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附录1　普氏原羚线粒体片段PCR扩增引物序列与反应条件

Appendix 1　Primer sequences and PCR reaction conditions for amplification of mitochondrial fragments in Przewalski’s gazelle

片段 Fragments	引物与序列 Primers & sequences	退火温度 Annealing temperature (℃)
Cyt *b*	F: TACCATGAGGACAAATATCCTTCTG	51
	R: CCTCCTAGTTTGTTGGGGATTGATCG	
12S rRNA	F: AAACTGGGATTAGATACCCCACTAT	51
	R: GAGGGTGACGGGCGGTGTGT	
16S rRNA	F: GCCTGTTTACCAAAAACAT	51
	R: CCGGTCTGAACTCAGATCACGT	
D-loop	F: CTATCAACACCCAAAGCTGA	50
	R: CAGTTAAGTCCAGCTACAAT	

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附录2　普氏原羚微卫星位点PCR扩增引物序列与反应条件

Appendix 2　Primer sequences and PCR reaction conditions for amplification of microsatellite loci in Przewalski's gazelle

位点 Loci	引物与序列 Primers & sequences	退火温度 Annealing temperature (°C)
PR-6	F: AGCTAGACCCTAAATCCTTGTGT R: ACTCCTCTCACGTCTTCAGC	60
PR-8	F: ACTTGGGGAAATCTCAAAAGTCT R: GGCAAAAGCCTTAGAGAAATGC	60
PR-12	F: TCCCCATTACCACACCTAAGT R: ACATCCAGGAGAGTGTCAGC	60
PR-14	F: AGATGAACTGCTCTGGGAAG R: AATGGGAAAGTATGAAAGGCA	60
PR-25	F: CCAAGAGTGAAGTTGTGCCA R: AACCAAGTGCTCTGTTTCAG	63
PR-28	F: ACCCAATTCGAGCTTCCAG R: TGTACTAGTTTTCCAGAGCTGC	63
PR-30	F: ATTCTCTGGGCCATCTGTG R: CACTGCTGGAATGGTCAAGG	63
PR-40	F: CCGTTCTCCAGGGGAATCTT R: TTCACAGGGCCTTCAGAAAC	60
PR-46	F: CTCTGTCCTCCGCTGTCTC R: CAAATTGCCTTGTCCCTGCC	60
PR-53	F: TCCCTGATCTGTAACAAATGTG R: CCTTAGCGTCACACACACAG	57
PR-58	F: CAGAGTCGGTCATGATGGGA R: TGCTTCCGACCAAGTGTTTG	63
PR-63	F: GGGGCATCACAATTCCATTCT R: TCCAACTTTCAGACCATAAATCC	63
PR-65	F: GGCAAGTGAGGTGATGAAGC R: TGGCCTTCTAGAGTTGTTTTGC	63
PR-69	F: AGCAATGAAGACCAGCATAACC R: CCCATCAATCTTTGCAGTCCC	63
PR-71	F: TTTGCTGCCTCGACAAACAG R: TCCCGCATTACAAGCAGATTC	63
PR-72	F: TGGTTCTGTACAAGCTTCAG R: CAGTCTGGATTGAGGGGTCT	63
PR-85	F: GTTCCAAGCTAAGCATTAAGGC R: GGGAACACATGTACACCCGT	60
PR-86	F: CGCTTTACCATCTCAGCCAC R: AGTCATCCATCGGTCCATGT	60

