Genetic Relationships among Korean Brown Frog Species (Anura, Ranidae), with Special Reference to Evolutionary Divergences between Two Allied Species Rana dybowskii and R. huanrenensis

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Genetic Relationships among Korean Brown Frog Species (Anura, Ranidae), with Special Reference to Evolutionary Divergences between Two Allied Species Rana dybowskii and R. huanrenensis

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ABSTRACT—Allozyme analysis for 41 populations of brown frog species, *Rana dybowskii, R. huanrenensis*, and *R. amurensis* from Korea and three reference species (Chinese *R. chensinensis* and Japanese *R. dybowskii* and *R. tsushimensis*), were performed to clarify taxonomic status of Korean brown frogs. The level of average genetic differentiation (Nei's D) among local populations of each species in Korea was very low (D<0.012) and Korean and Japanese *R. dybowskii* also showed conspecific level of differentiation (D=0.070). Whereas, much larger, discrete genetic differences were detected in the interspecific comparisons (D>0.370). In the genetic relationships among five species examined, the 24 chromosome brown frogs (*R. dybowskii, R. huanrenensis*, and *R. chensinensis*) did not form a monophyletic group. *Rana dybowskii* with the chromosome number of 2n=24 was grouped together with *R. amurensis* with the chromosome number of 2n=26. The hypothesis of reversal change from 24 to 26 in Korean *R. amurensis* seems to better explain the phylogenetic relationships of east Asian brown frogs than the assumption of parallel reduction in chromosome number from 2n=26 to 24 in *R. dybowskii* and in the common ancestor of *R. huanrenensis* and *R. chensinensis*. The genetic, morphological, and reproductive divergences between Korean *R. dybowskii* and *R. huanrenensis* were compared.

Key words: allozyme, brown frog, chromosome number, genetic differentiation, phylogenetic relationship

INTRODUCTION

The Eurasian brown frogs are a morphologically conservative assemblage consisting of the Eurasian *Rana temporaria* and a large number of similar species considered to be related (Frost, 1985; Borkin and Kuzmin, 1988; Green and Borkin, 1993; Nishioka *et al.*, 1992; Maeda and Matsui, 1999). The chromosome number of great majority of *Rana* species is 26 and most of brown frog species have the same number. Some of brown frogs, however, are unique in having diploid chromosomes of 2n=24 (Matsui, 1991; Green and Borkin, 1993; Xie *et al.*, 1995). These 24 chromosome brown frogs include the European *R. arvalis* and several

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east Asian species allied to R. chensinensis, such as R. dybowskii, R. ornativentris, R. pirica, and R. huanrenensis (Kobayashi, 1962; Seto, 1965; Wu, 1982; Green, 1983; Luo and Li, 1985; Lee and Park, 1986; Ma, 1987; Wei et al, 1990; Liu et al., 1993; Green and Borkin, 1993; Xie et al., 1995; Lee and Lee, 1998). These east Asian brown frogs are quite similar in morphology, and are very difficult to identify (Nakamura and Ueno, 1963; Matsui et al., 1993, 1998; Xie et al., 1995; Yang et al., 2000). Indeed, most of them were originally described on the basis of slight morphological differences. Recently, taxonomic status of each species was made clearer by lines of additional information, such as considerable genetic divergences among them (Matsui, 1991; Green and Borkin, 1993; Tanaka-Ueno et al., 1998; Matsui et al., 1998; Kim et al., 1999; Yang et al., 2000). Although extensively studied in the laboratory (Kawamura et al., 1981), the direct evidence of reproductive isolation in the field among these allied species have never been reported

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because of their geographic isolation due to allopatric distribution.

Until recently, it has been reported that *R. dybowskii* (a 24 chromosome member) and *R. amurensis coreana* (a 26 chromosome member) are distributed in South Korea (Yang and Yu, 1978; Sengoku, 1979; Green and Borkin, 1993; Matsui *et al*, 1998). Most recently, we (Yang *et al.*, 2000) reported a new Korean brown frog member (*R. huanrenensis* Fei, Ye and Huang, 1990) which was morphologically and karyologically (2n=24) very similar to *R. dybowskii*.

In this study, we investigate the degree of inter- and intraspecific genetic variation and to clarify the genetic relationships among three species of Korean brown frogs. For comparisons, Japanese *R. dybowskii* and *R. tsushimensis* and Chinese *R. chensinensis* are also incorporated to the analysis. In addition, we surveyed the levels of morphological, genetic, and reproductive divergence between sympatricsamples of *R. dybowskii* and *R. huanrenensis* from South Korea.

MATERIALS AND METHODS

Collection and field notes

Five brown frogs were collected from 41 localities in Korea, Japan, and China (Table 1). During most collecting trips in Korea and Japan, the notes and photographs on color pattern of each specimen and records of each breeding site were taken.

Protein Electrophoresis

For an electrophoretic examination, a total of 849 specimens belonging to 41 populations of five species were employed. These include 10 populations of *Rana huanrenensis* from South Korea, 17 populations of *R. dybowskii* from South Korea and Japan, 2 populations of *R. chensinensis* from China, 11 populations of *R. amurensis* from South Korea, and 1 population of *R. tsushimensis* from Japan (Table 1).

Live samples were transported to the laboratory and were stored at -70° C until use. In the laboratory, the tissues of liver, heart and skeletal muscle were removed from each specimens and homogenized by glass homogenizer in an equal volume of distilled water and were centrifugated at 18,000 rpm for 30 min at 4°C to obtain the supernatant for electrophoresis. Voucher specimens were fixed in 10% formalin, preserved in 70% ethanol, and deposited in Yang's collection at Inha University. The supernatant was subjected to horizontal starch-gel (12%) electrophoresis and histochemical staining procedures (Yang *et al.*, 1997: Appendix I). Multiple loci were numbered sequentially, and alleles were designated alphabetically with "a" being the fastest migrant.

Individual genotypes were used to calculate allele frequencies for each population, these in turn were used to calculate matrices of genetic similarity (Rogers, 1972) and genetic distance (Nei, 1978). Three different methods were employed to infer relationships among populations. First, Nei's (1978) distance was clustered according to the UPGMA algorithm (Sneath and Sokal, 1973). Then, modified Rogers' distance (Wright, 1978) was analyzed by the Neighbor-joining (NJ) method (Saitou and Nei, 1987), and finally, we employed Felsenstein's (1993) DNAML procedure with allele frequencies for the maximum-likelihood (ML) analysis. These analyses were performed by use of BIOSYS-1 (Swofford and Selander, 1981) and PHYLIP vers. 3.5 C computer packages (Felsenstein, 1993).

Morphology

In order to detect morphological differences between Korean *Rana dybowskii* and *R. huanrenensis*, conditions of vocal sacs and the pattern of coloration on the body were examined for these two species.

RESULTS

Genetic variation and relationships among brown frogs

Genetic variation—By-products of 18 loci were scored from 13 enzymes and general proteins. Observed allelic frequencies are given in Appendix II.

Based on allelic frequencies listed in Appendix II, the degree of genetic variation of each population was estimated (Table 2). The genetic variability of R. dybowskii was P=26.0% (22.2-33.3%), Ho=0.118 (0.070-0.183), and He=0.122 (0.078-0.153). The genetic variabilities of R. huanrenensis and R. amurensis were P=22.2% (16.7-27.8%), Ho=0.063 (0.046-0.073), He=0.067 (0.058-0.081) and P=22.2% (5.6-33.3%), Ho=0.080 (0.029-0.120), He=0.086 (0.035-0.124), respectively. In Korean brown frogs, Kanseong population of R. dybowskii had the highest genetic variability (P=36.4%, Ho=0.165, He=0.165) while Koseong population of R. amurensis showed the lowest variability (P=9.1%, Ho=0.048, He=0.042). On the other hand, Chinese *R. chensinensis*, a reference species, showed P=22.3%, Ho=0.078, He=0.075. Another reference species Japanese R. tsushimensis, was more variable, with P=27.8%, Ho=0.094, He=0.097, than in Korean brown frog species.

Genetic relationships—Based on allelic frequencies listed in Appendix II, average genetic similarities (Rogers' S) and distances (Nei's D) among populations of five brown frog species were calculated (Appendix III). In the Korean brown frogs, *R. huanrenensis*, *R. dybowskii* and *R. amurensis*, the degree of genetic differentiation within a species was small (D=0.034: Appendix III), but differentiations among these Korean brown frogs were very distinct (D=0.584 between *R. huanrenensis* and *R. amurensis*, and D=0.500 between *R. dybowskii* and *R. amurensis*, and D=0.500 between *R. dybowskii* and *R. amurensis*) due mainly to *Gp-4, aGpd, Mdh*, and *Ldh-1* loci that were ascertained as diagnostic among these Korean species.

When populations of 24 chromosome species from outside of Korea were included, genetic dissimilarities between *R. huanrenensis* (populations 1–10; Appendix III) and *R. dybowskii* (pops. 11–30) included fixed allelic differences at *Gp-4, Mdh*, and *Iddh* loci and diagnostic differences at the 95% confidence level (Ayala and Powell, 1972) at *Ldh-1* locus. *Rana huanrenensis* and *R. chensinensis* (pops. 28 and 29) included fixed allelic difference at *Ldh-1* locus and diagnostic differences at *Iddh*, *Aat-1*, and *Acoh*. Fixed allelic differences at *Gp-4, Ldh-1, Mdh*, and *Iddh* and diagnostic differences at *Aat-1* were found between *R. dybowskii* and *R. chensinensis* (Appendix II). Among populations of three brown frog species with 24 chromosomes (Appendix III),

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Table 1. Collection localities, collection dates, and sample sizes (N) for electrophoretic and morphological analyses of *Rana huanrenensis, R. dybowskii, R. chensinensis, R. amurensis, and R. tsushimensis* from Korea, Japan, and China.

	Collection localities	Date	N
	Rana huanrenensis (2n=24)		
1.	Jangseong: Bukha-myon, Jangseong-gun, Chollanam-do	Mar. 29, 1995	27
2.	Pohang: Bokyung-sa, Pohang-shi, Kyongsangbuk-do	Apr. 25, 1997	28
З.	Cheongsong: Daejeon-sa, Cheongsong-gun, Kyongsangbuk-do	Mar. 28, 1997	3
4.	Yeongdeog: Namjung-myon, Yeongdeog-gun, Kyongsangbuk-do	Apr. 25, 1997	20
5.	Pyeongchang: Chinbu-myon, Pyeongchang-gun, Kangwon-do	May 19, 1994	;
6.	Hanso-ri: Hanso-ri, Bekjeon-myon, Jeongseon-gun, Kangwon-do	Apr. 27, 1995	29
7.	Oban-ri: Oban-ri, Dong-myon, Jeongseon-gun, Kangwon-do	Mar. 27, 1997	2
8.	Inje: Baekdam-sa, Buk-myon, Inje-gun, Kangwon-do	Apr. 14, 1995	
9.	Kapyeong: Hwaak-ri, Buk-myon, Kapyeong-gun, Kyonggi-do	Apr. 4, 1998	1
10.	Donghae: Bicheon-dong, Donghae-shi, Kangwon-do <i>R. dybowskii</i> (2n=24)	Feb. 26, 1998	3
11.	Yangpyeong: Yongmun-myon, Yangpyeong-gun, Kangwon-do	Apr. 3, 1997	1
12.	Cheongyang: Taechi-myon, Cheongyang-gun, Chungchongnam-do	Mar. 30, 1997	2
13.	Muju: Ansung-myon, Muju-gun, Chollabuk-do	Mar. 12, 1997	2
14.	Jangseong: Bukha-myon, Jangseong-gun, Chollanam-do	Mar. 29, 1995	3
15.	Kurye: Hwaom-sa, Kurye-gun, Chollanam-do	Mar. 6, 1994	1-
16.	Haenam: Masan-myon, Haenam-gun, chollanam-do	Mar. 16, 1997	1-
17.	Jeju: Sogwipo-shi, Jeju-do	Mar. 23, 1996	3
18.	Keoje: Shinhyun-up, Keoje-shi, Kyongsangnam-do	Mar. 15, 1997	2
19.	Hadong: Ssangkye-sa, Hadong-gun, Kyongsangnam-do	Mar. 15, 1997	2
20.	Yangsan: Naewon-sa, Yangsan-gun, Kyongsangnam-do	Mar. 10, 1995	2
21.	Donghae: Bicheon-dong, Donghae-shi, Kangwon-do	Mar. 21, 1997	2
22.	Inje: Baekdam-sa, Buk-myon, Inje-gun, Kangwon-do	Apr. 14, 1995	1-
23.	Kanseong: Kanseong-up, Koseong-gun, Kangwon-do	Apr. 15, 1995	
24.	Keojin: Keojin-up, Koseong-gun, Kangwon-do	Mar. 2, 1997	2
25.	Kapyeong: Hwaak-ri, Buk-myon, Kapyeong-gun, Kyonggi-do	Apr. 4, 1998	13
26.	Wonju: Chiak-Mt., Wonju-shi, Kangwon-do	May 23, 1997	1
27.	Tsushima Isl.: Tokoya, Tsushima-Isl., Nagasaki-pref., Japan <i>R. chensinensis</i> (2n=24)	Mar. 9, 1998	
28*.	Ningxia Hui: Yinnan-pref., Ningxia Hui-prov., China	—	
29*.	Qinghai: Haidong-pref., Qinghai-prov., China <i>R. amurensis</i> (2n=26)	—	
30.	Haenam : Masan-myon, Haenam-gun, Chollanam-do	Mar. 16, 1997	2
31.	Kangwha : Naega-myon, Kangwha-gun, Incheon	Apr. 4, 1997	3
32.	Sorae : Sorae, Shihung-shi, Kyonggi-do	May 22, 1995	
33.	Yangpyeong : Yongmoon-myon, Yangpyeong-gun, Kyonggi-do	Sep. 26, 1997	2
34.	Cheongju : Sangdang-dong, Cheongju-shi, Chungchongbuk-do	Mar. 12, 1997	3
35.	Yeongdong : Chupungryong-myon, Yeongdong-gun, Chungchongbuk-do	Sep. 28, 1997	3
36.	Cheongyang : Chongsan-myon, Cheongyang-gun, Chungchongnam-do	Mar. 29, 1997	3
37.	Yangsan : Changan-up, Yangsan-gun, Kyongsangnam-do	Mar. 10, 1995	(
38.	Kyeongju : Kangdong-myon, Kyeongju-shi, Kyongsangbuk-do	Jun. 20, 1997	3
39.	Kangnung : Yuchon-dong, kangnung-shi, Kangwon-do	Sep. 27, 1997	3
40.	Koseong : Keojin-up, Koseong-gun, Kangwon-do <i>R. tsushimensis</i> (2n=26)	Mar. 21, 1997	2
41.	Tsushima Isl.: Tokoya, Tsushima-Isl., Nagasaki-pref., Japan	Mar. 9, 1998	1(

* Part of frozen tissues (RM 5176, 5178, 5180, 5308, 5309, 5431, 5432, and 5435, and TP 19669 and 19670) deposited in the MVZ (Museum of Vertebrate Zoology, University of California, Berkely).

average genetic distances among local populations of a single species were low (D=0.008 in *R. huanrenensis*, D=0.005 in Korean *R. dybowskii*, D=0.070 in Korean and Japanese *R. dybowskii*, D=0.053 in *R. chensinensis*), whereas the average genetic distances among three species were distinctly high (D=0.584 between *R. huanrenensis* and *R.*

Table 2. Genetic variation of 41 populations in *Rana huanrenensis*, *R. dybowskii*, *R. chensinensis*, *R. amurensis* and *R. tsushimensis* from Korea, Japan, and China.

