

**SUPPLEMENTARY TABLES**

**Table S1. Detail information of Z-DNA motifs predicted on nBMST. ZP1 in chickens and TG19 in Pigeon show high similarity to each other in length, composition and sequence.**

<b>Chicken</b>				
Name	Length	Repeat	Sequence	Score
ZP1	40	TG	TGTGTGTGTGTGTGTGTGTGTGTGT GTGTGTGTGTGTGTGTGCG	80
ZP3	14	CA	CACACACACACA	19
ZP6	25	TG	GTGCGTGTGCACGTGTGTGTGC ACA	91
ZP7	12	CA	CACGCACACACA	38
ZP4	22	TG	CACGTGTGTGTGTGCGTGTGCA	75
<b>Pigeon</b>				
Name	Length	Repeat	Sequence	Score
TG19	38	TG	GTGTGTGTGTGTGTGTGCGTGTGTG TGCGCACACACGTGT	121
1	19	CA	ACGCACGCACGCACACACA	93
2	17	CA	ACACACACACGCACACA	46
3	14	CA	ACACACACACACAC	19

4	20	TG	TGTGTGTGTGTGTGTGCGCA	61
5	12	CA	GCACACGCACGC	71

**Table S2. Phylogenetic linear regression model fitting result of Z-DNA density and predictors.**

Predictor	Model	All species			Non-Passeriformes			Passeriformes		
		logLik	AIC	AICw	logLik	AIC	AICw	logLik	AIC	AICw
Genome size	BM	-708.6	1423.3	0	-349.7	705.4	0.00087	-276.7	559.5	0
	OU	-649.7	1307.4	0.04109	-349.2	706.5	0.0005	-257.5	523.1	0.84553
	lambda	-646.5	1301.1	0.95891	-341.6	691.3	0.99863	-259.3	526.5	0.15447
Body mass	BM	-710.9	1427.9	0	-353.1	712.3	0	-283.0	571.9	0
	OU	-649.9	1307.9	0.99797	-349.2	706.5	0.00006	-265.5	539.0	0.96267
	lambda	-656.2	1320.3	0.00203	-339.4	686.9	0.99994	-268.7	545.5	0.03733
Egg mass	BM	-576	1158	0	-282.4	570.8	0.03269	-212.1	430.3	0
	OU	-520.7	1049.4	0.99894	-279.0	566.1	0.34276	-198.4	404.7	0.92414
	lambda	-527.5	1063.1	0.00106	-278.4	564.9	0.62455	-200.8	409.7	0.07586
Deve_T	BM	-602.8	1211.5	0	-290.6	587.2	0.17979	-230.8	467.7	0
	OU	-550	1108	0.99683	-290.2	588.3	0.12669	-214.4	436.9	0.8909
	lambda	-555.7	1119.5	0.00317	-288.4	584.9	0.69352	-216.6	441.1	0.1091
Incu_T	BM	-602.5	1211.0	0	-290	586	0.18214	-231.3	468.7	0
	OU	-548.1	1104.1	0.99842	-289	586	0.18214	-215.5	439.0	0.94268
	lambda	-554.5	1117.0	0.00158	-287.7	583.5	0.63572	-218.3	444.6	0.05732
Fled_T	BM	-602.8	1211.5	0	-291	588	0.20761	-230.0	466.1	0
	OU	-551.2	1110.4	0.99223	-290.7	589.4	0.1031	-213.6	435.3	0.86989

