza godlewskii godlewskii</i>	China	Gansu		KP877771
MAR6908	<i>Emberiza godlewskii godlewskii</i>	China	Ningxia	MTD C6908	KP877791
MAR4535	<i>Emberiza hortulana</i>	Germany	Brandenburg		KP877744
MAR4536	<i>Emberiza hortulana</i>	Germany	Brandenburg		KP877745
MAR4537	<i>Emberiza hortulana</i>	Germany	Brandenburg		KP877746
MAR5346	<i>Emberiza hortulana</i>	Austria	Austria		KP877766
MAR4478	<i>Emberiza leucocephalos</i>	Russia	Chitinskaya Oblast		KP877743
MAR4340	<i>Emberiza melanocephala</i>	Iran	Tabriz, 95 km NW Tehran	ZFMK_ORN 77.051	KP877736
MAR4860	<i>Emberiza rustica latifascia</i>	Russia	Primorskiy Kray		KP877752
MAR4889	<i>Emberiza rustica latifascia</i>	Russia	Primorskiy Kray		KP877758
MAR3969	<i>Emberiza rustica rustica</i>	Finland	Pello		KP877730
MAR5910	<i>Emberiza rutila</i>	Russia	Primorskiy Kray		KP877774
MAR3970	<i>Emberiza schoeniclus</i>	Finland	Oulu	Oulu T 14804	KP877731
MAR4272	<i>Emberiza schoeniclus</i>	Germany	Lake Constance		KP877733
MAR1262	<i>Emberiza spodocephala spodocephala</i>	Russia	Amur Oblast		KP877717
MAR1383	<i>Emberiza spodocephala spodocephala</i>	Russia	Amur Oblast		KP877718
MAR4853	<i>Emberiza spodocephala spodocephala</i>	Russia	Primorskiy Kray		KP877749
MAR4343	<i>Emberiza stewarti</i>	Afghanistan	20 km E of Kabul	ZFMK_ORN 2012.716	KP877737
100087	<i>Emberiza tahapisi</i>	Angola		MTD C49992	KP877707
MAR5914	<i>Emberiza tristrami</i>	Russia	Primorskiy Kray		KP877776
MAR6637	<i>Emberiza tristrami</i>	aviary		ZMUC 131642	KP877790
MAR4318	<i>Emberiza buchanani cerruti</i>	Turkey		ZFMK_ORN 68.1947	KP877734
100176	<i>Emberiza capensis</i>	Namibia		BMNH 1950.50.1167	KP877711
100091	<i>Emberiza cineracea</i>	Turkey		MTD C18657	KP877708
100086	<i>Emberiza variabilis</i>	Japan		MTD C36944	KP877706
100180	<i>Emberiza socotrana</i>	Jemen	Socotra	BMNH 1899.8.11.58	KP877714
MAR8156	<i>Emberiza godlewskii ssp.</i>	China	Qinghai		KP877801
MAR8528	<i>Emberiza godlewskii yunnanensis</i>	China	Yunnan		KP877802
MAR8577	<i>Emberiza godlewskii omissa</i>	China	Hebei		KP877803
MAR8580	<i>Emberiza godlewskii omissa</i>	China	Hebei		KP877804