			Mean N	% Polymorphism	Mean Hete	erozygosity
	Population	Ν	of Alleles (N)	(P)	Observed (Ho)	Expected (He)
Rana hu	anrenensis					
1.	Jangseong	27	1.3	27.8	0.064	0.080
2.	Pohang	28	1.6	22.2	0.046	0.060
3.	Cheongsong	30	1.5	22.2	0.065	0.065
4.	Yeongdeog	26	1.4	22.2	0.073	0.060
5.	Pyeongchang	8	1.4	27.8	0.069	0.072
6.	Hanso-ri	29	1.6	16.7	0.050	0.058
7.	Oban-ri	29	1.6	16.7	0.073	0.066
8.	Inje	7	1.3	22.2	0.063	0.081
9.	Kapyeong	16	1.4	27.8	0.066	0.066
10.	Donghae	30	1.6	16.7	0.063	0.058
R. dybov	vskii					
11.	Yangpyeong	16	1.7	22.2	0.108	0.113
12.	Cheongyang	21	1.9	22.2	0.138	0.120
13.	Muju	21	1.8	22.2	0.116	0.131
14.	Jangseong	33	2.0	22.2	0.121	0.131
15.	Kurye	14	1.6	27.8	0.095	0.117
16.	Haenam	14	1.4	27.8	0.087	0.118
17.	Jeju	30	1.4	22.2	0.070	0.078
18.	Keoje	27	1.6	27.8	0.130	0.122
19.	Hadong	25	1.7	27.8	0.109	0.124
20.	Yangsan	29	1.8	27.8	0.111	0.125
21.	Donghae	29	1.9	22.2	0.113	0.109
22.	Inje	14	1.6	22.2	0.119	0.120
23.	Kanseong	7	1.5	27.8	0.183	0.153
24.	Keojin	28	1.9	33.3	0.129	0.135
25.	Kapyeong	13	1.7	27.8	0.120	0.123
26.	Wonju	10	1.6	33.3	0.133	0.126
27.	Tsushima Isl.	1	_	-	_	_
R. chens	inensis					
28.	Ningxia	5	1.2	16.7	0.078	0.067
29.	Quing	5	1.3	27.8	0.078	0.083
R. amure	ensis					
30.	Haenam	26	1.4	16.7	0.068	0.070
31.	Kangwha	30	2.1	33.3	0.107	0.115
32.	Sorae	5	1.2	16.7	0.067	0.057
33.	Yangpyeong	20	1.6	33.3	0.094	0.100
34.	Cheongju	30	1.6	27.8	0.100	0.103
35.	Yeongdong	30	1.6	22.2	0.083	0.082
36.	Cheongyang	30	1.7	27.8	0.089	0.108
37.	Yangsan	6	1.5	33.3	0.120	0.124
38.	Kyeongju	35	1.7	22.2	0.076	0.084
39.	Kangnung	30	1.3	16.7	0.044	0.058
40.	Koseong	25	1.2	5.6	0.029	0.035
R. tsushi	•	_0		0.0		2.000
41.	Tsushima Isl.	10	1.3	27.8	0.094	0.097

dybowskii, D=0.386 between *R. huanrenensis* and *R. chensinensis*, and D=0.485 between *R. dybowskii* and *R. chensinensis*).

Between Korean *R. amurensis* (pops. 30–40) and Japanese *R. tsushimensis* (pop. 41), both with 26 chromosomes, genetic dissimilarities included fixed allelic differ-



Fig. 1. A UPGMA tree (A), a neighbor-joining tree (B), and a maximum-likelihood tree (C) among a total of 41 populations of *Rana huanrenensis* (Rh), *R. dybowskii* (Rd), *R. chensinensis* (Rc), *R. amurensis* (Ra), and *R. tsushimensis* (Rt). For population number, refer to Table 1. Nodal values on the UPGMA tree (A) indicate percent support for branches in 100 bootstrap replicates.

ences at *Got-1*, *Gp-4*, *Idh*, *Sod*, *Ldh-1*, and *Ldh-2* loci and diagnostic differences (at the 95% confidence level) at *Mdh*, *Pgm-1*, and *Pgm-2* loci (Appendix II). The average genetic differentiation among these two 26 chromosome species were distinctly high (mean D=0.935).

Fig. 1A shows the UPGMA tree based on Nei's unbiased genetic distance. Although the bootstrap support for most of the nodes, except for monophyly of each species (not shown in the figure), was weak, *Rana tsushimensis* exhibited the earliest divergence among all populations examined. The remaining populations were divided into two distinct groups; One group included *R. huanrenensis* and *R.* *chensinensis*, and the other included *R. dybowskii* and *R. amurensis*. Topologies of NJ (Fig. 1B) and ML (Fig. 1C) trees based on modified Rogers' distance and allele frequenicies, respectively, were similar to that of UPGMA tree in that *R. tsushimensis* first diverged and *R. amurensis* and *R. dybowskii*, and *R. chensinensis* and *R. huanrenensis*, respectively, formed a separate subcluster.

Comparisons between *R. dybowskii* and *R. huanrenensis*

Morphology—Intraspecific morphological variation was much less notable than interspecific one. *Rana huanrenen*-

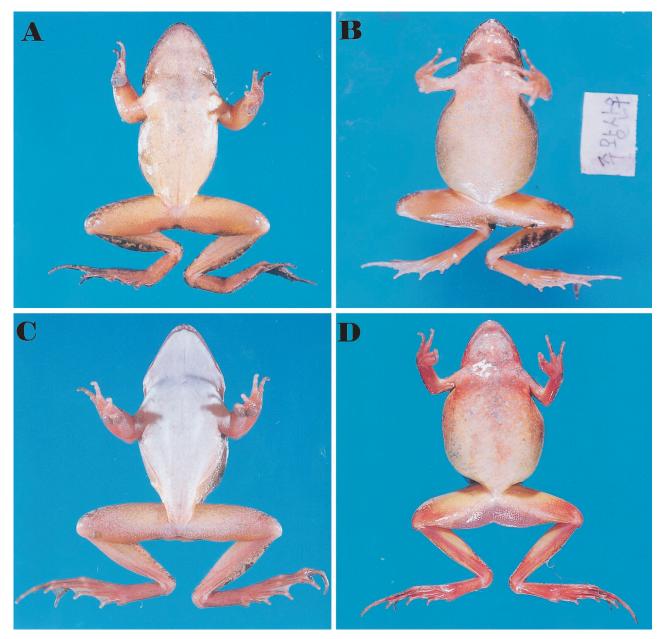


Fig. 2. Ventral views of *Rana huanrenensis* (A and B) and *R. dybowskii* (C and D) from South Korea in breeding season showing the grayshyellow throat and chest of male *R. huanrenensis* (A) compared to the milky-white throat and chest of male *R. dybowskii* (C) and the greenishyellow throat and chest of female *R. huanrenensis* (B) compared to the reddish-yellow throat and chest of female *R. dybowskii* (D).

Characters	Rana huanrenensis	Rana dybowskii
Female ventral color	minute black dots densely distrib- uted over throat and yellowish green chest	red color patched over throat and chest
Egg mass nature	relatively small and tightly clustered	relatively large and loose
Egg deposition	egg mass attached on the sub- merged rock in montane streams	egg mass floating on still water mainly in rice field

Table 3. Morphological and ecological diagnostic characters between *Rana huanrenensis* and *R. dybowskii* in breeding season

sis was morphologically very similar to *R. dybowskii*, but differs from the latter in the ventral color pattern (Fig. 2). In males, *R. dybowskii* had a milky white ground (Fig. 2C), whereas the ground color of male *R. huanrenensis* was yellowish gray with minute black dots densely distributed over the throat and chest (Fig. 2A). In the breeding season, females of *R. huanrenensis* had throat and chest covered with yellowish green (Fig. 2B), whereas in females of *R. dybowskii*, the red color patched over the throat and chest, which color turned to black patches in alcohol (Fig. 2D). In addition to these differences in coloration, male *R. dybowskii* had paired internal vocal sacs, while male *R. huanrenensis* lacked vocal sacs.

Protein electrophoresis — R. huanrenensis and R. dybowskii showed a discrete genetic difference (Nei's D=0.585: Appendix III) and no evidence of gene flow between these two species was found in the sympatric areas surveyed (Jangseong, Inje, Kapyeong, and Donghae; see Table 1, Appendix II).

Ecological notes—*R. huanrenensis* is sympatric with *R. dybowskii* in some parts of South Korea such as Tonghae, Inje, Jangseong, and Kapyeong (see Table 1), and therefore, ecological comparison of the two species is pertinent. *R. dybowskii* altitudinary ranges very wide, from plains to montane regions, where they breed in still waters in rice fields and small pools in early spring. On the other hand, *R. huanrenensis* occurs only at valley in relatively high montane regions, where the species spawn on the rocks in streams. Eggs of the species laid in relatively small and tightly clustered egg mass, and each egg mass is attached on the submerged rock in small streams in early spring (Table 3).

DISCUSSION

The Eurasian brown frogs are very difficult to classify (Matsui, 1991; Green and Borkin, 1993; Tanaka-Ueno *et al.*, 1998). Especially, members with 24 chromosomes are morphologically quite similar to each other and have a complicate taxonomic history, but now, taxonomic status of each member is made more clear than before by the presence of distinct genetic divergences among them (Matsui, 1991; Green and Borkin, 1993; Tanaka-Ueno *et al.*, 1998; Matsui *et al.*, 1998; Kim *et al.*, 1999). It has long been known that the frogs with 24 chromosomes include several east Asian

species allied to *R. chensinensis*, such as *R. ornativentris*, *R. dybowskii*, *R. pirica*. However, it has been known recently that *R. huanrenensis*, originally described from China (Fei *et al.*, 1990), is also a member of this group (Xie *et al.*, 1995) and co-occurs with *R. dybowskii* in South Korea (Yang *et al*, 2000). Before this finding, *R. huanrenensis* has been known only from the type locality, Huanren County, Liaoning Province, China for nearly 10 years. The significant range extention to Korea was recorded from localities that were well-known for the presence of *R. dybowskii* (Yang *et al.*, 2000).

In South Korea, *R. huanrenensis* has been misidentified as *R. dybowskii* because of difficulties in identification. However, as shown in the present study, *R. huanrenensis* is actually well differentiated morphologically from *R. dybowskii* chiefly by the ventral color pattern. Moreover, males of these two species clearly different in the presence or absence of vocal sacs.

Since the separation of gene pools is the essence of species formation, a study of speciation must involve the examination of the level of reproductive isolation between the taxa compared. Allozymic analysis has been used extensively for such an examination at the zones of sympatry, and the contact zones of amphibian species that are problematic in taxonomic status (Wake et al, 1980; Yang and Park, 1988; Yang et al, 1988, 1997; Good, 1989). In our result, genetic divergence between R. huanrenensis and R. dybowskii included fixed allelic differences at Gp-4, Mdh, and Iddh loci, and these three loci are diagnostic genetic markers to identify them. No evidence of gene flow between these two species was found at the zone of sympatry. R. huanrenensis and R. dybowskii are completely isolated reproductively by their microhabitats, especially of the spawning site, and breeding habits. Particularly, the different condition of vocal sacs in males of the two species means the presence of clear differences of mating signals between them.

The east Asian brown frogs include two chromosomal groups (Kuramoto, 1979; Nishioka *et al.*, 1986; Matsui, 1991; Green and Borkin, 1993). *R. dybowskii, R. huanrenensis*, and *R. chensinensis* have 2n=24 chromosomes, while *R. amurensis* and *R. tsushimensis* have 2n=26 (Lee and Park, 1986; Nishioka *et al.*, 1986; Xie *et al.*, 1995; Yang *et al.*, 2000). It is generally believed that the fundamental chromosome number in *Rana* is 2n=26 (Morescalchi, 1973;

Wilson et al., 1974; Kuramoto, 1979, 1989; Schmid, 1980; Green, 1983; Park, 1990). From the study of R. dybowskii, Green (1983) proposed that the karyotypes with 24-chromosomes could have arisen in east Asia, based on the location of secondary constrictions and chromosome bands. Meanwhile, from the banding patterns of Eurasian and North American brown frogs, Nishioka et al. (1986, 1987) similarly suggested the chromosome number reduction from 2n=26 to 2n=24. Chromosome evolution through reduction in number resulted from inversion/fusion has also been reported in other anuran species (King, 1990; Bogart and Tandy, 1981; Blommers-Schlosser, 1978). Considering this pattern of chromosome evolution as a single event, it could be presumed that the species with putative derived chromosome number (2n=24) form a monophyletic group. However, our results indicate that R. dybowskii with 2n=24 is genetically closer to R. amurensis with 2n=26 (D=0.500) than to R. huanrenensis (D=0.584) or to R. chensinensis (D=0.584) both with 24 chromosomes. Reflecting this situation, R. amurensis did not form a cluster, but was included in a cluster containing other brown frogs with 24 chromosomes in all the three trees we obtained.

These results imply that the interspecies relationships incidental to the chromosomal evolution are not in accordance with relationship inferred from genetic analyses. In view of our results, two assumptions of chromosomal evolution in brown frogs around Korea would emerge. One possibility is that the chromosome number reduction has evolved independently at least two times (parallel reduction in chromosome number from 2n=26 to 24). Namely, R. tsushimensis first differentiated from the common stock of brown frogs around Korea with 2n=26 chromosomes. Subsequently, through a reduction of primary chromosome number, divergence of an ancestor of the R. huanrenensis and R. chensinensis lineage (2n=24) occured from an ancestral species (2n=26) common to the Korean R. amurensis and R. dybowdkii lineage. Finally, speciation of R. dybowskii (2n=24) and Korean R. amurensis (2n=26) occurred while also accompanying a secondary chromosome number reduction in the R. dybowskii lineage.

Another possibility is that the common ancestor of all these four species, after diverged from *R. tsushimensis*, reduced the chromosome number from 26 to 24 before the separation of the *R. huanrenensis* and *R. chensinensis* lineage and the Korean *R. amurensis* and *R. dybowskii* lineage. Subsequent speciation of the latter lineage would have included the reversal change in chromosome number from 24 to 26 in Korean *R. amurensis*.