	lambda	-556.1	1120.1	0.00777	-288.8	585.6	0.68929	-215.6	439.1	0.13011
Deve_T	BM	-600.6	1207.2	0	-290.5	587.0	0.03062	-228.7	463.4	0
(bodymass_adj)	OU	-544.7	1097.4	0.99932	-288.4	584.7	0.0967	-215.2	438.4	0.95026
	lambda	-552	1112	0.00068	-286.2	580.3	0.87269	-218.2	444.3	0.04974
Incu_T	BM	-601	1208	0	-290.1	586.1	0.04673	-229.5	465.0	0
(bodymass_adj)	OU	-545.5	1098.9	0.99942	-288.3	584.5	0.104	-215.5	438.9	0.95026
	lambda	-552.9	1113.8	0.00058	-286.1	580.3	0.84927	-218.4	444.8	0.04974
Fled_T	BM	-600.4	1206.8	0	-291.2	588.4	0.03243	-227.8	461.6	0
(bodymass_adj)	OU	-544.4	1096.7	0.99913	-289.2	586.4	0.08817	-214.8	437.6	0.95026
	lambda	-551.4	1110.8	0.00087	-286.9	581.8	0.8794	-217.8	443.5	0.04974
Deve_T	BM	-575.5	1157.0	0	-283.9	573.9	0.01131	-211.1	428.3	0
(eggmass_adj)	OU	-519	1046	0.99877	-279.6	567.3	0.30652	-197.7	403.5	0.91293
	lambda	-525.7	1059.4	0.00123	-278.9	565.7	0.68217	-200.1	408.2	0.08707
Incu_T	BM	-575.8	1157.6	0	-282.8	571.7	0.0201	-212.1	430.2	0
(eggmass_adj)	OU	-520	1048	0.99909	-279.1	566.2	0.31437	-198.2	404.5	0.92056
	lambda	-527	1062	0.00091	-278.4	564.7	0.66553	-200.7	409.4	0.07944
Fled_T	BM	-575.6	1157.2	0	-285	576	0.02859	-210.2	426.4	0
(eggmass_adj)	OU	-519	1046	0.99797	-282.3	572.6	0.1565	-197.1	402.1	0.90887
	lambda	-525.2	1058.4	0.00203	-280.7	569.3	0.81491	-199.3	406.7	0.09112

**Table S3. Phylogenetic linear regression model fitting result of STR density and predictors.**

Predictor	Model	All species			Non-Passeriformes			Passeriformes		
		logLik	AIC	AICw	logLik	AIC	AICw	logLik	AIC	AICw
Genome size	BM	-973.1	1952.2	0	-624.2	1254.5	0	-340.3	686.6	0.00001
	OU	-951.3	1910.6	0	-604.3	1216.6	0.00003	-332.1	672.2	0.01799
	lambda	-932.8	1873.6	1	-593.9	1195.7	0.99997	-328.1	664.2	0.982
Body mass	BM	-967.7	1941.4	0	-624.3	1254.6	0	-337.2	680.4	0.00001
	OU	-945.7	1899.3	0	-604.4	1216.9	0.00003	-327.4	662.9	0.09112
	lambda	-928.7	1865.5	1	-594	1196	0.99997	-325.2	658.3	0.90886
Egg mass	BM	-777.5	1561.0	0	-522.6	1051.3	0	-251.4	508.9	0.00001
	OU	-757.1	1522.2	0	-506.3	1020.5	0.00015	-239.9	487.8	0.51249
	lambda	-743.8	1495.6	1	-497.4	1002.9	0.99985	-239.9	487.9	0.4875
Deve_T	BM	-812.6	1631.2	0	-535.2	1076.4	0	-273.0	552.1	0.00002
	OU	-791.8	1591.6	0	-517.7	1043.4	0.00014	-261.7	531.3	0.57443
	lambda	-777.7	1563.4	1	-508.8	1025.6	0.99986	-262.0	531.9	0.42555
Incu_T	BM	-812.3	1630.6	0	-535.3	1076.6	0	-272.1	550.2	0.00002
	OU	-791.9	1591.7	0	-518	1044	0.00012	-260.9	529.7	0.52497
	lambda	-777.9	1563.7	1	-509	1026	0.99988	-261.0	529.9	0.47501
Fled_T	BM	-812.5	1631.0	0	-535.1	1076.3	0	-273.3	552.5	0.00002
	OU	-791.7	1591.4	0	-517.6	1043.2	0.00014	-262.3	532.5	0.43781

