

Supplementary Materials

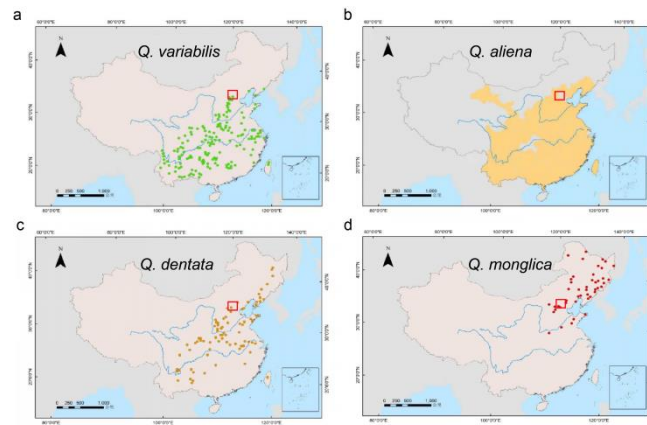


Figure S1. Distribution map of *Q. variabilis* (a), *Q. aliena* (b), *Q. dentata* (c) and *Q. mongolica* (d) respectively in China. The red squares represent Beijing area. This figure is modified from Wang et al.[28].

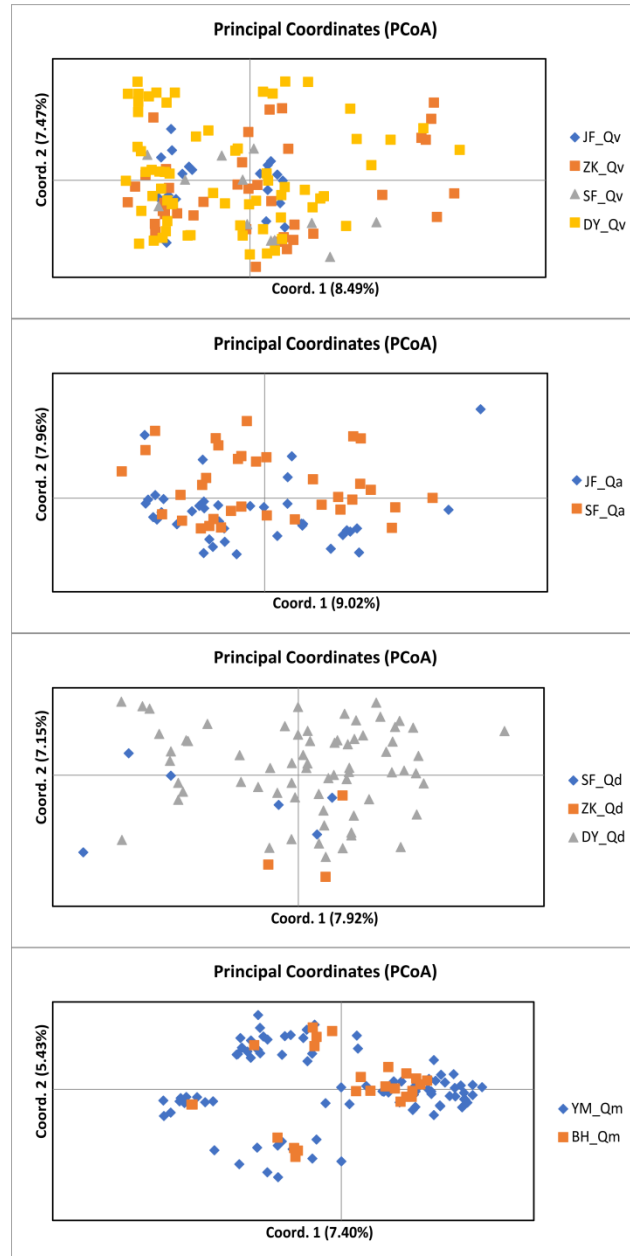


Figure S2. PCoA analysis of different populations within the same species. Different color and shape of the dots indicate the different populations.