It is yet to be surveyed which of these two assumptions is more probable, but the first assumption parallels with the idea proposed by Green and Borkin (1993) or Nishioka *et al.* (1992) that *R. arvalis* with 2n=24 chromosomes is paraphyletic with east Asian brown frogs having the same 2n=24 chromosomes. However, there are strong disagreements between Green and Borkin (1993) and Nishioka *et al.* (1992). Green and Borkin (1993) suggested parallel reduction to 2n=24 in European *R. arvalis* and all east Asian species including *R. dybowskii*, but according to Nishioka *et al.* (1992), all east Asian brown frogs with 26 chromosomes, excepting *R. tsushimensis* but including *R. amurensis* and even European *R. temporaria*, have that number as a result of reversal change in chromosome number from 24 to 26.

The second assumption more conforms to Green and Borkin (1993) or Tanaka-Ueno *et al.* (1998). These authors considered Japanese *R. ornativentris*, with 24 chromosomes, represents the sister group of other east Asian species having 24 chromosomes. Including *R. ornativentris*, "the parallel chromosome number reduction" hypothesis needs three steps (reductions in *R. ornativentris*, *R. dybowskii*, and the *R. huanrenensis* and *R. chensinensis* lineage), but "reversal change in Korean *R. amurensis*" requires only two steps (one reduction in the common ancestor of all species with 24 chromosomes and one reversal in Korean *R. amurensis*).

Moreover, later divergence of *R. amurensis* among east Asian brown frogs, suggested by our result and Nishioka et al. (1992), strongly contradicts to the idea proposed by Green and Borkin (1993) from allozyme analyses and by Tanaka-Ueno et al. (1998) from the analyses of mitochondrial DNA. Both of these reports suggested the earliest divergence of Russian R. amurensis among east Asian brown frogs. Interestingly, Korean and Russian R. amurensis exhibit different degree of genetic differentiation between *R. dybowskii*; The genetic differentiation between Korean *R.* dybowskii and R. amurensis we obtained in the present study (D=0.500) was intermediate between those reported between Korean R. dybowskii and Russian R. amurensis (D=0.874) by Green and Borkin (1993) and between R. dybowskii from Tsushima and R. amurensis from Mongolia, China, and Russia (D=0.304-0.311) reported by Nishioka et al. (1992).

These genetic inconsistencies of Korean and Russian *R. amurensis* suggest a distinct taxonomic status of each population. In order to clarify the problem of chromosome number change, as well as the relationships of local populations of *R. amurensis*, more extensive studies including many more taxa from regions surrounding Korea are strongly required.

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Appendix I. Buffer systems and enzymes for the analysis of horizontal starch gel electrophoresis

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Buffer System	E. C. No.*	Enzyme	Condition
Continuous tris citrate II (pH 8.0)	2.7.3.2	Creatine kinase (<i>Ck-1,2</i>)	100V/3 hrs
	1.1.1.42	Isocitrate dehydrogenase (Idh)	
	5.4.2.2	Phosphoglucomutase (Pgm-1,2)	
	1.1.1.14	lditol dehydrogenase (Iddh)	
	3.4.11.1	Leucine amino-peptidase (Lap)	
LiOH (pH 8.1)	N. S.**	General protein (Gp-3,4)	250V/3 hrs
	1.1.1.37	Malate dehydrogenase (Mdh)	
Discontinuous tris citrate (pH 8.2)	2.6.1.1	Aspartate aminotransferase (Aat-1)	200V/3 hrs
	4.2.1.3	Superoxide dismutase (Sod)	
	1.15.1.1	Aconitate hydratase (Acoh)	
	1.1.1.27	Lactate dehydrogenase (Ldh-1,2)	
	5.3.1.8	Mannose-6-phosphate isomerase (<i>Mpi</i>)	
Tris maleic EDTA (pH 7.4)	1.1.1.8	Glycerol-3-phosphate dehydrogenase (G3pdh)	100V/4 hrs
	2.6.1.1	Aspartate aminotransferase (Aat-2)	

* E. C. No. : Enzyme commisson number

** N. S.: Non specific

Appendix II.	Allele frequencies of 41 populations in Rana huanrenensis, R. dybowskii, R. chensinensis, R. amurensis and R. tsushi-
mensis from k	orea, Japan, and China.

Loci					Rana hua	anrenensis	5				Ra	na dybow	skii
Loci	1	2	3	4	5	6	7	8	9	10	11	12	13
Acoh	b	a(0.02) b(0.98)	b	a(0.02) b(0.98)	b	b	b(0.96) c(0.02) d(0.02)	b	b	b	а	а	а
Ck-1	а	а	а	а	а	а	а	а	а	а	а	а	а
Ck-2	a(0.93) c(0.07)	а	а	а	а	а	а	а	а	а	а	а	а
Aat-1	h(0.91) j(0.09)	g(0.04) h(0.90) j(0.02) K(0.04)	h	h	h(0.81) j(0.06) K(0.13)	h	c(0.03) h(0.95) K(0.02)	h	h(0.94) j(0.06)	h(0.93) k(0.97)	b(0.03) c(0.03) h(0.59) i(0.03) j(0.06) k(0.26)	b(0.02) c(0.12) g(0.02) h(0.59) j(0.02) k(0.21) l(0.02)	c(0.12 h(0.57 j(0.02) k(0.29
Aat-2	b	b	b	b	a(0.06) b(0.94)	a(0.03) b(0.97)	b	a(0.07) b(0.93)	b	b	b	b	b
Gp-3	С	С	С	С	С	С	b(0.02) c(0.98)	С	С	с	c(0.97) d(0.03)	c(0.98) d(0.02)	a(0.05) c(0.95)
Gp-4	d(0.07) e(0.93)	d(0.05) e(0.95)	d(0.03) e(0.95) f(0.02)	d(0.04) e(0.96)	е	d(0.02) e(0.96) f(0.02)	е	е	е	е	а	a(0.91) c(0.09)	a(0.95) c(0.05)
G3pdh	b	b	b	b	b	a(0.02) b(0.98)	a(0.03) b(0.97)	b	b	a(0.05) b(0.92) d(0.03)	b(0.47) d(0.53)	b(0.43) d(0.57)	b(0.55 d(0.45
ldh	b	b	b(0.93) c(0.07)	b	b	b	b	b	b	b	b	b	b
Sod	С	С	с	с	С	С	С	с	c(0.97) d(0.03)	с	с	c(0.95) e(0.05)	c(0.95) e(0.05)
Lap	а	а	а	а	а	а	а	а	а	а	а	а	а
Ldh-1	е	d(0.02) e(0.98)	е	d(0.02) e(0.98)	е	d(0.03) e(0.95) f(0.02)	d(0.02) e(0.98)	е	d(0.06) e(0.94)	d(0.03) e(0.97)	b	b	b(0.98 c(0.02
Ldh-2	d	d	a(0.03) d(0.97)	a(0.08) d(0.92)	d	d	d	d	a(0.03) d(0.97)	a(0.02) d(0.98)	d	d	d
Mdh	d(0.46) f(0.48) g(0.06)	d(0.32) f(0.59) g(0.09)	d(0.32) f(0.56) g(0.12)	d(0.44) f(0.50) g(0.06)	d(0.19) f(0.62) g(0.19)	d(0.22) f(0.62) g(0.16)	d(0.12) f(0.60) g(0.28)	d(0.36) f(0.50) g(0.14)	d(0.25) f(0.69) g(0.06)	a(0.02) d(0.22) f(0.56) g(0.20)	a(0.06) c(0.94)	с	С
Mpi	d(0.70) e(0.30)	b(0.04) d(0.94) g(0.02)	b(0.02) d(0.98)	b(0.06) d(0.94)	b(0.06) d(0.94)	d(0.97) e(0.03)	d(0.97) e(0.03)	d	b(0.09) d(0.91)	d	b(0.06) d(0.19) e(0.53) f(0.06) g(0.16)	b(0.12) d(0.07) e(0.58) g(0.21) h(0.02)	b(0.05 d(0.09 e(0.50 g(0.31 h(0.05
Pgm-1	b	b(0.96) c(0.04)	b(0.87) c(0.13)	b(0.94) c(0.06)	a(0.06) b(0.94)	b	b	b(0.93) c(0.07)	b	a(0.02) b(0.98)	с	С	b(0.09) c(0.91)
Pgm-2	b	b	b	b	b	b	b	b(0.43) c(0.57)	b	b(0.98) c(0.02)	с	С	b(0.02) c(0.98)
lddh	е	е	d(0.02) e(0.98)	е	е	d(0.09) e(0.91)	d(0.15) e(0.85)	е	d(0.09) e(0.91)	е	b	b(0.98) c(0.02)	a(0.02 b(0.98

Appendix II. (Continued)

Loci							Rana d	ybowskii						
LUCI	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Acoh	a(0.92) b(0.08)	а	a(0.89) b(0.11)	а	а	a(0.94) b(0.06)	a(0.98) b(0.02)	a(0.98) b(0.02)	а	а	a(0.98) b(0.02)	а	а	a(0.50) b(0.50)
Ck-1	а	а	а	а	а	а	а	а	а	а	а	а	а	а
Ck-2	a(0.97) b(0.03)	а	а	а	а	а	а	а	а	а	а	а	а	а
Aat-1	c(0.11) h(0.41) j(0.08) k(0.38) l(0.02)	c(0.14) h(0.61) j(0.07) k(0.18)	h(0.54) j(0.07) k(0.39)	b(0.08) d(0.25) h(0.57) k(0.10)	h(0.46) k(0.46) l(0.08)	c(0.26) h(0.48) k(0.26)	b(0.02) c(0.21) h(0.45) k(0.32)	c(0.02) f(0.02) g(0.02) h(0.31) i(0.02) k(0.60) l(0.01)	c(0.04) f(0.04) h(0.28) j(0.14) k(0.50)	f(0.21) h(0.36) k(0.43)	c(0.09) f(0.05) h(0.48) j(0.07) k(0.27) l(0.04)	c(0.08) f(0.04) h(0.39) j(0.08) k(0.41)	c(0.10) h(0.55) k(0.35)	c(0.50) h(0.50)
Aat-2	b	a(0.04) b(0.96)	b	b	b	b	b	a(0.02) b(0.98)	b	b	b	b	b	b
Gp-3	С	С	С	c(0.98) d(0.02)	С	С	С	С	С	С	С	С	С	С
Gp-4	a(0.97) c(0.03)	а	а	a(0.85) c(0.15)	а	а	а	a(0.88) c(0.12)	a(0.79) c(0.21)	a(0.71) c(0.29)	a(0.84) c(0.14)	a(0.96) c(0.04)	a(0.95) c(0.05)	а
G3pdh	b(0.42) d(0.58)	b(0.64) d(0.36)	b(0.54) d(0.46)	b(0.02) d(0.93) e(0.05)	b(0.83) d(0.17)	b(0.40) d(0.60)	b(0.43) d(0.57)	b(0.41) d(0.55) e(0.04)	b(0.46) d(0.54)	b(0.57) d(0.43)	b(0.39) d(0.59) e(0.02)	b(0.42) d(0.58)	b(0.40) d(0.60)	b(0.50) d(0.50)
Idh	b	a(0.07) b(0.93)	b	b	a(0.02) b(0.98)	b	b	b	b	b	b	b	b	b
Sod	c(0.97) e(0.03)	с	b(0.14) c(0.86)	с	a(0.02) c(0.98)	c(0.98) e(0.02)	a(0.02) c(0.96) e(0.02)	c(0.97) e(0.03)	с	с	c(0.98) e(0.02)	c(0.96) e(0.04)	c(0.95) e(0.05)	с
Lap	a(0.99) b(0.01)	а	а	а	а	а	а	а	а	а	а	а	а	а
Ldh-1	b(0.99) e(0.01)	b	b	b	a(0.02) b(0.98)	b(0.98) e(0.02)	b(0.98) e(0.02)	b	b	b	b	b	b	b
Ldh-2	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Mdh	С	С	С	С	С	С	С	С	С	С	c(0.98) e(0.02)	С	С	с
Мрі	a(0.02) b(0.06) d(0.11) e(0.55) g(0.20) h(0.06)	b(0.14) d(0.07) e(0.50) g(0.25) h(0.04)	b(0.04) d(0.04) e(0.39) g(0.54)	e	d(0.02) e(0.46) g(0.45) h(0.07)	b(0.06) d(0.10) e(0.66) g(0.12) h(0.06)	b(0.03) d(0.07) e(0.54) g(0.29) h(0.07)	b(0.02) d(0.10) e(0.66) g(0.17) h(0.05)	b(0.04) d(0.18) e(0.64) g(0.14)	b(0.07) d(0.14) e(0.51) g(0.21) h(0.07)	b(0.11) d(0.09) e(0.61) g(0.19)	d(0.08) e(0.62) g(0.27) h(0.04)	a(0.05) d(0.10) e(0.45) g(0.35) h(0.05)	d
Pgm-1	С	С	С	С	b(0.39) c(0.61)	b(0.16) c(0.84)	b(0.10) c(0.90)	с	b(0.04) c(0.96)	С	b(0.07) c(0.93)	b(0.08) c(0.92)	С	с
Pgm-2	a(0.03) c(0.97)	С	С	С	С	С	С	С	С	С	С	С	С	с
Iddh	a(0.04) b(0.96)	a(0.07) b(0.93)	b	a(0.25) b(0.75)	b(0.93) c(0.07)	a(0.02) b(0.96) c(0.02)	a(0.03) b(0.94) c(0.03)	b	b	b(0.79) c(0.21)	b(0.93) c(0.07)	b(0.92) c(0.08)	b(0.85) c(0.15)	b

Appendix II. (Continued)