	lambda	-777.7	1563.3	1	-508.8	1025.5	0.99986	-262	532	0.56217
Deve_T	BM	-812.6	1631.2	0	-535.3	1076.7	0	-273.4	552.7	0.00003
(bodymass_adj)	OU	-791.8	1591.6	0	-518.1	1044.2	0.00011	-263.1	534.1	0.3318
	lambda	-777.9	1563.7	1	-509	1026	0.99989	-262.3	532.7	0.66817
Incu_T	BM	-812.6	1631.2	0	-535.3	1076.6	0	-273.4	552.7	0.00003
(bodymass_adj)	OU	-791.8	1591.7	0	-518.1	1044.1	0.00011	-263.0	534.1	0.3318
	lambda	-777.9	1563.7	1	-508.9	1025.8	0.99989	-262.3	532.7	0.66817
Fled_T	BM	-812.6	1631.1	0	-535.3	1076.6	0	-273.4	552.7	0.00003
(bodymass_adj)	OU	-791.7	1591.4	0	-518.1	1044.2	0.00011	-263.1	534.1	0.3318
	lambda	-777.9	1563.7	1	-509	1026	0.99989	-262.3	532.7	0.66817
Deve_T	BM	-777.5	1561.0	0	-522.6	1051.3	0	-251.3	508.5	0.00002
(eggmass_adj)	OU	-757	1522	0	-506.2	1020.5	0.00015	-240.2	488.4	0.45016
	lambda	-743.8	1495.5	1	-497.4	1002.9	0.99985	-240	488	0.54982
Incu_T	BM	-777.4	1560.9	0	-522.6	1051.2	0	-251.2	508.4	0.00002
(eggmass_adj)	OU	-757.1	1522.2	0	-506.3	1020.5	0.00015	-240.1	488.3	0.46256
	lambda	-743.8	1495.6	1	-497.5	1002.9	0.99985	-240	488	0.53742
Fled_T	BM	-777.5	1560.9	0	-522.6	1051.2	0	-251.3	508.6	0.00002
(eggmass_adj)	OU	-756.9	1521.9	0	-506.2	1020.4	0.00016	-240.2	488.4	0.45016
	lambda	-743.7	1495.5	1	-497.4	1002.9	0.99984	-240	488	0.54982

**Table S4. Phylogenetic linear regression model fitting result of genome size and developmental periods.**

Predictor	Model	All species			Non-Passeriformes			Passeriformes		
		logLik	AIC	AICw	logLik	AIC	AICw	logLik	AIC	AICw
Deve_T	BM	-787.9	1581.9	0	-491.2	988.5	0	-287.9	581.9	0
	OU	-758.9	1525.8	0.00106	-479.6	967.3	0.00015	-273	554	0.6981
	lambda	-752.1	1512.1	0.99894	-470.9	949.7	0.99985	-273.8	555.7	0.3019
Incu_T	BM	-787	1580	0	-491.2	988.4	0	-287.3	580.7	0
	OU	-755.6	1519.2	0.00067	-476.9	961.8	0.00017	-273.6	555.2	0.82252
	lambda	-748.3	1504.6	0.99933	-468.2	944.4	0.99983	-275.1	558.2	0.17748
Fled_T	BM	-787.1	1580.2	0	-490.5	986.9	0	-287.2	580.4	0
	OU	-761.7	1531.5	0.00017	-480.4	968.9	0.0001	-272.4	552.8	0.67264
	lambda	-753.1	1514.2	0.99983	-471.2	950.4	0.9999	-273.1	554.2	0.32736
Deve_T (bodymass_adj)	BM	-787.9	1581.9	0	-491.5	989.0	0	-287.2	580.5	0
	OU	-761.1	1530.2	0.00007	-479.9	967.8	0.00013	-273	554	0.88471
	lambda	-751.6	1511.2	0.99993	-471	950	0.99987	-275.0	558.1	0.11529
Incu_T (bodymass_adj)	BM	-788.1	1582.2	0	-491.2	988.3	0	-287.6	581.3	0
	OU	-761.3	1530.6	0.0001	-480.1	968.2	0.00013	-273.3	554.6	0.87451
	lambda	-752.1	1512.2	0.9999	-471.1	950.3	0.99987	-275.2	558.5	0.12549
Fled_T (bodymass_adj)	BM	-787.5	1581.0	0	-491.6	989.3	0	-286.7	579.4	0
	OU	-761	1530	0.00005	-479.7	967.4	0.00013	-272.6	553.2	0.88848

	lambda	-751	1510	0.99995	-470.7	949.5	0.99987	-274.7	557.3	0.11152
Deve_T	BM	-752.7	1511.4	0	-479.3	964.5	0	-264.8	535.6	0
(eggmass_adj)	OU	-724.3	1456.6	0.0001	-466.5	941.1	0.00024	-250.3	508.6	0.81813
	lambda	-715.1	1438.2	0.9999	-458.2	924.5	0.99976	-251.8	511.6	0.18187
Incu_T	BM	-753.6	1513.1	0	-479.9	965.8	0	-265.1	536.1	0
(eggmass_adj)	OU	-724.4	1456.9	0.00027	-467.1	942.2	0.00032	-250.8	509.6	0.83061
	lambda	-716.2	1440.4	0.99973	-459.0	926.1	0.99968	-252.4	512.7	0.16939
Fled_T	BM	-751.8	1509.5	0	-478.5	963.0	0	-264.3	534.6	0
(eggmass_adj)	OU	-724.6	1457.2	0.0004	-466.3	940.7	0.00017	-249.7	507.4	0.77891
	lambda	-714.4	1436.7	0.9996	-457.6	923.3	0.99983	-250.9	509.9	0.22109