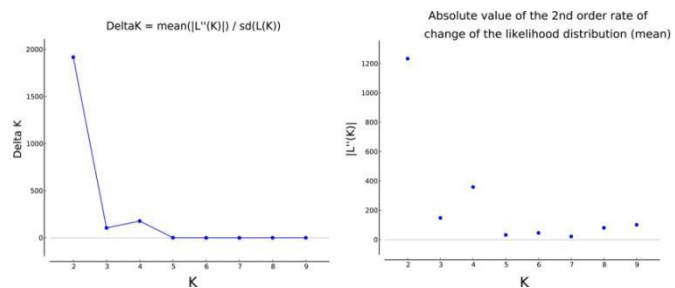


Figure S3. ΔK and $\ln PPK$ values are showed with blue dot. The values are calculated according to $K = 1$ to 10.

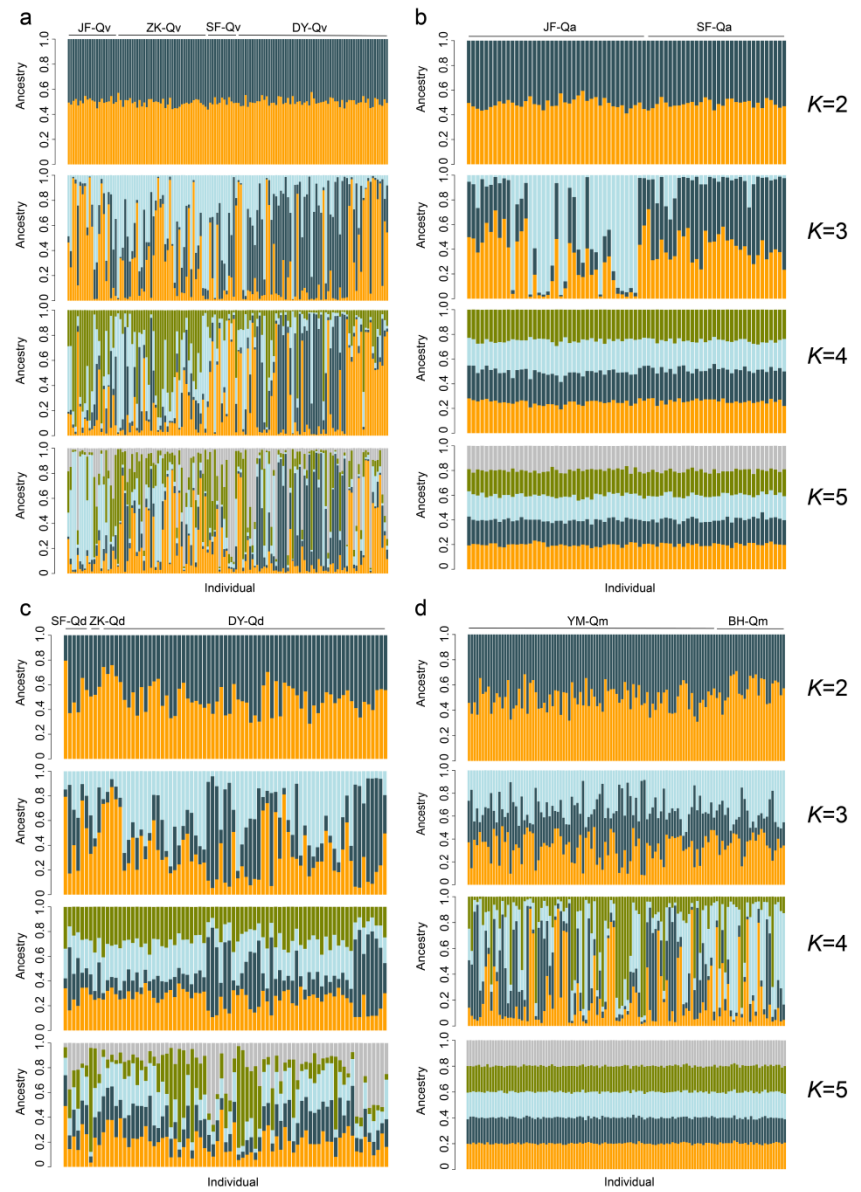


Figure S4. STRUCTURE analysis of 4 native oaks when $K = 2$ to 5. *Q. variabilis* (a), *Q. aliena* (b), *Q. dentata* (c) and *Q. mongolica* (d) respectively.