Loci	R. chen	sinensis					Rana ar	nurensis					F	R. t
Loci	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Acoh	а	а	a(0.83) b(0.17)	a(0.63) b(0.37)	а	a(0.40) b(0.60)	a(0.53) b(0.47)	a(0.40) b(0.58) c(0.02)	a(0.17) b(0.45) c(0.38)	a(0.58) b(0.42)	a(0.78) b(0.19) c(0.02) d(0.01)	a(0.93) b(0.07)	а	a(0.65) b(0.35)
Ck-1	а	а	а	а	а	а	а	а	а	а	а	а	а	а
Ck-2	а	а	а	а	а	а	а	а	а	а	а	а	а	а
Aat-1	g	b(0.10) g(0.90)	h(0.08) j(0.92)	g(0.04) h(0.04) j(0.90) l(0.02)	h(0.30) j(0.70)	h(0.15) j(0.85)	g(0.02) h(0.25) j(0.73)	j(0.92) I(0.08)	h(0.10) j(0.88) l(0.02)	g(0.08) j(0.84) l(0.02)	h(0.01) j(0.89) l(0.10)	j	j	a(0.35 e(0.65
Aat-2	b	b	b	b(0.93) c(0.07)	b	b	a(0.05) b(0.95)	b	b	a(0.25) b(0.75)	b	b	b	a(0.15 b(0.85
Gp-3	С	с	С	С	С	С	С	С	С	С	c(0.97) d(0.03)	с	С	С
Gp-4	е	е	d(0.98) e(0.02)	d	d	d	d	d	d	d	d	d	d	b
G3pdh	b	a(0.80) b(0.20)	с	c(0.97) d(0.33)	a(0.10) c(0.90)	b(0.05) c(0.88) d(0.07)	a(0.05) c(0.93) d(0.02)	С	a(0.05) c(0.95)	С	С	с	с	c(0.05) d(0.95)
ldh	b	b	b	b	b	b	b	b	b	a(0.08) b(0.92)	b	b	b	с
Sod	с	a(0.10) c(0.90)	d	d(0.96) f(0.02) g(0.02)	d	b(0.05) c(0.88) d(0.07)	d	d	d	d	d	d	d	е
Lap	а	а	а	а	а	а	а	а	а	а	а	а	а	а
Ldh-1	f	f	С	с	С	С	С	С	с	С	с	С	с	е
Ldh-2	a(0.10) d(0.50) e(0.40)	d(0.90) e(0.10)	d	d(0.97) e(0.33)	d	d(0.95) e(0.05)	d(0.97) e(0.03)	b(0.02) d(0.96) e(0.02)	d	d	d	d	d	С
Mdh	f	f	е	b(0.02) e(0.95) g(0.02) h(0.01)	е	e(0.90) h(0.10)	b(0.02) e(0.98)	е	b(0.02) e(0.98)	e(0.92) g(0.08)	b(0.03) e(0.94) g(0.03)	e(0.90) g(0.10)	е	b
Mpi	d(0.80) e(0.20)	b(0.20) d(0.80)	e(0.13) g(0.37) h(0.06) i(0.13) j(0.21) k(0.10)	e(0.18) g(0.07) i(0.30) j(0.42) k(0.03)	i(0.80) j(0.20)	e(0.05) g(0.07) i(0.68) j(0.15) l(0.05)	e(0.13) g(0.07) i(0.55) j(0.25)	e(0.40) g(0.48) i(0.05) j(0.07)	e(0.13) g(0.15) i(0.32) j(0.38) k(0.02)	e(0.08) g(0.08) i(0.25) j(0.59)	d(0.01) e(0.27) g(0.37) i(0.20) j(0.15)	e(0.22) g(0.38) i(0.15) j(0.25)	g(0.20) i(0.06) j(0.56) k(0.18)	a(0.20) c(0.75) g(0.05)
Pgm-1	b(0.90) c(0.10)	b	с	b(0.08) c(0.88) d(0.04)	С	С	С	С	b(0.02) c(0.98)	С	С	с	с	b
Pgm-2	с	с	с	c(0.98) d(0.02)	с	с	с	c(0.95) d(0.05)	с	с	с	с	С	d
lddh	d	d	d	b(0.02) d(0.98)	d	d	d	d(0.98) e(0.02)	d(0.88) e(0.12)	d	d(0.99) e(0.01)	d	d	d

Appendix III. Nei's (1978) genetic distance coefficients (above diagonal) and Rogers' (1972) genetic similarity coefficients (below diagonal) among 41 populations of *Rana huanrenensis*, *R. dybowskii*, *R. chensinensis*, *R. amurensis* and *R. tsushimensis* from Korea, Japan and China