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附录3 微卫星位点的个体识别效力评估

Appendix 3 Evaluation of individual identification power for microsatellite loci

位点 Locus	单一位点匹配概率 *PID*	单一位点同胞匹配概率 PID_{sibs}	累积匹配概率 Cumulative *PID*	累积同胞匹配概率 Cumulative PID_{sibs}
PR-14	0.026225	0.316293	2.6E–02	3.2E–01
PR-30	0.072951	0.372784	1.9E–03	1.2E–01
PR-40	0.073557	0.372028	1.4E–04	4.4E–02
PR-58	0.240651	0.524380	3.4E–05	2.3E–02
PR-85	0.163386	0.458185	5.5E–06	1.1E–02
PR-25	0.098137	0.399290	5.4E–07	4.2E–03
PR-8	0.151581	0.441031	8.2E–08	1.9E–03
PR-46	0.106251	0.410714	8.7E–09	7.6E–04
PR-53	0.179545	0.461641	1.6E–09	3.5E–04
PR-65	0.062243	0.360320	9.8E–11	1.3E–04
PR-71	0.130314	0.426311	1.3E–11	5.4E–05
PR-6	0.112248	0.405962	1.4E–12	2.2E–05
PR-12	0.127841	0.425514	1.8E–13	9.3E–06
PR-28	0.094244	0.391786	1.7E–14	3.7E–06
PR-42	0.149953	0.443001	2.6E–15	1.6E–06
PR-63	0.105225	0.414255	2.7E–16	6.7E–07
PR-69	0.122648	0.424856	3.3E–17	2.9E–07
PR-72	0.145811	0.446187	4.9E–18	1.3E–07
PR-86	0.142290	0.457761	6.9E–19	5.8E–08

PID: 个体匹配概率; PID_{sibs}: 同胞匹配概率。

PID, Probability of identity for individuals; PID_{sibs}, Probability of identity for siblings.

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附录5　普氏原羚mtDNA单倍型在各地理种群中的分布

Appendix 5　Distribution of mtDNA haplotypes among geographic populations of Przewalski's gazelle

单倍型 Haplotypes	种群 Populations					总计 Total
	HN	HE	GH	TJ	ND	
Hap 01	5	6	8	2	1	22
Hap 02	56	13	1	8	12	90
Hap 03	23	4	0	0	0	27
Hap 04	1	0	0	0	0	1
Hap 05	1	0	0	0	0	1
Hap 06	3	0	0	0	0	3
Hap 07	2	0	0	1	0	3
Hap 08	2	0	0	0	0	2
Hap 09	11	0	0	0	0	11
Hap 10	1	0	0	0	0	1
Hap 11	2	4	0	0	0	6
Hap 12	15	0	0	0	0	15
Hap 13	1	0	0	0	0	1
Hap 14	2	0	0	0	0	2
Hap 15	1	0	0	0	0	1
Hap 16	1	0	0	0	0	1
Hap 17	2	0	0	0	0	2
Hap 18	2	0	0	0	0	2
Hap 19	5	0	1	1	0	7
Hap 20	15	0	0	0	0	15
Hap 21	1	0	0	0	0	1
Hap 22	1	0	0	0	0	1
Hap 23	1	0	0	0	0	1
Hap 24	1	0	0	0	0	1
Hap 25	1	0	0	0	0	1
Hap 26	1	0	0	0	0	1
Hap 27	2	0	0	0	0	2
Hap 28	1	0	0	0	0	1
Hap 29	1	0	0	1	0	2
Hap 30	2	0	0	0	0	2
Hap 31	1	0	0	0	0	1
Hap 32	2	0	0	0	0	2
Hap 33	1	0	0	0	0	1
Hap 34	1	0	0	0	0	1
Hap 35	1	0	0	0	0	1
Hap 36	2	0	0	0	0	2
Hap 37	2	0	0	0	0	2
Hap 38	1	0	0	0	0	1
Hap 39	1	0	0	0	0	1
Hap 40	1	0	0	0	0	1
Hap 41	1	0	0	0	0	1
Hap 42	0	2	0	0	0	2
Hap 43	0	1	0	0	0	1
Hap 44	0	2	3	7	0	12
Hap 45	0	1	0	0	0	1

单倍型 Haplotypes	种群 Populations					总计 Total
	HN	HE	GH	TJ	ND	
Hap 46	0	5	0	0	0	5
Hap 47	0	1	0	0	0	1
Hap 48	0	1	0	0	0	1
Hap 49	0	1	0	0	0	1
Hap 50	0	1	0	0	0	1
Hap 51	0	1	0	0	0	1
Hap 52	0	1	0	0	0	1
Hap 53	0	1	0	0	0	1
Hap 54	0	1	0	0	0	1
Hap 55	0	0	1	0	0	1
Hap 56	0	0	1	0	0	1
Hap 57	0	0	2	0	0	2
Hap 58	0	0	1	0	0	1
Hap 59	0	0	1	0	0	1
Hap 60	0	0	1	0	0	1
Hap 61	0	0	3	0	0	3
Hap 62	0	0	2	0	0	2
Hap 63	0	0	2	0	0	2
Hap 64	0	0	1	0	0	1
Hap 65	0	0	0	1	0	1
Hap 66	0	0	0	1	0	1
Hap 67	0	0	0	1	0	1
总计 Total	176	47	28	23	13	287