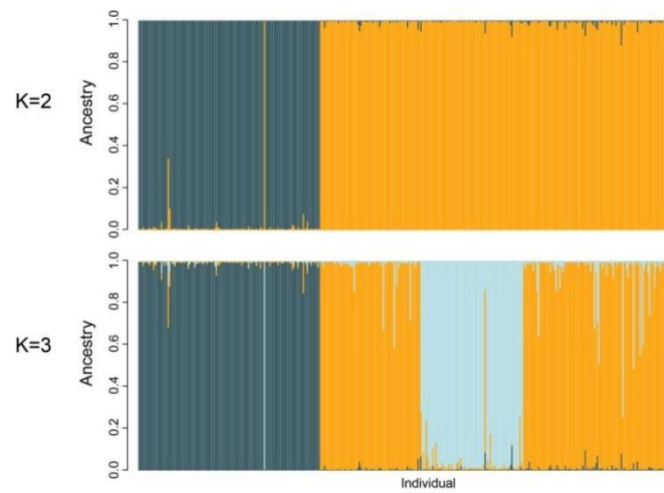


Figure S5. STRUCTURE analysis of populations when K = 2 and K = 3. Dark blue background shows *Q. variabilis* cluster.

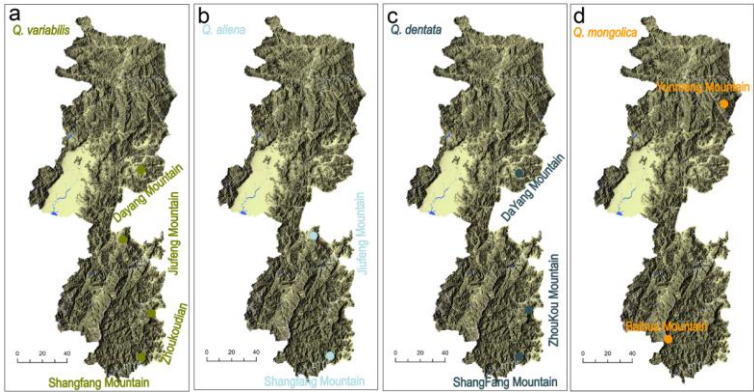


Figure S6. The sampling regions of four native oaks. *Q. variabilis* (a), *Q. aliena* (b), *Q. dentata* (c) and *Q. mongolica* (d) respectively.

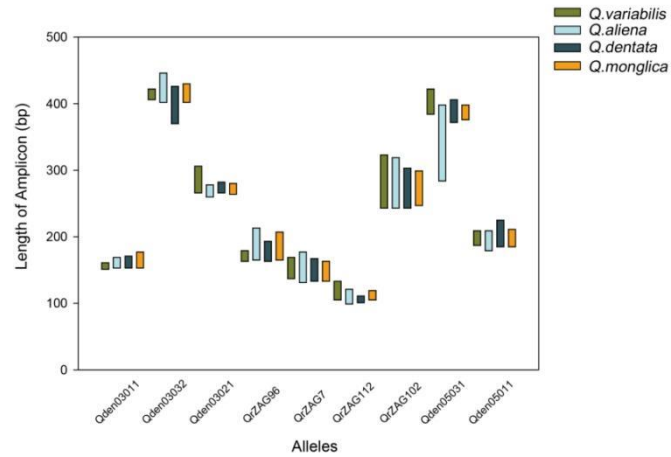


Figure S7. Length variety of the amplicons of each allele in different oak species. Green, blue, cyan and orange bars indicate length variety of each allele in *Q. variabilis*, *Q. aliena*, *Q. dentata* and *Q. mongolica* respectively.