China																					
population	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
R. huanrenesis 1 Jangseong	_	.005	.007	.004	.007	.007	.011	.024	.006	.008	.573	.588	.556	.584	.566	.582	.640	.514	.558	.577	
2 Pohang	.965	.005	.000	.000	.000	.000	.003	.017	.000	.000	.581	.599	.565	.594	.575	.589	.670	.525	.574	.588	
3 Cheongsong	.952	.978	_	.000	.001	.001	.004	.017	.002	.001	.576	.594	.563	.591	.570	.585	.664	.531	.573	.587	
4 Yeongdeog 5 Pyeongchang	.963 .950	.982 .975	.977 .963	.963	.002	.002 .000	.006 .001	.017 .018	.002 .000	.002 .000	.582 .592	.600 .610	.568 .575	.598 .601	.576 .586	.592 .598	.671 .683	.531 .532	.577 .582	.591 .596	
6 Hanso-ri	.952	.975	.903	.968	.971	.000	.000	.018	.000	.000	.586	.605	.570	.601	.581	.596	.672	.530	.578	.594	
7 Oban-ri	.942	.967	.957	.956	.964	.979	_	.021	.002	.001	.583	.601	.567	.597	.578	.594	.669	.527	.573	.589	
8 Inje 9 Kapyeong	.925 .952	.946 .972	.948 .963	.947 .966	.943 .966	.943 .978	.930 .968	.930	.019	.017 .001	.510 .590	.528 .607	.499 .574	.526 .604	.504 .583	.519 .598	.595 .679	.463 .532	.505 .581	.519 .597	
10 Donghae	.950	.977	.968	.967	.974	.976	.973	.945	.969	.001	.587	.606	.573	.6004	.585	.597	.672	.534	.578	.594	
R. dybowskii																					
11 Yangpyeong	.547	.541	.538	.538	.539	.535 .527	.541	.563	.538	.541 .532	-	.000	.000	.001 .000	.000 .001	.005 .005	.026 .022	.022 .024	.002 .001	.002	
12 Cheongyang 13 Muju	.538 .550	.532 .545	.529 .539	.528 .538	.530 .543	.527 .540	.532 .545	.555 .567	.531 .541	.532 .544	.973 .961	.969	.000	.000	.000	.005	.022	.024	.001	.000. .000	
14 Jangseong	.539	.531	.525	.524	.530	.526	.530	.553	.527	.530	.960	.968	.961	-	.003	.004	.026	.022	.001	.000	
15 Kurye	.550	.545	.543	.538	.547	.543	.544	.571	.539	.543	.961	.961	.961	.952		.004	.037	.015	.005	.003	
16 Haenam 17 Jeju	.534 .515	.532 .508	.526 .503	.525 .502	.530 .504	.526 .504	.530 .509	.554 .531	.528 .502	.530 .506	.952 .915	.948 .926	.955 .904	.954 .911	.947 .906	.888	.045	.015 .075	.011 .022	.004 .027	
18 Keoje	.571	.568	.564	.561	.566	.563	.567	.591	.563	.566	.919	.917	.937	.921	.933	.931	.864	-	.022	.016	
19 Hadong 20 Yangsan	.546 .540	.540 .535	.535 .530	.534 .529	.538 .533	.535 .530	.540 .535	.563 .558	.535 .531	.538 .534	.955 .960	.962 .968	.958 .972	.967 .973	.947 .957	.939 .951	.913 .910	.925 .939	.978	.000	
20 Yangsan 21 Donghae	.540	.535	.530	.529	.535	.530	.535	.558	.531	.534	.960	.966	.972	.973	.937	.944	.910	.939	.978	.958	
22 Inje	.538	.531	.525	.524	.529	.525	.529	.553	.525	.529	.958	.959	.949	.958	.938	.938	.917	.916	.950	.954	
23 Kanseong	.550 .546	.545 .540	.540	.539	.543	.540 .534	.544	.567	.539	.543 .538	.940 .959	.945 .974	.943	.943 .964	.942 .949	.931 .939	.906	.916 .922	.927	.940	
24 Keojin 25 Kapyeong	.546	.540	.534 .522	.533 .521	.538 .527	.534 .523	.538 .527	.562 .551	.535 .524	.538 .527	.959 .959	.974 .969	.960 .967	.964 .974	.949 .949	.939 .949	.927 .916	.922	.966 .966	.970 .979	
26 Wonju	.538	.534	.528	.527	.532	.528	.533	.556	.530	.532	.959	.971	.967	.966	.952	.955	.918	.930	.955	.970	
27 Tsushima Isl.	-	-	-	-	-	-	-	-	-	-	.903	.895	.891	.898	.895	.897	.845	.852	.899	.896	
<i>R. chensinensis</i> 28 Ninxia	.653	.664	.659	.660	.665	.666	.671	.687	.674	.660	.599	.592	.599	.586	.599	.578	.566	.631	.596	.597	
29 Quing	.611	.629	.616	.624	.631	.634	.641	.647	.648	.634	.589	.588	.589	.581	.580	.572	.572	.600	.590	.592	
R. amurensis		·						· - -			a - 1	<u> </u>		e		e · -					
30 Haenam 31 Kangwha	.439 .452	.435 .448	.430 .444	.429 .443	.431 .447	.432 .446	.437 .449	.457 .473	.436 .450	.430 .444	.600 .580	.603 .581	.600 .584	.608 .586	.600 .578	.617 .586	.587 .569	.582 .563	.594 .584	.602 .586	
32 Sorae	.452 .433	.448 .432	.444 .427	.443	.447 .427	.446 .428	.449 .433	.473	.450 .433	.444 .427	.606	.608	.584	.602	.604	.602	.569	.563	.584 .593	.586	
33 Yangpyeong	.509	.507	.504	.504	.503	.503	.509	.529	.510	.503	.619	.620	.613	.623	.615	.624	.608	.592	.611	.615	
34 Cheongju 35 Yeongdong	.459 .460	.455 .453	.452 .450	.451 .449	.456 .449	.456 .449	.457 .455	.483 .474	.458 .455	.452 .449	.585 .579	.587 .584	.579 .581	.589 .589	.585 .578	.592 .600	.574 .566	.557 .565	.577 .572	.581 .582	
35 Yeongdong 36 Cheongyang	.460	.453	.450	.449	.449	.449	.455	.474	.455	.449	.579	.573	.569	.569	.569	.580	.560	.565	.566	.572	
37 Yangsan	.431	.429	.428	.422	.432	.429	.431	.458	.429	.424	.561	.564	.557	.568	.571	.571	.552	.539	.556	.561	
38 Kyeongju 39 Kangnung	.441 .431	.436 .427	.431 .421	.429 .420	.432 .422	.432 .423	.439 .429	.458 .448	.437	.431 .422	.605	.608 .609	.604 .605	.610 .613	.602	.618 .618	.591	.584	.596	.604	
39 Kangnung 40 Koseong	.431	.427 .417	.421	.420	.422	.423	.429	.448 .439	.427 .418	.422	.606 .595	.609	.605	.594	.606 .594	.596	.593 .584	.587 .573	.600 .583	.608 .593	
R. tsushimensis																					
41 Tsushima Isl.	420								400		.372	.378	.375	.382	.367	.375	.390	.375	.389	.385	
41 150511111a 151.	.430	.426	.422	.424	.429	.429	.433	.430	.429	.426	.572	.070					.000	.070	.000	.000	
Population	.430	.426	.422	.424	.429 25	.429	.433	28	.429	.426	31	32	33	34	35	36	37	38	39	40	41
Population R. huanrenensis	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	
Population <i>R. huanrenensis</i> 1 Jangseong	21 .610	22 .586	23 .561	24 .570	25 .588	26 .587	27	28 .385	29 .445	30 .813	31 .769	32 .827	33 .638	34 .751	35 .756	36 .738	37 .810	38 .809	39 .841	40 .872	.834
Population R. huanrenensis	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	
Population <i>R. huanrenensis</i> 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongdeok	21 .610 .623 .621 .628	22 .586 .598 .597 .604	23 .561 .568 .565 .572	24 .570 .584 .581 .586	25 .588 .602 .602 .607	26 .587 .593 .589 .596	27 	28 .385 .364 .377 .378	29 .445 .417 .434 .433	30 .813 .824 .826 .835	31 .769 .784 .787 .796	32 .827 .830 .828 .837	33 .638 .648 .646 .656	34 .751 .762 .759 .769	35 .756 .779 .780 .791	36 .738 .752 .751 .762	37 .810 .819 .819 .832	38 .809 .825 .827 .837	39 .841 .855 .858 .868	40 .872 .878 .882 .890	.834 .841 .839 .844
Population R. huanrenensis 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongdeok 5 Pyeongchang	21 .610 .623 .621 .628 .627	22 .586 .598 .597 .604 .602	23 .561 .568 .565 .572 .574	24 .570 .584 .581 .586 .593	25 .588 .602 .602 .607 .609	26 .587 .593 .589 .596 .603	27 	28 .385 .364 .377 .378 .363	29 .445 .417 .434 .433 .415	30 .813 .824 .826 .835 .836	31 .769 .784 .787 .796 .793	32 .827 .830 .828 .837 .846	33 .638 .648 .646 .656 .656	34 .751 .762 .759 .769 .774	35 .756 .779 .780 .791 .788	36 .738 .752 .751 .762 .760	37 .810 .819 .819 .832 .824	38 .809 .825 .827 .837 .836	39 .841 .855 .858 .868 .868 .865	40 .872 .878 .882 .890 .890	.834 .841 .839 .844 .843
Population <i>R. huanrenensis</i> 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongdeok	21 .610 .623 .621 .628	22 .586 .598 .597 .604	23 .561 .568 .565 .572	24 .570 .584 .581 .586	25 .588 .602 .602 .607	26 .587 .593 .589 .596	27 	28 .385 .364 .377 .378	29 .445 .417 .434 .433	30 .813 .824 .826 .835	31 .769 .784 .787 .796	32 .827 .830 .828 .837	33 .638 .648 .646 .656	34 .751 .762 .759 .769	35 .756 .779 .780 .791	36 .738 .752 .751 .762	37 .810 .819 .819 .832	38 .809 .825 .827 .837	39 .841 .855 .858 .868	40 .872 .878 .882 .890	.834 .841 .839 .844
Population R. huanrenensis 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongdeok 5 Pyeongchang 6 Hanso-ri 7 Oban-ri 8 Inje	21 .610 .623 .621 .628 .627 .631 .626 .553	22 .586 .598 .597 .604 .602 .606 .601 .530	23 .561 .568 .565 .572 .574 .576 .572 .499	24 .570 .584 .581 .586 .593 .589 .589 .586 .514	25 .588 .602 .602 .607 .609 .609 .605 .533	26 .587 .593 .589 .596 .603 .599 .596 .522	27 	28 .385 .364 .377 .378 .363 .356 .346 .317	29 .445 .417 .434 .433 .415 .406 .393 .369	30 .813 .824 .826 .835 .836 .830 .818 .752	31 .769 .784 .787 .796 .793 .788 .777 .714	32 .827 .830 .828 .837 .846 .834 .822 .756	33 .638 .648 .646 .656 .656 .651 .642 .582	34 .751 .762 .759 .769 .774 .763 .754 .688	35 .756 .779 .780 .791 .788 .784 .784 .773 .712	36 .738 .752 .751 .762 .760 .757 .748 .680	37 .810 .819 .819 .832 .824 .822 .811 .740	38 .809 .825 .827 .837 .836 .831 .818 .753	39 .841 .855 .858 .868 .865 .862 .862 .847 .783	40 .872 .878 .882 .890 .890 .890 .887 .873 .806	.834 .841 .839 .844 .843 .834 .834 .816 .840
Population <i>R. huanrenensis</i> 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongdeok 5 Pyeongchang 6 Hanso-ri 7 Oban-ri 8 Inje 9 Kapyeong	21 .610 .623 .621 .628 .627 .631 .626 .553 .634	22 .586 .598 .597 .604 .602 .606 .601 .530 .608	23 .561 .568 .565 .572 .574 .576 .572 .499 .578	24 .570 .584 .581 .586 .593 .589 .586 .514 .592	25 .588 .602 .602 .607 .609 .609 .605 .533 .612	26 .587 .593 .589 .596 .603 .599 .596 .522 .603	27 - - - - - - - - - - - -	28 .385 .364 .377 .378 .363 .356 .346 .317 .348	29 .445 .417 .434 .433 .415 .406 .393 .369 .399	30 .813 .824 .826 .835 .836 .830 .818 .752 .816	31 .769 .784 .787 .796 .793 .788 .777 .714 .775	32 .827 .830 .828 .837 .846 .834 .822 .756 .823	33 .638 .648 .646 .656 .656 .651 .642 .582 .645	34 .751 .762 .759 .769 .774 .763 .754 .688 .753	35 .756 .779 .780 .791 .788 .784 .773 .712 .770	36 .738 .752 .751 .762 .760 .757 .748 .680 .744	37 .810 .819 .819 .832 .824 .822 .811 .740 .811	38 .809 .825 .827 .837 .836 .831 .818 .753 .818	39 .841 .855 .858 .868 .865 .862 .847 .783 .848	40 .872 .878 .882 .890 .890 .887 .873 .806 .870	.834 .841 .839 .844 .843 .834 .834 .816 .840 .827
Population R. huanrenensis 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongdeok 5 Pyeongchang 6 Hanso-ri 7 Oban-ri 8 Inje 9 Kapyeong 10 Donghae	21 .610 .623 .621 .628 .627 .631 .626 .553	22 .586 .598 .597 .604 .602 .606 .601 .530	23 .561 .568 .565 .572 .574 .576 .572 .499	24 .570 .584 .581 .586 .593 .589 .589 .586 .514	25 .588 .602 .602 .607 .609 .609 .605 .533	26 .587 .593 .589 .596 .603 .599 .596 .522	27 	28 .385 .364 .377 .378 .363 .356 .346 .317	29 .445 .417 .434 .433 .415 .406 .393 .369	30 .813 .824 .826 .835 .836 .830 .818 .752	31 .769 .784 .787 .796 .793 .788 .777 .714	32 .827 .830 .828 .837 .846 .834 .822 .756	33 .638 .648 .646 .656 .656 .651 .642 .582	34 .751 .762 .759 .769 .774 .763 .754 .688	35 .756 .779 .780 .791 .788 .784 .784 .773 .712	36 .738 .752 .751 .762 .760 .757 .748 .680	37 .810 .819 .819 .832 .824 .822 .811 .740	38 .809 .825 .827 .837 .836 .831 .818 .753	39 .841 .855 .858 .868 .865 .862 .862 .847 .783	40 .872 .878 .882 .890 .890 .890 .887 .873 .806	.834 .841 .839 .844 .843 .834 .834 .816 .840
Population <i>R. huanrenensis</i> 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongdeok 5 Pyeongchang 6 Hanso-ri 7 Oban-ri 8 Inje 9 Kapyeong 10 Donghae <i>R. dybowskii</i> 11 Yangpyeong	21 .610 .623 .621 .626 .631 .626 .553 .634 .628 .006	22 .586 .598 .597 .604 .602 .606 .601 .530 .608 .604 .604	23 .561 .568 .572 .574 .576 .572 .499 .578 .575 .006	24 .570 .584 .581 .586 .593 .589 .589 .586 .514 .592 .590 .001	25 .588 .602 .607 .609 .609 .609 .609 .533 .612 .608 .001	26 .587 .593 .596 .603 .599 .599 .522 .603 .599 .000	27 	28 .364 .377 .378 .363 .356 .346 .317 .348 .368 .466	29 .445 .417 .434 .433 .415 .406 .393 .369 .399 .411 .504	30 .813 .824 .826 .835 .836 .830 .818 .752 .816 .841 .492	31 .769 .784 .787 .796 .793 .788 .777 .714 .775 .799 .512	32 .827 .830 .828 .837 .846 .834 .834 .822 .756 .823 .845 .845	33 .638 .648 .646 .656 .656 .651 .645 .660 .442	34 .751 .762 .759 .769 .774 .763 .754 .753 .755 .775	35 .756 .779 .780 .791 .788 .784 .784 .770 .794 .526	36 .738 .752 .751 .762 .760 .757 .748 .680 .744 .765 .544	37 .810 .819 .832 .824 .822 .811 .740 .811 .834 .535	38 .809 .825 .827 .837 .836 .831 .838 .753 .818 .841 .489	39 .841 .855 .858 .868 .865 .862 .847 .783 .848 .872 .487	40 .872 .878 .882 .890 .890 .887 .873 .806 .870 .897 .507	.834 .841 .839 .844 .843 .834 .816 .840 .827 .838 .991