**Table S6. Accession ID of genomes that were included in the analysis.**

<b>Species</b>	<b>accession ID</b>	<b>Species</b>	<b>accession ID</b>	<b>Species</b>	<b>accession ID</b>
<i>Acanthisitta chloris</i>	GCA_016904835.1	<i>Cyanistes caeruleus</i>	GCF_002901205.1	<i>Nothoprocta perdicaria</i>	GCF_003342845.1
<i>Accipiter gentilis</i>	GCF_929443795.1	<i>Cyanocitta stelleri</i>	GCA_026167965.1	<i>Numida meleagris</i>	GCF_002078875.1
<i>Acridotheres tristis</i>	GCA_027559615.1	<i>Cygnus atratus</i>	GCF_013377495.2	<i>Nyctibius grandis</i>	GCA_013368605.1
<i>Agelaius phoeniceus</i>	GCF_020745825.1	<i>Cygnus olor</i>	GCF_009769625.2	<i>Oenanthe melanoleuca</i>	GCF_029582105.1
<i>Alca torda</i>	GCA_008658365.1	<i>Diglossa brunneiventris</i>	GCA_019023105.1	<i>Onychostruthus taczanowskii</i>	GCF_017590055.1
<i>Alectoris rufa</i>	GCA_019345075.1	<i>Dromaius novaehollandiae</i>	GCA_016128335.2	<i>Opisthocomus hoazin</i>	GCF_000692075.1
<i>Amazona aestiva</i>	GCA_017639355.1	<i>Dryobates pubescens</i>	GCF_014839835.1	<i>Oxyura jamaicensis</i>	GCF_011077185.1
<i>Ammospiza caudacuta</i>	GCF_027887145.1	<i>Egretta garzetta</i>	GCF_000687185.1	<i>Parus major</i>	GCF_001522545.3
<i>Ammospiza nelsoni</i>	GCF_027579445.1	<i>Empidonax traillii</i>	GCF_003031625.1	<i>Passer montanus</i>	GCF_014805655.1
<i>Anas platyrhynchos</i>	GCF_015476345.1	<i>Erithacus rubecula</i>	GCA_903797595.2	<i>Passerculus sandwichensis</i>	GCA_022577445.1
<i>Anser cygnoides</i>	GCA_013030995.1	<i>Falco biarmicus</i>	GCF_023638135.1	<i>Pavo muticus</i>	GCA_016647715.1
<i>Apaloderma vittatum</i>	GCF_000703405.1	<i>Falco cherrug</i>	GCF_023634085.1	<i>Pelecanus crispus</i>	GCA_030463565.1



<i>Aphelocoma californica</i>	GCA_028536675.1	<i>Falco naumanni</i>	GCF_017639655.2	<i>Pezoporus wallicus</i>	GCF_028554395.1
<i>Aptenodytes forsteri</i>	GCF_000699145.1	<i>Falco peregrinus</i>	GCF_023634155.1	<i>Phaethornis superciliosus</i>	GCA_023637945.1
<i>Apteryx mantelli</i>	GCF_001039765.1	<i>Falco rusticolus</i>	GCF_015220075.1	<i>Phasianus colchicus</i>	GCF_004143745.1
<i>Apteryx rowi</i>	GCF_003343035.1	<i>Ficedula albicollis</i>	GCF_000247815.1	<i>Phoenicopterus ruber</i>	GCA_009819775.1
<i>Apus apus</i>	GCF_020740795.1	<i>Fulmarus glacialis</i>	GCF_000690835.1	<i>Pipra filicauda</i>	GCF_003945595.2
<i>Aquila chrysaetos</i>	GCF_900496995.4	<i>Gallus gallus</i>	GCA_027408225.1	<i>Phuvialis apricaria</i>	GCA_017639485.1
<i>Aratinga solstitialis</i>	GCA_902168055.1	<i>Geospiza fortis</i>	GCF_000277835.1	<i>Podargus strigoides</i>	GCA_028020825.1
<i>Artemisiospiza belli</i>	GCA_021963965.1	<i>Geothlypis trichas</i>	GCA_009764595.1	<i>Poecile atricapillus</i>	GCF_030490865.1
<i>Athene cunicularia</i>	GCF_003259725.1	<i>Grus americana</i>	GCF_028858705.1	<i>Pogoniulus pusillus</i>	GCA_015220805.1
<i>Aythya fuligula</i>	GCF_009819795.1	<i>Gymnogyps californianus</i>	GCF_018139145.2	<i>Porphyrio hochstetteri</i>	GCA_020800305.1
<i>Balearica regulorum</i>	GCF_000709895.1	<i>Gypaetus barbatus</i>	GCA_028022735.1	<i>Pseudopodoces humilis</i>	GCF_000331425.1
<i>Branta canadensis</i>	GCA_006130075.1	<i>Haemorhous mexicanus</i>	GCA_027477595.1	<i>Pterocles gutturalis</i>	GCA_009769525.1
<i>Bucorvus abyssinicus</i>	GCA_009769605.1	<i>Haliaeetus albicilla</i>	GCA_947461875.1	<i>Pygoscelis adeliae</i>	GCF_000699105.1
<i>Calidris pugnax</i>	GCF_001431845.1	<i>Haliaeetus leucocephalus</i>	GCF_000737465.1	<i>Pyrgilauda ruficollis</i>	GCF_017590135.1
<i>Callipepla</i>	GCA_023055505.1	<i>Harpia harpyja</i>	GCF_026419915.1	<i>Rallus limicola</i>	GCA_022605955.1