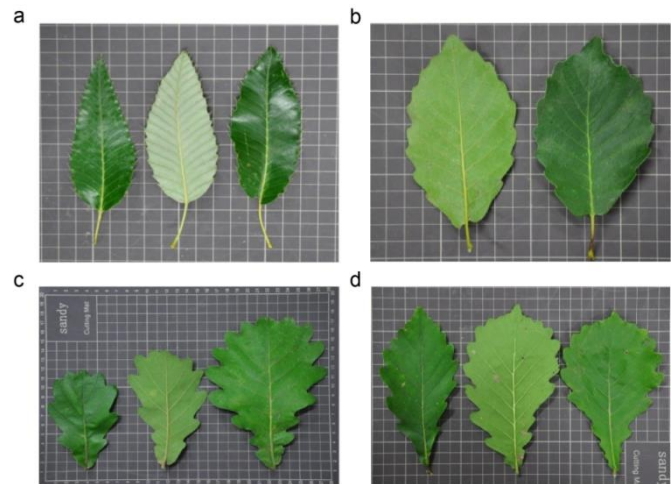


Figure S8. Leaf surface and back of *Q. variabilis* (a), *Q. aliena* (b), *Q. dentata* (c) and *Q. mongolica* (d) respectively.

Table S1. Main genetic parameters for the chosen 9 SSR primers.

Locus ¹	Na	Ne	Ho	He	I	F
QrZAG96	27	7.47	0.64	0.87	2.45	0.26
QrZAG102	38	22.37	0.59	0.96	3.28	0.38
QrZAG112	23	7.44	0.65	0.87	2.36	0.25
QrZAG7	24	12.02	0.82	0.92	2.71	0.10
Qden03011	13	7.75	0.72	0.87	2.18	0.17
Qden03032	20	7.30	0.39	0.86	2.34	0.55
Qden03021	13	5.31	0.47	0.81	1.83	0.43
Qden05011	24	8.77	0.76	0.89	2.41	0.14
Qden05031	33	5.74	0.45	0.83	2.35	0.46
Mean	23.9	9.35	0.61	0.87	2.43	0.30

¹Locus are the name of the 9 SSR markers. Na, Ne, Ho, He, I, F are main genetic parameters. Na: average number of alleles. Ne: number of effective alleles. Ho: observed heterozygosity. He: expected heterozygosity. I: Shannon's index. F: inbreeding coefficient.

Table S2. Sample information.

	<i>Q. variabilis</i>	<i>Q. aliena</i>	<i>Q. dentata</i>	<i>Q. mongolica</i>	Total
Dayang Mountain (40°18'50"N, 116°25'26"E)	65 (DY-Qv)	-	68 (DY-Qd)	-	133
Yunmeng Mountain (40°32'55"N, 116°41'18"E)	-	-	-	88 (YM-Qm)	88
Baihua Mountain (39°49'59"N, 115°34'43"E)	-	-	-	25 (BH-Qm)	25
Jiufeng (40°03'25"N, 116°04'55"E)	21 (JF-Qv)	39 (JF-Qa)	-	-	60
Shangfang Mountain (39°40'18"N, 115°48'59"E)	12 (SF-Qv)	35 (SF-Qa)	6 (SF-Qd)	-	53
Zhoukoudian (39°44'44"N, 115°54'3"E)	38 (ZK-Qv)	-	3 (ZK-Qd)	-	41
Total	136	74	77	113	400

¹Samples from Jiufeng are artificial populations.

Table S3. Information of the 9 SSR primers.