Population R. huanrenensis 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongdeok 5 Pyeongchang 6 Hanso-ri 7 Oban-ri 8 Inje 9 Kapyeong 10 Donghae R. dybowskii 11 Yangpyeong 12 Cheongyang	21 .610 .623 .621 .628 .627 .631 .626 .553 .634 .628 .006 .005	22 .586 .598 .597 .604 .602 .606 .601 .530 .608 .604 .005 .004	23 .561 .568 .565 .572 .574 .576 .572 .499 .578 .575 .006 .003	24 .570 .584 .581 .586 .593 .589 .586 .514 .590 .590 .001 .000	25 .588 .602 .602 .607 .609 .605 .533 .612 .608 .001 .000	26 .587 .593 .589 .596 .603 .599 .596 .522 .603 .599 .000 .000	27 .056 .063	28 .385 .364 .377 .378 .363 .356 .346 .317 .348 .368 .466 .475	29 .445 .417 .434 .433 .415 .406 .393 .369 .399 .411 .504 .509	30 .813 .824 .826 .835 .836 .830 .818 .752 .816 .841 .492 .487	31 .769 .784 .787 .796 .793 .788 .777 .714 .775 .799 .512 .508	32 .827 .830 .828 .837 .846 .834 .834 .834 .822 .756 .823 .845 .483 .481	33 .638 .648 .646 .656 .656 .651 .642 .645 .660 .442 .443	34 .751 .762 .759 .769 .774 .763 .754 .688 .753 .775 .507 .503	35 .756 .779 .780 .791 .788 .784 .778 .712 .770 .794 .526 .519	36 .738 .752 .751 .762 .760 .757 .748 .680 .744 .765 .544 .540	37 .810 .819 .829 .824 .822 .811 .740 .811 .834 .535 .531	38 .809 .825 .827 .837 .836 .831 .831 .831 .831 .841 .489 .483	39 .841 .855 .858 .865 .862 .847 .783 .848 .872 .487 .482	40 .872 .878 .882 .890 .890 .887 .873 .873 .876 .877 .507 .504	.834 .841 .839 .844 .843 .834 .816 .846 .827 .838 .991 .971
Population R. huanrenensis 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongdeok 5 Pyeongchang 6 Hanso-ri 7 Oban-ri 8 Inje 9 Kapyeong 10 Donghae R. dybowskii 11 Yangpyeong 12 Cheongyang 13 Muju	21 .610 .623 .621 .628 .627 .631 .628 .634 .628 .006 .005 .006	22 .586 .598 .597 .604 .602 .606 .601 .530 .608 .604 .005 .004 .005	23 .561 .568 .565 .572 .574 .576 .572 .499 .578 .575 .006 .003 .004	24 .570 .584 .581 .586 .589 .586 .514 .592 .590 .001 .000 .001	25 .588 .602 .607 .609 .605 .533 .612 .608 .001 .000 .000	26 .587 .593 .596 .603 .596 .522 .603 .599 .000 .000 .000	27 0.056 .063 .062	28 .385 .364 .377 .378 .363 .356 .346 .346 .317 .348 .368 .466 .475 .456	29 .445 .417 .434 .433 .415 .406 .393 .369 .399 .411 .504 .509 .498	30 .813 .824 .826 .835 .836 .830 .818 .752 .816 .841 .492 .487 .488	31 .769 .784 .787 .796 .793 .788 .777 .714 .775 .799 .512 .508 .512	32 .827 .830 .828 .837 .846 .834 .822 .756 .823 .845 .483 .481 .484	33 .638 .648 .646 .656 .651 .642 .582 .645 .660 .442 .443 .446	34 .751 .762 .759 .769 .774 .763 .754 .688 .753 .775 .507 .503 .508	35 .756 .779 .780 .791 .788 .784 .773 .712 .770 .794 .526 .519 .522	36 .738 .752 .751 .762 .760 .757 .748 .680 .744 .765 .544 .540 .544	37 .810 .819 .829 .824 .822 .811 .740 .811 .834 .535 .531 .536	38 .809 .825 .827 .837 .836 .831 .818 .753 .818 .841 .489 .483 .486	39 .841 .855 .858 .868 .865 .862 .847 .783 .848 .872 .487 .482 .484	40 .872 .878 .882 .890 .890 .887 .873 .873 .806 .870 .897 .507 .504 .506	.834 .841 .839 .844 .843 .834 .816 .840 .827 .838 .991 .971 .971
Population R. huanrenensis 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongdeok 5 Pyeongchang 6 Hanso-ri 7 Oban-ri 8 Inje 9 Kapyeong 10 Donghae R. dybowskii 11 Yangpeong 12 Cheongyang 13 Muju 14 Jangseong 15 Kurye	21 .610 .623 .621 .628 .627 .631 .626 .553 .634 .628 .006 .005 .006 .002 .012	22 .586 .598 .597 .604 .602 .606 .601 .530 .608 .604 .005 .004 .005 .002 .002	23 .561 .568 .565 .572 .574 .576 .572 .499 .578 .575 .006 .003 .004 .004 .006	24 .570 .584 .586 .593 .589 .586 .514 .590 .001 .000 .001 .001 .001	25 .588 .602 .607 .609 .609 .605 .533 .612 .608 .001 .000 .000 .000	26 .587 .593 .599 .596 .599 .596 .522 .603 .599 .503 .599 .000 .000 .000 .000	27 	28 .385 .364 .377 .378 .363 .356 .346 .346 .348 .368 .466 .475 .456 .480 .480	29 .445 .417 .433 .415 .406 .393 .399 .411 .504 .509 .504 .515	30 .813 .824 .826 .836 .830 .818 .752 .816 .841 .492 .487 .488 .486 .490	31 .769 .784 .796 .793 .798 .777 .714 .775 .799 .512 .508 .512 .508 .512	32 .827 .830 .828 .837 .846 .834 .834 .822 .756 .823 .845 .483 .481 .484 .486 .484	33 .638 .648 .646 .656 .651 .642 .582 .645 .660 .442 .443 .446 .435 .442	34 .751 .762 .759 .774 .763 .774 .754 .688 .753 .775 .503 .507 .503 .502 .508	35 .756 .779 .780 .791 .788 .784 .773 .712 .770 .794 .526 .519 .526 .511 .524	36 .738 .752 .757 .760 .757 .748 .680 .744 .765 .544 .540 .544 .532 .544	37 .810 .819 .839 .824 .822 .811 .740 .811 .740 .834 .535 .531 .535 .525 .533	38 .809 .825 .827 .836 .831 .818 .753 .818 .753 .818 .841 .489 .483 .486 .481 .488	39 .841 .855 .858 .865 .862 .847 .783 .848 .872 .487 .482 .487 .482 .481 .486	40 .872 .878 .882 .890 .890 .873 .873 .873 .806 .870 .897 .504 .506 .503 .507	.834 .841 .839 .844 .816 .834 .834 .834 .834 .834 .838 .991 .971 .971 .971 1.015
Population R. huanrenensis 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongdeok 5 Pyeongchang 6 Hanso-ri 7 Oban-ri 8 Inje 9 Kapyeong 10 Donghae R. dybowskii 11 Yangpyeong 12 Cheongyang 13 Muju 14 Jangseong 15 Kurye 16 Haenam	21 .610 .623 .621 .628 .627 .631 .626 .553 .634 .628 .006 .005 .006 .005 .006 .002 .012 .010	22 .586 .597 .604 .602 .606 .601 .530 .608 .604 .005 .004 .005 .004 .005 .002 .010	23 .561 .565 .572 .574 .576 .572 .578 .575 .006 .003 .004 .004 .006 .008	24 .570 .584 .585 .593 .586 .593 .586 .514 .592 .590 .001 .000 .001 .001 .001 .004 .008	25 .588 .602 .607 .609 .605 .533 .612 .608 .001 .000 .000 .000 .000 .004 .003	26 .587 .593 .596 .603 .599 .596 .522 .603 .529 .000 .000 .000 .000 .000 .000 .000	27 - - - - - - - - - - - - - - - - - - -	28 .385 .364 .377 .378 .363 .346 .346 .317 .348 .368 .466 .475 .456 .456 .456 .462 .491	29 .445 .417 .434 .433 .415 .406 .393 .369 .399 .411 .504 .509 .498 .514 .515 .533	30 .813 .824 .835 .836 .838 .838 .752 .816 .841 .492 .487 .488 .486 .490 .478	31 .769 .787 .796 .793 .787 .793 .714 .775 .799 .512 .508 .512 .508 .512 .508 .512 .504 .514	32 .827 .830 .828 .837 .846 .837 .846 .823 .756 .823 .845 .483 .481 .484 .484 .484	33 .638 .648 .656 .656 .656 .652 .582 .645 .582 .645 .660 .442 .443 .446 .435 .442	34 .751 .769 .769 .774 .763 .754 .688 .753 .775 .507 .503 .508 .508 .508 .508 .499	35 .756 .790 .780 .791 .788 .788 .788 .773 .712 .770 .794 .526 .519 .522 .511 .524 .501	36 .738 .752 .751 .762 .760 .757 .748 .680 .744 .765 .544 .540 .544 .544 .527	37 .810 .819 .832 .824 .822 .811 .740 .811 .740 .811 .535 .531 .536 .523 .523 .524	38 .809 .825 .827 .837 .836 .831 .753 .818 .841 .489 .483 .486 .481 .488 .475	39 .841 .855 .858 .868 .865 .862 .783 .848 .872 .487 .482 .487 .482 .484 .481 .486 .475	40 .872 .878 .882 .890 .890 .873 .873 .873 .876 .870 .870 .897 .504 .507 .504 .507 .507 .507	.834 .841 .843 .844 .843 .834 .834 .834 .827 .838 .991 .971 .971 .971 1.015 .996
Population R. huanrenensis 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongdeok 5 Pyeongchang 6 Hanso-ri 7 Oban-ri 8 Inje 9 Kapyeong 10 Donghae R. dybowskii 11 Yangyyeong 12 Cheongyang 13 Muju 14 Jangseong 15 Kurye 16 Haenam 17 Jeju	21 .610 .623 .621 .628 .627 .631 .628 .634 .628 .006 .005 .006 .002 .012 .010 .029	22 .586 .597 .604 .602 .606 .601 .530 .608 .604 .608 .604 .005 .004 .005 .002 .010 .011 .028	23 .561 .568 .565 .572 .574 .576 .572 .499 .578 .575 .006 .003 .004 .004 .004 .008 .034	24 .570 .584 .581 .586 .589 .586 .514 .592 .590 .001 .001 .001 .001 .001 .001 .004 .020	25 .588 .602 .607 .609 .605 .533 .612 .608 .001 .000 .000 .000 .000 .000 .003 .024	26 .587 .593 .589 .596 .596 .596 .596 .596 .596 .592 .603 .599 .000 .000 .000 .000 .000 .000 .002 .001	27 	28 .385 .364 .377 .378 .356 .346 .346 .346 .346 .456 .456 .456 .456 .480 .462 .491 .533	29 .445 .417 .433 .415 .406 .393 .399 .411 .504 .509 .498 .514 .513 .535	30 .813 .824 .826 .835 .836 .830 .818 .752 .816 .841 .492 .487 .488 .486 .490 .478 .512	31 .769 .784 .796 .793 .788 .777 .714 .775 .799 .512 .508 .512 .504 .512 .504 .515	32 .827 .830 .828 .837 .846 .834 .822 .756 .823 .845 .483 .481 .484 .486 .484 .486 .502	33 .638 .646 .656 .656 .651 .642 .582 .665 .442 .443 .446 .435 .442 .443 .446	34 .751 .762 .759 .769 .774 .763 .774 .688 .753 .775 .503 .508 .508 .502 .508 .499 .520	35 .756 .779 .780 .791 .784 .773 .712 .774 .794 .526 .511 .524 .521 .524 .521 .525	36 .738 .752 .751 .762 .760 .757 .748 .680 .744 .765 .544 .540 .544 .544 .544 .544 .544 .54	37 .810 .819 .832 .824 .822 .811 .740 .811 .740 .811 .535 .535 .535 .535 .525 .525	38 .809 .825 .827 .836 .831 .818 .753 .818 .841 .489 .483 .486 .481 .481 .481 .481 .481 .475 .502	39 .841 .855 .858 .868 .862 .847 .783 .848 .872 .487 .487 .487 .484 .481 .486 .475 .504	40 .872 .878 .882 .890 .890 .873 .873 .873 .876 .877 .504 .506 .503 .507 .504 .507 .504	.834 .841 .849 .844 .843 .834 .834 .840 .827 .838 .991 .971 .971 .971 1.015 .996 .947
Population R. huanrenensis 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongchock 5 Pyeongchang 6 Hanso-ri 7 Oban-ri 8 Inje 9 Kapyeong 10 Donghae <i>R. dybowskii</i> 11 Yangpyeong 12 Cheongyang 13 Muju 14 Jangseong 15 Kurye 16 Haenam 17 Jeju 18 Keoje 19 Hadong	21 .610 .623 .621 .628 .627 .631 .626 .553 .634 .628 .006 .006 .006 .006 .006 .006 .002 .010 .029 .024 .007	22 .586 .598 .597 .604 .602 .606 .601 .530 .608 .604 .005 .004 .005 .002 .010 .011 .028 .028 .006	23 .561 .568 .572 .574 .576 .572 .499 .575 .575 .006 .003 .004 .004 .004 .008 .008 .008 .034 .010	24 .570 .584 .581 .586 .589 .586 .514 .592 .590 .001 .000 .001 .001 .004 .008 .020 .020 .001	25 .588 .602 .607 .609 .609 .605 .533 .612 .608 .001 .000 .000 .000 .004 .003 .024 .000	26 .587 .593 .589 .596 .599 .596 .599 .596 .599 .000 .000 .000 .000 .000 .000 .000	27 	28 .385 .364 .377 .378 .356 .346 .346 .348 .368 .466 .475 .456 .480 .462 .491 .533 .410	29 .445 .417 .434 .433 .406 .393 .369 .399 .411 .504 .509 .498 .515 .533 .535 .473 .491	30 .813 .824 .826 .835 .836 .830 .818 .752 .816 .841 .492 .487 .488 .486 .490 .478 .512 .505	31 .769 .787 .796 .793 .787 .793 .793 .777 .714 .775 .799 .512 .508 .512 .508 .512 .504 .514 .505 .523 .542 .518	32 .827 .830 .828 .837 .846 .834 .842 .756 .823 .845 .845 .845 .483 .481 .484 .484 .486 .502 .521 .500	33 .638 .646 .656 .656 .651 .642 .582 .645 .660 .442 .443 .446 .442 .440 .4461 .478 .452	34 .751 .762 .759 .764 .763 .754 .688 .753 .775 .503 .508 .508 .508 .508 .508 .508 .508 .508	35 .756 .779 .780 .781 .784 .773 .784 .773 .794 .526 .519 .522 .511 .524 .501 .535 .551	36 .738 .752 .751 .762 .757 .748 .680 .744 .765 .544 .544 .544 .544 .527 .544 .527 .560 .579 .552	37 .810 .819 .832 .822 .811 .740 .834 .535 .533 .534 .535 .533 .524 .552 .552 .552 .545	38 .809 .825 .827 .837 .836 .831 .818 .753 .818 .841 .489 .483 .486 .481 .488 .475 .502 .500	39 .841 .855 .858 .868 .862 .847 .783 .848 .872 .482 .484 .481 .486 .475 .504 .501	40 .872 .878 .882 .890 .890 .887 .873 .806 .873 .806 .870 .504 .504 .506 .503 .507 .506 .503 .507 .531 .538 .524	.834 .841 .839 .844 .816 .838 .838 .838 .971 .971 .971 .971 .971 .996 .947 .940
Population R. huanrenensis 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongdeok 5 Pyeongchang 6 Hanso-ri 7 Oban-ri 8 Inje 9 Kapyeong 10 Donghae R. dybowskii 11 Yangpyeong 12 Cheongyang 13 Muju 14 Jangseong 15 Kurye 16 Haenam 17 Jeju 18 Keoje 19 Hadong 20 Yangsan	21 .610 .623 .621 .628 .627 .631 .626 .553 .634 .628 .006 .005 .006 .002 .012 .010 .029 .029 .029 .029 .025	22 .586 .598 .597 .604 .602 .606 .601 .530 .608 .604 .005 .002 .005 .002 .010 .028 .023 .005	23 .561 .568 .575 .574 .576 .572 .499 .578 .575 .006 .003 .004 .004 .004 .004 .004 .004 .004	24 .570 .584 .581 .586 .593 .586 .514 .590 .001 .001 .001 .001 .003 .023 .001	25 .588 .602 .607 .609 .609 .609 .605 .533 .612 .608 .001 .000 .000 .000 .004 .024 .016 .000	26 .587 .593 .589 .596 .596 .596 .599 .596 .599 .000 .000 .000 .000 .000 .000 .000	27 - - - - - - - - - - - - -	28 .385 .364 .377 .378 .356 .346 .346 .347 .348 .368 .456 .456 .456 .456 .456 .456 .450 .452 .491 .533 .410 .462 .464	29 .445 .417 .434 .433 .416 .393 .369 .393 .369 .411 .504 .509 .498 .514 .533 .535 .533 .535 .473 .496	30 .813 .824 .826 .835 .836 .830 .818 .752 .816 .841 .492 .487 .487 .487 .487 .486 .490 .478 .512 .519 .505 .492	31 .769 .784 .787 .796 .798 .788 .777 .714 .775 .799 .512 .508 .512 .504 .512 .504 .512 .505 .523 .542 .523 .542 .513	32 .827 .830 .828 .837 .846 .834 .822 .756 .823 .845 .483 .484 .486 .484 .486 .502 .521 .500 .491	33 .638 .646 .656 .656 .651 .642 .582 .645 .660 .442 .443 .446 .435 .446 .440 .461 .478 .452 .448	34 .751 .769 .769 .763 .754 .688 .753 .775 .503 .508 .502 .508 .502 .508 .502 .508 .502 .508 .502 .508 .502 .508 .502 .508 .502 .508 .502 .509 .520 .520 .520 .521 .521 .521 .555 .507 .555 .507 .555 .507 .555 .507 .555 .507 .555 .507 .555 .755 .7	35 .756 .779 .780 .791 .784 .773 .712 .774 .794 .526 .519 .522 .511 .525 .551 .531 .522	36 .738 .752 .751 .762 .762 .748 .680 .744 .765 .544 .532 .544 .532 .544 .527 .560 .579 .556 .546	37 .810 .819 .824 .824 .822 .811 .740 .811 .740 .811 .535 .531 .536 .525 .533 .524 .552 .570 .545 .537	38 .809 .825 .827 .837 .836 .831 .818 .753 .818 .841 .489 .483 .486 .481 .489 .481 .488 .475 .502 .516 .500 .488	39 .841 .855 .858 .865 .862 .847 .783 .848 .872 .487 .482 .487 .482 .484 .481 .486 .504 .514 .504 .514 .504	40 .872 .878 .882 .890 .887 .873 .876 .870 .897 .504 .506 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .531 .538 .524 .510	.834 .841 .839 .844 .816 .840 .827 .838 .991 .971 .971 .971 .971 .975 .996 .947 .971 .947 .950