<i>californica</i>					
<i>Calypte anna</i>	GCF_003957555.1	<i>Hemiprocne comata</i>	GCA_020745705.1	<i>Rhea americana</i>	GCA_003343005.1
<i>Camarhynchus parvulus</i>	GCA_902806625.1	<i>Hirundo rustica</i>	GCF_015227805.2	<i>Rhea pennata</i>	GCA_028389875.1
<i>Caprimulgus europaeus</i>	GCA_907165065.1	<i>Indicator indicator</i>	GCF_027791375.1	<i>Rhynchotos jubatus</i>	GCA_027574665.1
<i>Cariama cristata</i>	GCA_009819825.1	<i>Lagopus leucura</i>	GCF_019238085.1	<i>Rissa tridactyla</i>	GCA_028501385.1
<i>Catharus ustulatus</i>	GCF_009819885.2	<i>Lagopus muta</i>	GCF_023343835.1	<i>Serinus canaria</i>	GCF_022539315.1
<i>Centrocercus urophasianus</i>	GCF_019232065.1	<i>Laterallus jamaicensis</i>	GCA_022605575.1	<i>Setophaga petechia</i>	GCA_024362935.1
<i>Chaetura pelagica</i>	GCF_000747805.2	<i>Lepidothrix coronata</i>	GCF_001604755.1	<i>Spheniscus humboldti</i>	GCA_027474245.1
<i>Chamaea fasciata</i>	GCA_029207755.1	<i>Lonchura striata</i>	GCF_005870125.1	<i>Sterna hirundo</i>	GCA_009819605.1
<i>Charadrius vociferus</i>	GCF_000708025.1	<i>Lycocorax pyrrhopterus</i>	GCA_014706295.1	<i>Streptopelia turtur</i>	GCA_901699155.2
<i>Chiroxiphia lanceolata</i>	GCF_009829145.1	<i>Malurus melanocephalus</i>	GCF_030028575.1	<i>Strigops habroptila</i>	GCF_004027225.2
<i>Chlamydotis macqueenii</i>	GCF_000695195.1	<i>Manacus candei</i>	GCF_025592945.1	<i>Struthio camelus</i>	GCF_000698965.1
<i>Chrysolophus pictus</i>	GCA_003413605.1	<i>Manacus vitellinus</i>	GCF_001715985.3	<i>Sturnus vulgaris</i>	GCF_001447265.1
<i>Ciconia maguari</i>	GCA_017639555.1	<i>Melanerpes formicivorus</i>	GCA_026170545.1	<i>Sylvia atricapilla</i>	GCA_009819655.1