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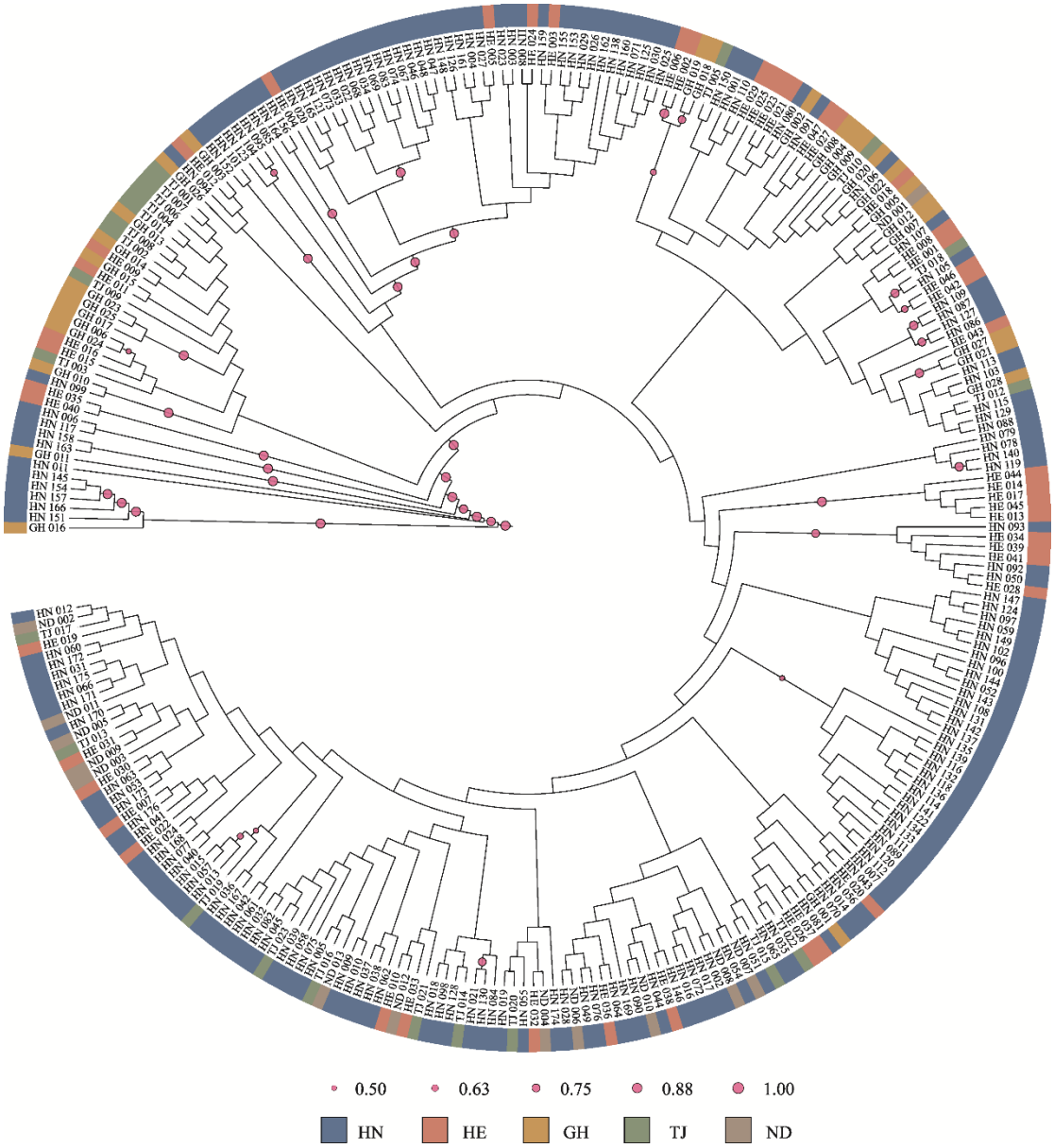