Primer Name	Primer Sequence (5' to 3')	Motif
QrZAG96-F	CCCAGTCACATCCACTACTGTCC	(TC)20
QrZAG96-R	GGTTGGGAAAAGGAGATCAGA	
QrZAG102-F	GCCTACACTCTTCAATCTACATGA	(GA)29
QrZAG102-R	GACTTGTAACACCTTAAGCATTATCT	
QrZAG112-F	TTCTTGCTTTGGTGCGCG	(GA)32
QrZAG112-R	GTGGTCAGAGACTCGGTAAGTATTC	
QrZAG7-F	CAACTTGGTGTTCCGGATCAA	(TC)17
QrZAG7-R	GTGCATTTCTTTTATAGCATTCAC	
Qden03011-F	AACCCAACCTTCCCTTCATC	(AG)8
Qden03011-R	GCAGTGGTGCTAATGTAGAC	
Qden03021-F	ACAGCAAACCAGACTCCAC	(AG)8
Qden03021-R	CCCCAAAGTTTCGGCTAATAC	
Qden03032-F	AGTTGTGGTCCTGCTCGC	(CT)12
Qden03032-R	GAAAAGTGCGATGACGGTTG	
Qden05011-F	CCCACTCCCTGTCCATTGT	(CT)8

Qden05011-R	CACTGTGTGCTGCGACTTG	
Qden05031-F	CCCCGATTGCGCCATCATTGT	
Qden05031-R	GTAACGCCGTTTTTCTCCACC	(GT)12

Table S4.DNA fingerprints of 400 samples.

Sample No.	DNA Fingerprint ¹
1	A167B125-129C139-143D249E155-157F268-270G406H187-195I400-410
2	A165-167B125-129C139-145D267-279E153-157F270-274G406H189-195I396-410
3	A165-167B119C139-169D245-247E153-157F268G406H195-199
4	A165-167B109-125C137-169E151-153F268G406H199
5	A167B111-117C137-139D267-275E153-155F270-272G406H189-197
6	A165-167B111-119C137-139E151-153F268G406-412H195
7	A165-167B109-119C137-159E151-153F268-272G406H195-199I396-400
8	A165-167B109-119C137-169D253E151-153F306G406H189-193I396-402
9	A165-167B119-129C143-169D259-269E153-155F270-274G406H189-195
10	A165-167B117-125C139-169D253E151-153F268G406H189-193
11	A165-167B119-125C139-169D279E153F266-268G406H189-199
12	A165-167B125-131C137-149D269-281E153F270G406H189I404-422
13	A167B111-121C137-147D277E155F270G406H187
14	A165-167B111C137-151E151-153F268-272G406H189-193I399
15	A165-167B119-125C137-139D249-271E153-155F268G406H189-199
16	A165-167B119-129C137-151D249-271E153F270-272G406H193-197I400
17	A167B125C137-141D245-247E151-155F266G406H189-193I400-404
18	A167B109-119C137-139D273E157-159F268G406H195I402-410
19	A165-167B109-131C139D247-273E151-155F266-270G406H189I422
20	A165-167B109-129C137-141D249-287E153-155F270G406H189-197
21	A165-167B117-131C139E151-155F266G406H189-199
22	A167B117-125C141-143D293-295E151F266-272G408H189-193I394-400
23	A165-167B109-122C139D291F272-274G416H187-195I400
24	B105-119C137-139D255E155F268H189-193
25	A165B115-125C139D247-289E153F266G406H195-205I420-422
26	A167B113-115C139D299E153-155F266-270G406H195-197
27	A167C139-143D251-261E153F268-272G408H187I404-412
28	A165-167C141-145E151-153F272G408H187-195I398-404
29	A167B113-125C141D245-247E151-153F266-270G408H189
30	A163-167B109-119C137-139D267-269E153F268G408-414H189-193
31	A165-167B123-125C137-139D257-277E153F266G406H189
32	A167C139-141D261-263E151-153G408-414H187-195I404
33	A165-167B127-129C137-151D251-273E153-155F268-272G406H189-197
34	A167B119-121C137-141D267-269E151-155F268-272G408H189I404-406
35	A165-167B119-133C137-139E155F270-272G406H193-195
36	A167B115-125C137-139D257-263E155F266G406H189-195
37	A167B111-129C139D247E155G408H189I400-410
38	A167B119-127D251-285E153F268G406H193-197I396-400
39	A167B109C137-139E151-155F268G406H193-195