<i>Colinus virginianus</i>	GCA_008692595.2	<i>Meleagris gallopavo</i>	GCA_905368555.1	<i>Sylvia borin</i>	GCA_014839755.1
<i>Coloeus monedula</i>	GCA_013407035.1	<i>Melospittacus undulatus</i>	GCF_000238935.1	<i>Taeniopygia guttata</i>	GCF_003957565.2
<i>Columba livia</i>	GCF_000337935.1	<i>Melospiza georgiana</i>	GCF_028018845.1	<i>Tauraco erythrolophus</i>	GCA_009769465.1
<i>Corapipo altera</i>	GCF_003945725.1	<i>Melospiza melodia</i>	GCA_022749695.1	<i>Theristicus caerulescens</i>	GCA_020745775.1
<i>Corvus brachyrhynchos</i>	GCF_000691975.1	<i>Melozone crissalis</i>	GCF_028551555.1	<i>Trogon surrucura</i>	GCA_020746105.1
<i>Corvus cornix</i>	GCF_000738735.6	<i>Merops nubicus</i>	GCA_009819595.1	<i>Tympanuchus cupido</i>	GCA_001870855.1
<i>Corvus hawaiiensis</i>	GCF_020740725.1	<i>Molothrus ater</i>	GCF_012460135.2	<i>Tyto alba</i>	GCF_018691265.1
<i>Corvus kubaryi</i>	GCF_017639235.1	<i>Motacilla alba</i>	GCF_015832195.1	<i>Vidua chalybeata</i>	GCA_026979565.1
<i>Corvus moneduloides</i>	GCF_009650955.1	<i>Myiopsitta monachus</i>	GCA_017639245.1	<i>Vidua macroura</i>	GCF_024509145.1
<i>Coturnix japonica</i>	GCF_001577835.2	<i>Myiozetetes cayanensis</i>	GCF_022539395.1	<i>Zonotrichia albicollis</i>	GCF_000385455.1
<i>Crossoptilon mantchuricum</i>	GCA_019593555.1	<i>Neopelma chrysocephalum</i>	GCF_003984885.1		
<i>Cuculus canorus</i>	GCF_017976375.1	<i>Nestor notabilis</i>	GCF_000696875.1		

**Table S7. Whole genome Z-DNA density and STR density of 154 avian species.**

<b>Species</b>	<b>D_zdna</b>	<b>D_STR</b>	<b>Species</b>	<b>D_zdna</b>	<b>D_STR</b>	<b>Species</b>	<b>D_zdna</b>	<b>D_STR</b>
<i>Acanthisitta chloris</i>	101.3787	539.7981	<i>Cyanistes caeruleus</i>	77.2479	631.5437	<i>Nothoprocta perdicaria</i>	134.8876	865.8691
<i>Accipiter gentilis</i>	106.5386	781.3964	<i>Cyanocitta stelleri</i>	88.69569	679.25	<i>Numida meleagris</i>	97.225	712.4837
<i>Acridotheres tristis</i>	84.41681	997.7168	<i>Cygnus atratus</i>	113.3116	1052.294	<i>Nyctibius grandis</i>	102.0341	631.2333
<i>Agelaius phoeniceus</i>	92.69496	728.2655	<i>Cygnus olor</i>	111.4434	1046.684	<i>Oenanthe melanoleuca</i>	96.57692	800.2058
<i>Alca torda</i>	114.5432	778.8669	<i>Diglossa brunneiventris</i>	97.01759	709.7463	<i>Onychostruthus taczanowskii</i>	90.94369	725.7709
<i>Alectoris rufa</i>	93.87379	833.4039	<i>Dromaius novaehollandiae</i>	136.8144	687.9952	<i>Opisthocomus hoazin</i>	100.2317	518.4233
<i>Amazona aestiva</i>	77.21239	522.0115	<i>Dryobates pubescens</i>	86.47563	828.4731	<i>Oxyura jamaicensis</i>	107.4374	1098.908
<i>Ammospiza caudacuta</i>	152.3073	716.8774	<i>Egretta garzetta</i>	100.4934	660.1934	<i>Parus major</i>	83.22941	655.5696

<i>Ammospiza nelsoni</i>	125.1958	708.2992	<i>Empidonax traillii</i>	92.75536	736.2411	<i>Passer montanus</i>	89.7625	671.6817
<i>Anas platyrhynchos</i>	117.9412	1125.187	<i>Erithacus rubecula</i>	90.62385	778.1633	<i>Passerculus sandwichensis</i>	144.5557	746.2974
<i>Anser cygnoides</i>	115.9811	1042.02	<i>Falco biarmicus</i>	108.307	688.8326	<i>Pavo muticus</i>	94.89057	694.4472
<i>Apaloderma vittatum</i>	91.82617	598.1486	<i>Falco cherrug</i>	102.658	663.4733	<i>Pelecanus crispus</i>	117.0511	754.8863
<i>Aphelocoma californica</i>	105.1785	672.5726	<i>Falco naumanni</i>	111.4016	715.6713	<i>Pezoporus wallicus</i>	96.34298	660.0649
<i>Aptenodytes forsteri</i>	104.552	636.4704	<i>Falco peregrinus</i>	112.7908	1230.03	<i>Phaethornis superciliosus</i>	84.83235	870.8873
<i>Apteryx mantelli</i>	113.3507	586.373	<i>Falco rusticolus</i>	109.6333	699.9942	<i>Phasianus colchicus</i>	96.67353	822.1176
<i>Apteryx rowi</i>	127.6911	684.4626	<i>Ficedula albicollis</i>	88.93482	773.0848	<i>Phoenicopterus ruber</i>	122.3864	675.2984
<i>Apus apus</i>	90.98	721.6	<i>Fulmarus glacialis</i>	101.9167	643.5798	<i>Pipra filicauda</i>	95.89722	658.4315
<i>Aquila chrysaetos</i>	105.2398	740.5545	<i>Gallus gallus</i>	102.2288	845.8766	<i>Pluvialis apricaria</i>	111.192	707.3552
<i>Aratinga solstitialis</i>	85.30684	584.206	<i>Geospiza fortis</i>	84.85047	607.5065	<i>Podargus strigoides</i>	139.1528	1353.887
<i>Artemisiospiza</i>	91.72214	808.79	<i>Geothlypis</i>	92.5037	678.0407	<i>Poecile</i>	124.9264	783.984