附录6　普氏原羚的最大分支置信度(MCC)树。外圈彩色条带对应个体所属的地理种群。HN: 青海湖北部种群; **HE**: 青海湖东部种群; **GH**: 共和种群; **TJ**: 天峻种群; **ND**: 乌岛种群。粉色圆点大小与分支后验概率值正相关。本树为无支长的分支图, 未展示支长差异。

Appendix 6　Maximum clade credibility (MCC) phylogenetic tree of *Procapra przewalskii*. Colored strips at the outer ring denote the five geographic populations: HN, Northern Qinghai Lake; HE, Eastern Qinghai Lake; GH, Gonghe; TJ, Tianjun; ND, Niaodao. The size of pink dots at nodes is positively correlated with the posterior probability of each branch. This tree presented as a cladogram; therefore, branch lengths do not reflect genetic distance.

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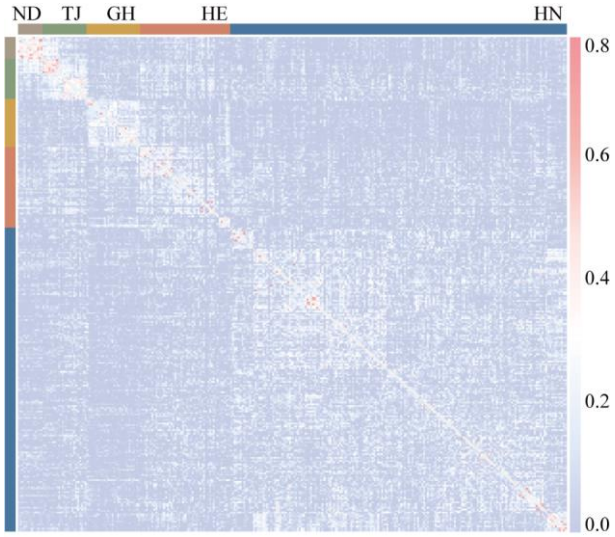

附录7　普氏原羚个体间的成对亲缘关系系数热图。行与列对应研究个体，顶部与左侧彩色条带对应5个地理种群：HN为青海湖北部种群，HE为青海湖东部种群，GH为共和种群，TJ为天峻种群，ND为鸟岛种群；色阶代表*r*值大小，颜色越红代表个体间亲缘关系越近。

Appendix 7　Heatmap of pairwise kinship coefficient between individuals of *Procapra przewalskii*. Rows and columns correspond to the individuals in the study, and the colored strips at the top and left correspond to the five geographic populations. Abbreviations: HN, northern Qinghai Lake population; HE, eastern Qinghai Lake population; GH, Gonghe population; TJ, Tianjun population; ND, Bird Island population. The color scale represents the value of *r*, the redder the color, the closer the kinship between individuals.

附录8　普氏原羚与其他近缘/受胁有蹄类动物群体遗传多样性参数比较

Appendix 8　Comparison of population genetic diversity parameters between Przewalski's gazelle and other closely related/threatened ungulates

物种 Species	单倍型多样性 Haplotype diversity (*Hd*)	核苷酸多样性 Nucleotide diversity (π)	观测杂合度 Observed heterozygosity (*Ho*)	期望杂合度 Expected heterozygosity (*He*)	濒危等级 Threat category	数据来源 Data source
普氏原羚 *Procapra przewalskii*	0.879	0.004	0.639	0.632	EN	*
普氏原羚 *Procapra przewalskii*	0.830	0.003	0.512	0.584	EN	Yu et al., 2017
蒙原羚 *Procapra gutturosa*	0.978	0.007	0.558	0.591	LC	Shi et al., 2023
藏原羚 *Procapra picticaudata*	0.975	0.105	0.752	0.789	NT	Zhang et al., 2013
藏羚 *Pantholops hodgsonii*	0.911	0.025	0.891	0.792	VU	Zhang et al., 2013
豚鹿 *Axis porcinus*	0.831	0.031	0.542	0.755	EN	Gupta et al., 2018
克什米尔麝 *Moschus cupreus*	0.906	0.005	0.445	0.764	EN	Sharief et al., 2025

本研究结果。 indicates the result of this study.

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