additional GenBank sequences used for single-locus analysis, *cytb*

EU325735	<i>Emberiza aureola</i>	Russia	E Siberia
EU325749	<i>Emberiza bruniceps</i>	Kazakhstan	
EU325756	<i>Emberiza caesia</i>	Greece	Lesbos
EU325746	<i>Emberiza calandra</i>	Italy	Sardinia
EU325733	<i>Emberiza chrysophrys</i>	China	Hebei
EU325758	<i>Emberiza cia cia</i>	Spain	
EU325759	<i>Emberiza cioides weigoldi</i>	China	Hebei
EU325752	<i>Emberiza cirius</i>	Bulgaria	
EU325753	<i>Emberiza citrinella</i>	Sweden	
EU325744	<i>Emberiza elegans elegans</i>	China	Heliongjiang
EU325766	<i>Emberiza flaviventris</i>	Captivity	
EU325747	<i>Emberiza fucata fucata</i>	China	Hebei
EU325760	<i>Emberiza godlewskii omissa</i>	China	Hebei
EU325755	<i>Emberiza hortulana</i>	Kazakhstan	
EU325761	<i>Emberiza jankowskii</i>	China	Jilin
EU325750	<i>Emberiza lathamii</i>	Captivity	
EU325751	<i>Emberiza leucocephalos</i>	Kazakhstan	
EU325748	<i>Emberiza melanocephala</i>	Turkey	
EU325742	<i>Emberiza pallasi</i>	Japan	
EU325740	<i>Emberiza pusilla</i>	China	Hebei
EU325738	<i>Emberiza rustica rustica</i>	Japan	
EU571274	<i>Emberiza rustica rustica</i>	Sweden	
EU325739	<i>Emberiza rutila</i>	China	Heliongjiang
EU325799	<i>Emberiza schoeniclus</i>	Sweden	
EU325745	<i>Emberiza siemsseni</i>	China	Shaanxi
EU325736	<i>Emberiza spodocephala spodocephala</i>	China	Hebei
EU325754	<i>Emberiza stewarti</i>	Kazakhstan	
EU325732	<i>Emberiza tristrami</i>	China	Hebei
EU325743	<i>Emberiza yessoensis yessoensis</i>	Japan	
EF529949	<i>Emberiza calandra</i>	Russia	Khabarovsk Kray
JX515340	<i>Emberiza capensis media</i>	South Africa	Orange Free State
JX515354	<i>Emberiza capensis smithersii</i>	Zimbabwe	
JX515353	<i>Emberiza goslingi septemstriata</i>	Eritrea	

JX515345	<i>Emberiza sahari</i>	Mauretania	
NC015233	<i>Emberiza chrysophrys</i>	-	
AF284081	<i>Emberiza cirius</i>	France	
AY495392	<i>Emberiza citrinella</i>	-	
DQ192026	<i>Emberiza elegans</i>	China	
DQ192027	<i>Emberiza elegans</i>	China	
L78806	<i>Emberiza elegans</i>	-	
AY495391	<i>Emberiza elegans</i>	-	
AB159173	<i>Emberiza cioides ciopsis</i>	Japan	Fukushima
AB159174	<i>Emberiza cioides ciopsis</i>	Japan	Tokyo
AB159175	<i>Emberiza cioides castaneiceps</i>	Korea	Jeju Island
AB159176	<i>Emberiza cioides castaneiceps</i>	Korea	Jeju Island
EF529949	<i>Emberiza godlewskii</i>	Mongolia	Omngovi Aymag
L77902	<i>Emberiza impetuani</i>	-	
EF529941	<i>Emberiza lathamii</i>	Nepal	Kipsung
FJ547288	<i>Emberiza lathamii</i>	Nepal	Kipsung
EU325750	<i>Emberiza lathamii</i>	Captivity	
DQ792774	<i>Emberiza pallasi</i>	China	
DQ792773	<i>Emberiza pallasi</i>	China	
EF529947	<i>Emberiza pallasi</i>	Russia	Khabarovsk Krai
EF529946	<i>Emberiza pusilla</i>	Russia	Magadanskaya Oblast
FJ547287	<i>Emberiza rustica</i>	Russia	Magadanskaya Oblast
DQ792771	<i>Emberiza rustica</i>	China	
DQ792772	<i>Emberiza rustica</i>	China	
EF529943	<i>Emberiza rustica</i>	Russia	Magadanskaya Oblast
AF284082	<i>Emberiza rustica</i>	Denmark	
AF290157	<i>Emberiza schoeniclus</i>	Russia	Kamchatkaya Oblast
EF529944	<i>Emberiza schoeniclus</i>	Russia	Moscovskaya Oblast
KC007554	<i>Emberiza siemsseni</i>	-	
DQ119533	<i>Emberiza rutila</i>	China	
DQ119534	<i>Emberiza rutila</i>	China	
DQ792768	<i>Emberiza spodocephala</i>	China	
DQ792769	<i>Emberiza spodocephala</i>	China	
DQ792770	<i>Emberiza spodocephala</i>	China	
DQ236214	<i>Emberiza spodocephala</i>	China	

DQ119535	<i>Emberiza tristrami</i>	China	
DQ119536	<i>Emberiza tristrami</i>	China	
EF529945	<i>Emberiza variabilis</i>	Russia	Sakhalinskaya Oblast
EU325768	<i>Plectrophenax nivalis</i>	Norway	
EF529930	<i>Plectrophenax nivalis</i>	USA	Minnesota
EU325769	<i>Calcarius lapponicus</i>	Sweden	
EF529927	<i>Calcarius lapponicus</i>	USA	Minnesota
EU571277	<i>Emberiza citrinella</i>	Sweden	
AF284080	<i>Emberiza citrinella</i>	Italy	