<i>belli</i>			<i>trichas</i>			<i>atricapillus</i>		
<i>Athene cunicularia</i>	92.19483	719.4371	<i>Grus americana</i>	120.0524	750.731	<i>Pogoniulus pusillus</i>	83.65827	666.5252
<i>Aythya fuligula</i>	112.4327	1176.881	<i>Gymnogyps californianus</i>	106.9274	708.0411	<i>Porphyrio hochstetteri</i>	109.9283	760.8748
<i>Balearica regulorum</i>	106.4168	681.646	<i>Gypaetus barbatus</i>	97.27299	863.1569	<i>Pseudopodoces humilis</i>	88.88077	696.8154
<i>Branta canadensis</i>	113.2252	1038.528	<i>Haemorhous mexicanus</i>	88.43043	750.4626	<i>Pterocles gutturalis</i>	103.1053	742.2779
<i>Bucorvus abyssinicus</i>	107.877	644.2602	<i>Haliaeetus albicilla</i>	100.8902	698.3818	<i>Pygoscelis adeliae</i>	101.2287	623.132
<i>Calidris pugnax</i>	106.0496	732.0878	<i>Haliaeetus leucocephalus</i>	97.17203	658.3568	<i>Pyrgilauda ruficollis</i>	89.63905	711.221
<i>Callipepla californica</i>	109.1642	924.3156	<i>Harpia harpyja</i>	95.65704	686.7444	<i>Rallus limicola</i>	107.2493	681.4457
<i>Calypte anna</i>	77.9934	807.4208	<i>Hemiprocne comata</i>	88.74224	654.3043	<i>Rhea americana</i>	124.7388	734.8052
<i>Camarhynchus parvulus</i>	100.9972	680.6774	<i>Hirundo rustica</i>	98.31081	819.9243	<i>Rhea pennata</i>	137.9937	847.4835
<i>Caprimulgus europaeus</i>	104.0771	755.3881	<i>Indicator indicator</i>	84.75043	924.8026	<i>Rhynchotos jubatus</i>	108.8662	634.518
<i>Cariama</i>	99.77049	687.632	<i>Lagopus leucura</i>	94.51471	800.3078	<i>Rissa</i>	113.0016	677.2213