40	A165-167B119-125C139-141D249E151F270-272G406H195
41	A167B109-121C137-139D251-257E155F268-272G406H195-197
42	A165-167B109-113C139-143D271-273E153-155F266-272G406H189-195I400-406
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44	A165B109-121C137-141D253E155-157F268-272G406H195I400-402
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46	A165-167B113-119C137-147D251-299E155-157F272G406H189
47	A165-167B113C137E153-155F270G406H195-199
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57	A167B109-129C139D247-251E155F266G406H189-193I406-408
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59	A167B109-125C143-149D255E155G406H187-189
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65	A167B121-125C137-139D255E151-153F270G406H187
66	A167-165B111-119C141-151D271-277E151-155F270G406H195I404-410
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73	A167B125C137D273-289E153-155F274G406H189-195I398-400
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133	A165-167B117C137D253-263E155F274G406-412H187-195
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153	A171-177B105C147D269-291E161F268-274G412H187-193I384
154	A173-179B105C155-157D265-269E161F268G412H193-203
155	A167-171B105C137-159D251E159-161F268-272G418H207-209I384-396
156	A175-177B105C157-159D251E155-161F268-282G412-418H187-195I384-386
157	A173-179B105C155-157D269-291E159-161F272G412H187-193
158	A171B105-109C141-147D255-265E159-167F272-274G410-412H193-203I382-390
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161	A173-179B105-109C155-157D263-265E159-161F272G412H191-203
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165	B105C137-147E161F268G414H189-193I386-400
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168	A171-173B105C143-147D279-285E161-163F270G412-418H195-201
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170	A173-177B105C135-157D275-285E157-161F268-270G412H195-207I396-396
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180	A173-177B105C135-137D275-283E161-165F268-274G412-414H193-199I386-390
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183	A165-173B105C151-157D301-303E165F268-278H193I384-390
184	A179-181B105C145-157D261E157-167F268-270G412H189-203I384-386
185	A167-173B105-111C153-157D259-265E163F268-272G412H193I380-384
186	A179-187B105C135-157D265E161-165G412-414H197I380
187	A181-189B105C149-159D257-265E159-167F268-270G414H187-213I386-390
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215	B105-107C133-143D287-289E157-161F268-272G418-422H197-203I384

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321	A165-185B113C149-153D273-275E163G412H187-189I385
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323	A167-195B111-117C149-153D293E155-159F268G414-426H189-197I382-386
324	A169-189B111-113C133-153D249E161-165F268G414-426H193I390-396
325	A167-173B105-111C157-161D257E157-163F268G410-410I382-382
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357	A165-175B109-113C149-153D251E157-161F270-278G412-416H197-199
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359	A165-181B109-111C143-145D257E157-163G410-418H187-189
360	A165-213B111C145-161D285-287E157-161F268-272H187-199I390
361	A165-213B111C147-155D253-257E155-159F268-274G410-418H187-189I384-392
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371	A175-181B107-113C137D253-285E157-161F268G420I384-386
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374	A167B111-113C137-145D293-295E161-163F268-274G422-430H191-195I388
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376	A167-179B107-109C141-149D285-287E161G420-426H199-203I388-390
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394	A165-181B105-111C141-157E159F270G412-418H187-199I386-384
395	A171-183B105C149-153D297E157-163F270G418-422H187-197I384-388
396	A169-171B101-109C147-157D251E159-165G412-418H191-195I386-388
397	A171-183B111-113C141-157D279E159-167F268-270G402-418H191-193I386-388
398	A171-175B115C141-147D283-297E155-157F268-270G420H199-205I286-396
399	A175-179B105-111C133-135D285-303E159-165F268-274G410-418H193I384-392
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¹Letters represent alleles: A: Qden03011; B: Qden03032; C: Qden03021; D: QrZAG96; E: QrZAG7; F: QrZAG112; G: QrZAG102; H: Qden05031; I: Qden05011. Samples 1~136 are *Q. variabilis*; 137~210 are *Q. aliena*; 211~287 are *Q. dentata*; 288~400 are *Q. mongolica*.