Population R. huanrenensis J Jangseong Pohang C. Pohang C. Pohang C. Pohang C. Pongdeok F. Pyeongchang G. Hanso-ri B. Inje Kapyeong D. Donghae R. dybowskii J. Yangpyeong C. Cheongyang J. Muju J. Jangseong J. Muju J. Jangseong J. Kurye G. Haenam J. Jeju Keoje J. Hadong Q. Yangsan J. Donghae	21 .610 .623 .627 .631 .626 .553 .634 .634 .634 .006 .005 .006 .005 .006 .005 .006 .005 .012 .010 .024 .007 .007	22 .586 .598 .597 .604 .602 .606 .601 .530 .608 .604 .005 .004 .005 .002 .010 .011 .028 .028 .006	23 .561 .568 .565 .572 .574 .576 .572 .578 .575 .575 .006 .003 .004 .004 .006 .003 .004 .006 .003 .004 .006 .003 .018 .010 .002	24 .570 .584 .581 .586 .589 .586 .514 .592 .590 .001 .000 .001 .001 .004 .008 .020 .020 .001	25 .588 .602 .603 .609 .609 .609 .603 .533 .612 .608 .001 .000 .000 .004 .003 .024 .016 .000 .000	26 .587 .593 .589 .599 .599 .592 .603 .599 .000 .000 .000 .000 .000 .000 .000	27 	28 .385 .364 .377 .378 .363 .356 .346 .347 .348 .368 .466 .475 .456 .480 .462 .493 .410 .462 .493 .410 .462 .478	29 .445 .417 .434 .433 .406 .393 .399 .411 .504 .509 .491 .515 .533 .535 .473 .491 .491 .513	30 .813 .824 .826 .835 .836 .830 .818 .752 .816 .841 .492 .487 .488 .486 .490 .478 .512 .505	31 .769 .784 .787 .793 .788 .777 .714 .775 .799 .512 .508 .512 .504 .514 .514 .514	32 .827 .830 .828 .837 .846 .834 .822 .756 .823 .845 .483 .481 .484 .486 .521 .521 .521 .500 .495	33 .638 .648 .646 .656 .651 .642 .582 .645 .645 .645 .645 .645 .645 .443 .443 .443 .445 .442 .440 .451 .478 .452 .445 .450	34 .751 .762 .759 .764 .763 .754 .683 .753 .775 .503 .507 .503 .502 .508 .499 .508 .499 .546 .517 .514	35 .756 .779 .780 .791 .788 .784 .773 .712 .770 .794 .526 .519 .522 .511 .524 .551 .531 .531 .531 .532 .523	36 .738 .752 .751 .760 .757 .748 .680 .744 .765 .544 .540 .544 .532 .544 .532 .544 .527 .552 .545 .547	37 .810 .819 .822 .824 .822 .811 .740 .811 .834 .535 .531 .535 .533 .524 .552 .570 .545 .535	38 .809 .825 .827 .837 .836 .831 .818 .753 .818 .841 .489 .483 .486 .481 .488 .475 .502 .500	39 .841 .855 .858 .868 .862 .847 .783 .848 .872 .482 .484 .481 .486 .475 .504 .501	40 .872 .878 .890 .890 .887 .873 .873 .873 .873 .873 .875 .504 .504 .506 .503 .507 .500 .531 .538 .524 .512	.834 .841 .839 .844 .816 .838 .838 .838 .971 .971 .971 .971 .971 .996 .947 .940
Population R. huanrenensis J Jangseong Pohang C. Pohang C. Pohang C. Pongdeok S. Pyeongchang G. Hanso-ri R. hypeong G. Hanso-ri B. Inje Kapyeong D. Donghae R. dybowskii L. Yangpyeong C. Cheongyang Muju L. Jangseong S. Kurye G. Haenam H. Jangseong C. Haenam C. Haenam C. Haenam C. Haenam C. Haenam C. Haenam H. Jangseong C. Haenam C. Ha	21 .610 .623 .627 .631 .626 .553 .634 .628 .006 .005 .006 .002 .012 .010 .029 .024 .005 .024 .005 .025 .025 .950	22 .586 .598 .597 .604 .602 .606 .601 .530 .604 .604 .005 .002 .010 .011 .028 .005 .002 .010 .011 .023 .005 .005 .005 .005 .005 .005 .005 .00	23 .561 .568 .575 .574 .576 .572 .499 .575 .575 .575 .006 .003 .004 .004 .006 .008 .004 .006 .008 .004 .018 .010 .005 .002 .002 .002	24 .570 .584 .581 .589 .589 .586 .514 .592 .590 .001 .000 .001 .001 .004 .023 .001 .004	25 .588 .602 .607 .609 .605 .533 .612 .608 .001 .000 .000 .004 .003 .024 .016 .000 .000 .000 .000 .000 .000	26 .587 .593 .596 .603 .599 .596 .522 .603 .599 .000 .000 .000 .000 .000 .000 .000	27 	28 .385 .364 .377 .378 .363 .363 .363 .346 .346 .475 .480 .462 .491 .462 .491 .462 .491 .462 .494 .478 .453	29 .445 .417 .434 .433 .415 .406 .393 .369 .399 .411 .504 .513 .535 .535 .535 .473 .498 .514 .515 .533 .498 .514 .515 .535 .478 .496 .479 .498 .499 .499 .499 .499 .499 .499 .49	30 .813 .824 .825 .836 .835 .836 .831 .752 .816 .841 .487 .488 .486 .490 .478 .488 .490 .478 .519 .505 .492 .496 .476	31 .769 .784 .787 .796 .773 .783 .777 .774 .775 .799 .512 .504 .512 .504 .514 .515 .523 .544 .513 .513 .513 .513 .513 .513 .514 .490	32 .827 .830 .828 .837 .846 .833 .845 .823 .845 .823 .845 .483 .484 .484 .486 .484 .484 .484 .486 .502 .521 .502 .521 .480 .481 .481 .481 .484 .484 .484 .485 .481 .481 .481 .485 .481 .481 .481 .485 .485 .485 .485 .485 .485 .485 .485	33 .638 .648 .646 .656 .651 .642 .645 .660 .442 .443 .446 .443 .446 .442 .444 .445 .442 .444 .441 .478 .442 .443 .444 .444 .444 .444 .444 .444	34 .751 .762 .759 .769 .774 .763 .754 .753 .775 .507 .507 .508 .508 .502 .508 .502 .508 .502 .508 .510 .512 .514 .512 .514 .514 .488	35 .756 .779 .780 .781 .788 .784 .773 .770 .794 .526 .511 .522 .551 .535 .551 .535 .551 .535 .551 .535 .522 .533 .503	36 .738 .752 .751 .760 .760 .757 .748 .680 .744 .765 .544 .540 .544 .522 .544 .527 .546 .547 .552 .546 .546 .547 .531 .522	37 .810 .819 .832 .824 .824 .824 .811 .740 .811 .535 .531 .535 .533 .524 .535 .533 .525 .533 .525 .537 .535 .535 .535 .535 .535 .535 .53	38 809 825 827 837 836 836 831 838 843 483 483 484 483 484 484 484 484	39 .841 .855 .868 .868 .865 .847 .783 .848 .872 .482 .487 .482 .484 .484 .486 .475 .504 .514 .504 .514 .504 .514 .504 .514 .487 .487 .487 .487 .487 .487 .487 .48	40 .872 .878 .880 .890 .890 .873 .873 .806 .870 .504 .504 .503 .507 .504 .503 .507 .503 .507 .531 .538 .524 .512 .483	.834 .841 .839 .844 .843 .834 .816 .827 .838 .971 .971 .971 .971 .971 .971 .971 .947 .947 .947 .950 .950 .950 .979
Population <i>R. huanrenensis</i> 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongdeok 5 Pyeongchang 6 Hanso-ri 7 Oban-ri 8 Inje 9 Kapyeong 10 Donghae <i>R. dybowskii</i> 11 Yangpyeong 12 Cheongyang 13 Muju 14 Jangseong 15 Kurye 16 Haenam 17 Jeju 18 Keoje 19 Hadong 20 Yangsan 21 Donghae 22 Inje 23 Kanseong 24 Keojin	21 .610 .623 .627 .631 .626 .553 .634 .634 .634 .634 .006 .005 .006 .005 .006 .005 .006 .005 .006 .005 .006 .005 .006 .007 .012 .010 .024 .007 .055 .955	22 .586 .598 .597 .604 .602 .606 .603 .604 .005 .004 .005 .004 .010 .011 .028 .006 .005 .002 .006 .005 .000 .023 .006 .006 .005 .006 .005 .006 .005 .005	23 .561 .568 .565 .572 .572 .572 .578 .575 .575 .006 .003 .004 .004 .006 .008 .010 .006 .010 .010 .010 .002 .000 .002 .000 .002 .000	24 .570 .584 .581 .586 .586 .586 .586 .586 .586 .586 .586	25 .588 .602 .607 .605 .533 .612 .605 .533 .612 .605 .000 .000 .000 .000 .000 .000 .000	26 .587 .593 .596 .603 .599 .596 .522 .603 .599 .000 .000 .000 .000 .000 .000 .001 .002 .001 .003 .000 .000 .004 .004	27 	28 .385 .364 .377 .363 .356 .346 .346 .346 .475 .456 .456 .456 .491 .533 .462 .462 .491 .462 .464 .478 .454 .453 .460	29 .445 .417 .433 .406 .393 .369 .399 .411 .504 .515 .533 .535 .547 .513 .491 .496 .473 .491 .496 .479 .489	30 .813 .824 .826 .835 .836 .836 .836 .841 .487 .488 .487 .488 .487 .488 .490 .478 .519 .505 .492 .496 .477	31 .769 .784 .797 .796 .793 .777 .714 .775 .799 .512 .508 .512 .508 .512 .514 .505 .542 .518 .513 .514 .496	32 .827 .830 .828 .837 .837 .837 .846 .834 .822 .756 .823 .845 .823 .845 .483 .481 .484 .484 .484 .484 .484 .484 .485 .521 .521 .500 .491 .495 .474	33 .638 .648 .646 .656 .656 .642 .582 .645 .645 .445 .443 .446 .442 .444 .442 .440 .452 .448 .452 .433 .431	34 .751 .769 .774 .763 .774 .688 .775 .507 .503 .508 .508 .508 .508 .508 .508 .508 .508	35 .756 .779 .780 .781 .773 .712 .770 .773 .712 .770 .774 .526 .519 .522 .511 .524 .501 .523 .551 .523 .553 .501	36 .738 .752 .751 .762 .762 .767 .748 .680 .748 .680 .744 .745 .540 .544 .527 .544 .527 .544 .527 .544 .528 .549 .528	37 .810 .819 .822 .832 .832 .832 .834 .834 .535 .533 .524 .533 .524 .533 .524 .535 .520 .545 .535 .520 .519	38 .809 .825 .837 .836 .831 .753 .818 .753 .818 .841 .489 .483 .486 .484 .475 .502 .516 .500 .488 .475 .516	39 .8411 .8555 .858 .865 .862 .847 .783 .848 .872 .484 .481 .486 .475 .504 .487 .484 .486 .475 .514 .501 .487 .489 .471	40 .872 .878 .890 .890 .890 .873 .806 .873 .806 .870 .897 .504 .506 .503 .507 .504 .506 .503 .507 .504 .506 .503 .507 .504 .500 .501 .524 .510 .524 .512 .493 .484 .494	.834 .841 .839 .844 .816 .843 .834 .827 .838 .991 .971 .971 .971 .971 .976 .996 .940 .950
Population R. huanrenensis 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongchok 5 Pyeongchang 6 Hanso-ri 7 Oban-ri 8 Inje 9 Kapyeong 10 Donghae <i>R. dybowskii</i> 11 12 Cheongyang 13 Muju 14 Jangseong 15 Kurye 16 Haenam 17 Jeju 18 Keoje 19 Hadong 20 Yangsan 21 Donghae 22 Inje 23 Kanseong 24 Keojin 23 Kanseong 24 Keojin 25 Kapyeong	21 .610 .623 .627 .631 .626 .553 .634 .628 .006 .005 .006 .002 .012 .010 .029 .029 .029 .029 .029 .029 .029 .02	22 .586 .597 .604 .602 .606 .608 .604 .005 .004 .005 .004 .005 .004 .005 .002 .011 .028 .005 .005 .005 .005 .005 .967	23 .561 .568 .572 .574 .576 .575 .575 .006 .003 .004 .006 .008 .004 .006 .003 .004 .006 .003 .004 .005 .002 .005 .002 .002 .002 .002 .003 .005 .002 .005 .002 .005 .005 .005 .005	24 .570 .584 .586 .586 .513 .586 .514 .586 .514 .589 .001 .001 .001 .004 .004 .001 .001 .001	25 .588 .602 .605 .605 .533 .612 .606 .533 .612 .608 .000 .000 .000 .004 .000 .004 .000 .004 .000 .000 .000 .000 .000 .000	26 .587 .593 .596 .603 .599 .596 .522 .603 .599 .000 .000 .000 .000 .000 .000 .000	27 	28 .364 .377 .378 .363 .346 .317 .348 .346 .475 .456 .480 .462 .491 .533 .410 .462 .464 .478 .464 .433 .465	29 .445 .417 .434 .433 .453 .369 .411 .504 .503 .535 .535 .535 .533 .491 .496 .513 .496 .513 .496 .499	30 813 824 826 835 836 837 838 841 492 487 488 492 487 488 492 487 486 492 496 496 496 497 492 492 492 493 492 493 492 493 492 493 492 493 493 493 493 493 493 493 493	31 .769 .784 .787 .796 .773 .783 .783 .777 .714 .775 .799 .512 .508 .512 .504 .514 .515 .503 .512 .513 .514 .513 .514 .513 .514 .513 .514 .513 .514 .513 .514 .515 .513 .514 .515 .513 .514 .515 .513 .514 .515 .513 .515 .515 .515 .515 .515 .515	32 827 830 828 837 846 834 822 756 823 845 483 484 484 486 484 486 484 486 484 486 484 484	33 .638 .648 .646 .656 .651 .642 .582 .645 .645 .645 .443 .446 .445 .442 .440 .4461 .478 .442 .448 .452 .443 .421 .433 .421 .433	34 .751 .769 .774 .763 .754 .688 .753 .755 .507 .503 .502 .502 .502 .502 .502 .502 .502 .512 .512 .512 .512 .514 .505	35 .756 .779 .780 .781 .784 .773 .774 .770 .794 .526 .519 .521 .531 .531 .535 .551 .508 .501 .512	36 .738 .752 .751 .762 .762 .767 .767 .778 .748 .680 .744 .765 .544 .540 .544 .547 .552 .544 .552 .552 .546 .547 .552 .528 .537	37 810 819 832 824 832 824 834 834 535 533 525 533 525 552 552 552	38 .809 .825 .827 .837 .836 .831 .841 .483 .486 .481 .483 .484 .483 .484 .475 .516 .500 .488 .483 .484 .475 .510 .488 .483 .484 .475 .510 .500 .473 .464 .473 .472 .478	39 .841 .855 .858 .868 .868 .868 .862 .847 .783 .848 .848 .848 .842 .481 .481 .481 .481 .461 .504 .514 .504 .514 .487 .487 .447 .487 .447 .4	40 .872 .878 .890 .890 .897 .873 .806 .873 .806 .877 .504 .503 .507 .504 .503 .507 .503 .507 .531 .533 .531 .534 .524 .510 .512 .493 .499	.834 .841 .839 .844 .843 .834 .834 .827 .838 .991 .971 .971 .971 .971 .971 .971 .975 .940 .950 .940 .955 .979 .953