<i>cristata</i>						<i>tridactyla</i>		
<i>Catharus</i> <i>ustulatus</i>	90.5531	700.8832	<i>Lagopus muta</i>	97.26117	858.8854	<i>Serinus</i> <i>canaria</i>	89.15714	719.2229
<i>Centrocercus</i> <i>urophasianus</i>	91.92871	782.4802	<i>Laterallus</i> <i>jamaicensis</i>	94.60144	595.7935	<i>Setophaga</i> <i>petechia</i>	94.30082	748.132
<i>Chaetura</i> <i>pelagica</i>	86.19375	659.2098	<i>Lepidothrix</i> <i>coronata</i>	91.2463	640.4926	<i>Spheniscus</i> <i>humboldti</i>	124.8912	717.314
<i>Chamaea</i> <i>fasciata</i>	92.41261	737.4193	<i>Lonchura striata</i>	83.33208	693.0274	<i>Sterna</i> <i>hirundo</i>	115.9439	746.1276
<i>Charadrius</i> <i>vociferus</i>	103.7492	689.0631	<i>Lycocorax</i> <i>pyrrhopterus</i>	100.3216	617.7505	<i>Streptopelia</i> <i>turtur</i>	107.5025	724.8831
<i>Chiroxiphia</i> <i>lanceolata</i>	94.78807	672.6083	<i>Malurus</i> <i>melanocephalus</i>	82.55392	677.2147	<i>Strigops</i> <i>habroptila</i>	90.15739	614.98
<i>Chlamydotis</i> <i>macqueenii</i>	98.11193	837.3284	<i>Manacus candei</i>	94.49018	682.7179	<i>Struthio</i> <i>camelus</i>	119.3057	659.7553
<i>Chrysolophus</i> <i>pictus</i>	93.87255	775.0843	<i>Manacus</i> <i>vitellinus</i>	87.45607	611.5037	<i>Sturnus</i> <i>vulgaris</i>	85.34519	669.1712
<i>Ciconia</i> <i>maguari</i>	107.5645	658.5806	<i>Melanerpes</i> <i>formicivorus</i>	84.18182	939.9114	<i>Sylvia</i> <i>atricapilla</i>	90.22243	747.5439
<i>Colinus</i> <i>virginianus</i>	107.5011	814.5916	<i>Meleagris</i> <i>gallopavo</i>	98.935	870.103	<i>Sylvia borin</i>	90.35905	738.0552
<i>Coloeus</i>	89.95385	620.2	<i>Melopsittacus</i>	76.72143	479.0607	<i>Taeniopygia</i>	85.98208	737.4849

<i>monedula</i>			<i>undulatus</i>			<i>guttata</i>		
<i>Columba livia</i>	108.9351	694.9982	<i>Melospiza georgiana</i>	133.519	694.4871	<i>Tauraco erythrolophus</i>	105.7792	686.908
<i>Corapipo altera</i>	90.87727	651.0636	<i>Melospiza melodia</i>	179.936	614.7478	<i>Theristicus caerulescens</i>	109.7333	700.6975
<i>Corvus brachyrhynchos</i>	85.10826	564.3651	<i>Melozone crissalis</i>	240.0794	714.4922	<i>Trogon surrucura</i>	103.5171	710.2291
<i>Corvus cornix</i>	91.47282	611.3359	<i>Merops nubicus</i>	91.0487	800.4652	<i>Tympanuchus cupido</i>	97.53061	790.4878
<i>Corvus hawaiiensis</i>	95.07565	653.3617	<i>Molothrus ater</i>	94.35963	711.3229	<i>Tyto alba</i>	101.7248	846.6256
<i>Corvus kubaryi</i>	88.59906	595.2925	<i>Motacilla alba</i>	94.1514	698.1981	<i>Vidua chalybeata</i>	90.05556	803.7102
<i>Corvus moneduloides</i>	91.57117	623.2523	<i>Myiopsitta monachus</i>	88.44188	641.8205	<i>Vidua macroura</i>	87.39286	799.0384
<i>Coturnix japonica</i>	96.95591	846.0323	<i>Myiozetetes cayanensis</i>	96.4287	714.3306	<i>Zonotrichia albicollis</i>	84.71238	622.9476
<i>Crossoptilon mantchuricum</i>	94.53069	816.2614	<i>Neopelma chrysocephalum</i>	95.00702	627.4298			
<i>Cuculus canorus</i>	90.79831	584.5449	<i>Nestor notabilis</i>	86.79333	558.68			



**Table S8. Pairwise *p*-values of Z-DNA number in different regions upstream from a start codon.**

	1 kb	2 kb	3 kb	4 kb	5 kb	6 kb	7 kb	8 kb	9 kb
2 kb	0.02372	-	-	-	-	-	-	-	-
3 kb	9.3e-14	1.2e-05	-	-	-	-	-	-	-
4 kb	< 2e-16	9.2e-14	9.3e-05	-	-	-	-	-	-
5 kb	< 2e-16	8.9e-14	5.3e-07	0.99420	-	-	-	-	-
6 kb	< 2e-16	< 2e-16	6.6e-14	0.00073	0.02947	-	-	-	-
7 kb	< 2e-16	< 2e-16	1.1e-13	4.1e-06	0.00050	0.98925	-	-	-
8 kb	< 2e-16	< 2e-16	7.6e-14	0.00200	0.06103	1.00000	0.95743	-	-
9 kb	< 2e-16	< 2e-16	7.8e-14	0.00234	0.06808	1.00000	0.94894	1.00000	-
10 kb	< 2e-16	< 2e-16	9.8e-14	2.6e-07	5.1e-05	0.88065	0.99998	0.75715	0.73347