Population <i>R. huanrenensis</i> 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongdeok 5 Pyeongchang 6 Hanso-ri 7 Oban-ri 8 Inje 9 Kapyeong 10 Donghae <i>R. dybowskii</i> 11 Yangpyeong 12 Cheongyang 13 Muju 14 Jangseong 15 Kurye 16 Haenam 17 Jeju 18 Keoje 19 Hadong 20 Yangsan 21 Donghae 22 Inje 23 Kanseong 24 Keojin	21 .610 .623 .627 .631 .626 .553 .634 .634 .634 .634 .006 .005 .006 .005 .006 .005 .006 .005 .006 .005 .006 .005 .006 .007 .012 .010 .024 .007 .055 .955	22 .586 .593 .597 .604 .602 .606 .603 .604 .005 .004 .005 .004 .010 .011 .023 .006 .005 .000 .011 .023 .006 .005 .000 .005 .006 .005 .006 .005 .006 .005 .005	23 .561 .568 .565 .572 .572 .572 .578 .575 .575 .006 .003 .004 .004 .006 .008 .010 .006 .010 .010 .010 .002 .000 .002 .000 .002 .000	24 .570 .584 .581 .586 .586 .586 .586 .586 .586 .586 .586	25 .588 .602 .607 .605 .533 .612 .605 .533 .612 .605 .000 .000 .000 .000 .000 .000 .000	26 .587 .593 .599 .596 .522 .603 .529 .000 .000 .000 .000 .000 .000 .001 .003 .000 .000	27 	28 .385 .364 .377 .363 .356 .346 .346 .346 .475 .456 .456 .456 .462 .491 .533 .462 .462 .462 .464 .478 .454 .453 .460	29 .445 .417 .433 .406 .393 .369 .399 .411 .504 .515 .533 .535 .547 .513 .491 .496 .473 .491 .496 .479 .489	30 .813 .824 .835 .835 .836 .836 .838 .752 .816 .841 .487 .488 .487 .488 .487 .488 .490 .478 .519 .505 .492 .496 .477	31 .769 .784 .797 .796 .793 .777 .714 .775 .799 .512 .508 .512 .508 .512 .514 .505 .542 .518 .513 .514 .496	32 .827 .830 .828 .837 .837 .837 .846 .834 .822 .756 .823 .845 .823 .845 .483 .481 .484 .484 .484 .484 .484 .484 .485 .521 .521 .500 .491 .495 .474	33 .638 .648 .646 .656 .656 .642 .582 .645 .645 .445 .443 .446 .442 .444 .442 .440 .452 .448 .452 .433 .431	34 .751 .769 .774 .763 .774 .688 .775 .507 .503 .508 .508 .508 .508 .508 .508 .508 .508	35 .756 .779 .780 .781 .773 .712 .770 .773 .712 .770 .774 .526 .519 .522 .511 .524 .501 .523 .551 .523 .553 .501	36 .738 .752 .751 .762 .762 .767 .748 .680 .748 .680 .744 .745 .540 .544 .527 .544 .527 .544 .527 .544 .528 .549 .528	37 .810 .819 .822 .832 .832 .832 .834 .834 .535 .531 .536 .525 .533 .524 .533 .524 .535 .520 .545 .535 .520 .519	38 .809 .825 .837 .836 .831 .753 .818 .753 .818 .841 .489 .483 .486 .484 .475 .502 .516 .500 .488 .475 .516	39 .8411 .8555 .858 .865 .862 .847 .783 .848 .872 .484 .481 .486 .475 .504 .487 .484 .486 .475 .514 .501 .487 .489 .471 .463 .471	40 .872 .878 .890 .890 .890 .873 .806 .873 .806 .870 .897 .504 .506 .503 .507 .504 .506 .503 .507 .504 .506 .503 .507 .504 .500 .501 .524 .510 .524 .512 .493 .484 .494	.834 .841 .839 .844 .816 .843 .834 .827 .838 .991 .971 .971 .971 .971 .976 .996 .940 .950
Population R. huanrenensis J Jangseong Pohang C Pohang C Pohang C Pohang C Pohang C Pongdeok F Pyeongchang F Hanso-ri O Donghae R. dybowskii C Cheongyang C C C C C C C C C C C C C C C C C C C	21 .610 .623 .627 .631 .626 .553 .634 .628 .006 .005 .006 .002 .012 .010 .029 .029 .029 .029 .029 .029 .029 .02	22 .586 .597 .604 .602 .606 .608 .604 .005 .004 .005 .004 .010 .011 .028 .005 .006 .005 .006 .005 .006 .005 .005	23 .561 .568 .572 .574 .576 .575 .575 .006 .003 .004 .006 .008 .004 .006 .008 .003 .004 .006 .003 .004 .005 .002 .002 .002 .002 .002 .002 .003 .004 .005 .002 .002 .002 .003 .004 .005 .003 .004 .005 .005	24 .570 .584 .586 .586 .513 .586 .514 .586 .514 .592 .590 .001 .004 .004 .004 .000 .020 .020 .021 .001 .000 .021 .001 .00	25 .588 .602 .605 .605 .533 .615 .533 .612 .605 .533 .612 .000 .000 .000 .000 .000 .004 .000 .004 .000 .004 .000 .004 .002 .000 .004 .002 .002	26 .587 .593 .599 .596 .522 .596 .522 .000 .000 .000 .000 .000 .000 .000	27 	28 .364 .377 .378 .363 .356 .346 .317 .368 .466 .475 .456 .480 .462 .480 .462 .491 .462 .464 .433 .465 .474 .454	29 .445 .417 .434 .433 .466 .383 .369 .411 .504 .513 .535 .535 .535 .533 .491 .496 .513 .492 .479 .499 .504	30 813 824 826 835 836 837 830 818 752 487 488 486 492 487 486 492 519 505 505 505 505 492 496 477 483 477 483 477 483 477	31 .769 .784 .787 .796 .793 .778 .777 .714 .775 .502 .504 .512 .503 .514 .505 .514 .513 .514 .523 .549 .513 .513 .504 .503	32 827 830 828 837 846 834 822 756 833 481 484 486 484 486 484 486 484 486 484 486 484 486 484 484	33 .638 .646 .656 .656 .651 .642 .582 .645 .645 .645 .442 .443 .446 .445 .442 .440 .446 .442 .444 .452 .443 .421 .433 .421 .437 	34 .751 .769 .774 .763 .774 .688 .753 .755 .507 .503 .502 .502 .502 .502 .502 .502 .549 .549 .549 .541 .512 .512 .515 .512 .515 .505 .499 .499 	35 .756 .779 .780 .781 .784 .773 .774 .526 .519 .522 .511 .535 .551 .531 .535 .551 .508 .501 .512 .512 .512 .512	36 .738 .752 .751 .762 .762 .767 .777 .778 .748 .680 .744 .540 .544 .540 .544 .547 .544 .527 .544 .527 .552 .546 .547 .552 .554 .547 .552 .534 .537 .534 .537	37 810 819 832 824 824 834 834 535 533 525 533 525 570 545 552 570 510 528 528 528 528 528 528 528 528	38 .809 .825 .827 .837 .836 .831 .831 .818 .841 .483 .485 .483 .484 .475 .516 .500 .488 .483 .484 .475 .510 .500 .488 .483 .464 .472 .478 .476 .476 .476	39 841 855 858 868 865 862 847 783 848 848 848 848 481 486 475 504 4514 487 487 487 487 447 475 504 471 463 471 463 474	40 .872 .878 .890 .890 .897 .873 .806 .873 .806 .870 .504 .504 .503 .507 .504 .503 .507 .503 .507 .503 .531 .531 .534 .524 .510 .512 .493 .499 .499 .499 .496 -	.834 .841 .839 .844 .816 .827 .838 .991 .971 1.015 .996 .947 .971 .971 .975 .940 .950 .950 .955 .979 .950 .953 .956 -
Population R. huanrenensis 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongdeok 5 Pyeongchang 6 Hanso-ri 7 Oban-ri 8 Inje 9 Kapyeong 10 Donghae <i>R. dybowskii</i> 11 Yangpyeong 12 Cheongyang 13 Muju 14 Jangseong 15 Kurye 16 Haenam 17 Jeju 18 Keoje 19 Hadong 20 Yangsan 21 Donghae 22 Inje 23 Kanseong 24 Keojin 25 Kapyeong 24 Keojin 25 Kapyeong 24 Keojin 25 Kapyeong 24 Keojin 25 Kapyeong 24 Keojin 25 Kapyeong 26 Wonju 27 Tsushima Isl. <i>R. chensinensis</i> 28 Ninxia	21 .610 .623 .627 .631 .626 .553 .634 .628 .006 .005 .006 .005 .006 .002 .012 .010 .024 .010 .024 .007 .025 .950 .965 .950 .958 .884 .589	22 .586 .597 .604 .602 .606 .603 .604 .604 .604 .005 .002 .004 .005 .002 .000 .010 .010 .010 .010 .023 .005 .000 .959 .949 .848 .603	23 .561 .568 .565 .572 .574 .576 .575 .575 .575 .575 .006 .003 .004 .004 .004 .006 .008 .006 .008 .006 .002 .000 .002 .002 .002 .002 .002	24 .570 .584 .581 .586 .514 .593 .586 .514 .592 .001 .000 .001 .001 .004 .003 .001 .004 .003 .001 .004 .003 .001 .004 .005 .885 .885	25 .588 .602 .607 .605 .533 .612 .605 .533 .612 .608 .001 .000 .000 .000 .000 .004 .003 .004 .006 .000 .000 .000 .000 .000 .000	26 .587 .593 .596 .603 .596 .522 .603 .599 .599 .000 .000 .000 .000 .000 .000	27 - - - - - - - - - - - - -	28 .365 .364 .377 .363 .356 .346 .346 .346 .347 .348 .456 .480 .462 .491 .453 .464 .478 .464 .478 .464 .474 .474 .474	29 .445 .417 .433 .413 .369 .393 .369 .393 .369 .393 .411 .504 .515 .535 .473 .496 .513 .496 .513 .497 .498 .499 .499 .499 .499 .409 .504 .475 .504 .504 .504 .504 .505 .475 .475 .475 .475 .417 .417 .415 .415 .415 .415 .415 .415 .415 .415	30 .813 .824 .826 .835 .836 .838 .836 .838 .841 .492 .496 .478 .492 .496 .479 .492 .496 .479 .492 .496 .479 .492 .496 .477 .483 .478 .478 .519 .486 .478 .575	31 .769 .784 .796 .796 .793 .777 .714 .775 .508 .512 .504 .514 .505 .514 .515 .514 .514 .496 .490 .495 .504 .504 .504 .504 .504 .504 .504 .50	32 .827 .830 .828 .837 .846 .834 .837 .846 .822 .756 .845 .845 .845 .845 .845 .845 .481 .484 .484 .486 .502 .521 .501 .495 .474 .485 .474 .485 .475 .555	33 .638 .648 .646 .656 .656 .642 .582 .582 .645 .642 .443 .443 .445 .443 .445 .442 .443 .445 .448 .450 .442 .448 .421 .437 .421 .437 .513	34 .751 .769 .774 .763 .774 .763 .754 .688 .753 .507 .507 .507 .503 .508 .502 .508 .502 .518 .502 .514 .505 .514 .505 .514 .505 .514	35 .756 .779 .780 .781 .784 .773 .712 .770 .774 .519 .522 .511 .535 .522 .523 .501 .501 .502 .512 .512 .512 .512 .512 .512 .512 .51	36 .738 .752 .762 .765 .762 .766 .762 .765 .748 .680 .744 .540 .544 .532 .544 .532 .554 .547 .531 .554 .547 .531 .522 .528 .537 .534 .534 .	37 .810 .819 .822 .824 .824 .824 .824 .824 .824 .824 .824 .535 .525 .5	38 .809 .825 .827 .836 .831 .838 .818 .753 .818 .818 .489 .483 .484 .483 .484 .483 .484 .485 .516 .506 .488 .489 .473 .464 .478 .476 .572	39 .841 .855 .868 .865 .862 .847 .783 .848 .848 .847 .482 .484 .487 .482 .484 .485 .504 .514 .504 .514 .504 .477 .489 .471 .463 .471 .476 .514 .475 .514 .515 .514 .515 .514 .515 .514 .515 .514 .515 .514 .477 .489 .477 .515 .514 .515 .515	40 .872 .878 .880 .890 .890 .873 .806 .873 .806 .870 .504 .504 .504 .504 .503 .507 .500 .531 .538 .524 .538 .524 .538 .524 .538 .524 .538 .524 .512 .493 .494 .494 .496 - .577	.834 .841 .839 .844 .843 .834 .840 .827 .838 .991 .971 .971 .971 .971 .971 .971 .971
Population R. huanrenensis 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongdeok 5 Pyeongchang 6 Hanso-ri 7 Oban-ri 8 Inje 9 Kapyeong 10 Donghae <i>R. dybowskii</i> 11 Yangpyeong 12 Cheongyang 13 Muju 14 Jangseong 15 Kurye 16 Haenam 17 Jeju 18 Keoje 19 Hadong 20 Yangsan 21 Donghae 22 Inje 23 Kanseong 24 Keojin 25 Kapyeong 26 Wonju 27 Tsushima Isl. <i>R. chensinensis</i> 28 Ninxia 29 Quing	21 .610 .623 .627 .631 .626 .553 .634 .628 .006 .005 .006 .002 .012 .010 .029 .029 .029 .029 .029 .029 .029 .02	22 .586 .597 .604 .602 .606 .608 .604 .005 .004 .005 .004 .010 .011 .028 .005 .006 .005 .006 .005 .006 .005 .005	23 .561 .568 .572 .574 .576 .575 .575 .006 .003 .004 .006 .008 .004 .006 .008 .003 .004 .006 .003 .004 .005 .002 .002 .002 .002 .002 .002 .003 .004 .005 .002 .002 .002 .003 .004 .005 .003 .004 .005 .005	24 .570 .584 .586 .586 .513 .586 .514 .586 .514 .590 .001 .004 .004 .004 .000 .020 .020 .021 .001 .004 .000 .021 .001 .000 .021 .001 .000 .023 .001 .000 .023 .001 .000 .023 .001 .000 .023 .001 .000 .024 .025 .001 .000 .001 .0001 .001.001	25 .588 .602 .605 .605 .533 .615 .533 .612 .605 .533 .612 .000 .000 .000 .000 .000 .004 .000 .004 .000 .004 .000 .004 .002 .000 .004 .002 .002	26 .587 .593 .599 .596 .522 .596 .522 .000 .000 .000 .000 .000 .000 .000	27 	28 .364 .377 .378 .363 .356 .346 .317 .368 .466 .475 .456 .480 .462 .480 .462 .491 .462 .464 .433 .465 .474 .454	29 .445 .417 .434 .433 .466 .383 .369 .411 .504 .513 .535 .535 .535 .533 .491 .496 .513 .492 .479 .499 .504	30 813 824 826 835 836 837 830 818 752 487 488 486 492 487 488 492 519 505 505 505 505 492 496 477 483 477 483 477 483 477	31 .769 .784 .787 .796 .793 .778 .777 .714 .775 .502 .504 .512 .503 .514 .505 .514 .513 .514 .523 .549 .513 .513 .504 .503	32 827 830 828 837 846 834 822 756 833 481 484 486 484 486 484 486 484 486 484 486 484 486 484 484	33 .638 .646 .656 .656 .651 .642 .582 .645 .645 .645 .442 .443 .446 .445 .442 .440 .446 .452 .443 .421 .433 .421 .437 	34 .751 .769 .774 .763 .754 .688 .753 .755 .507 .503 .502 .502 .502 .502 .502 .502 .549 .549 .549 .541 .512 .512 .512 .515 .505 .499 .499 	35 .756 .779 .780 .781 .784 .773 .774 .526 .519 .522 .511 .535 .551 .531 .535 .551 .508 .501 .512 .512 .512 .512	36 .738 .752 .751 .762 .762 .767 .777 .778 .748 .680 .744 .540 .544 .540 .544 .527 .544 .522 .546 .547 .552 .528 .546 .547 .552 .528 .537 .534	37 810 819 832 824 824 834 834 535 533 525 533 525 570 545 552 570 510 528 528 528 528 528 528 528 528	38 .809 .825 .827 .837 .836 .831 .831 .818 .841 .483 .485 .483 .484 .475 .516 .500 .488 .483 .484 .475 .510 .500 .488 .483 .472 .472 .478 .476 .476	39 841 855 858 868 865 862 847 783 848 848 848 848 481 486 475 504 4514 487 487 487 487 447 475 504 471 463 471 463 474	40 .872 .878 .890 .890 .897 .873 .806 .873 .806 .870 .504 .504 .503 .507 .504 .503 .507 .503 .507 .503 .531 .531 .534 .524 .510 .512 .493 .499 .499 .499 .496 -	.834 .841 .839 .844 .816 .827 .838 .991 .971 1.015 .996 .947 .971 .971 .975 .940 .950 .950 .955 .979 .950 .953 .956 -
Population R. huanrenensis 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongdeok 5 Pyeongchang 6 Hanso-ri 7 Oban-ri 8 Inje 9 Kapyeong 10 Donghae <i>R. dybowskii</i> 11 Yangpyeong 12 Cheongyang 13 Muju 14 Jangseong 15 Kurye 16 Haenam 17 Jeju 18 Keoje 19 Hadong 20 Yangsan 21 Donghae 22 Inje 23 Kanseong 24 Keojin 25 Kapyeong 24 Keojin 25 Kapyeong 24 Keojin 25 Kapyeong 24 Keojin 25 Kapyeong 24 Keojin 25 Kapyeong 26 Wonju 27 Tsushima Isl. <i>R. chensinensis</i> 28 Ninxia 29 Quing <i>R. amurensis</i> 30 Haenam	21 .610 .623 .627 .631 .626 .553 .634 .628 .006 .005 .006 .002 .012 .010 .024 .007 .024 .007 .024 .007 .025 .950 .955 .950 .955 .955 .958 .884 .589 .584 .601	22 .586 .597 .604 .602 .606 .603 .604 .604 .604 .005 .002 .004 .005 .002 .000 .010 .010 .010 .010 .005 .000 .005 .000 .005 .000 .005 .000 .005 .007 .005 .006 .002 .005 .004 .005 .004 .005 .007 .007 .007 .007 .007 .007 .007	23 .561 .568 .565 .572 .574 .576 .575 .575 .575 .006 .003 .004 .004 .004 .004 .004 .006 .008 .006 .008 .006 .008 .001 .002 .000 .002 .002 .002 .002 .002	24 .570 .584 .581 .586 .514 .593 .586 .514 .592 .001 .000 .001 .000 .001 .004 .003 .001 .004 .001 .004 .001 .004 .005 .885 .885 .599 .594	25 .588 .602 .607 .605 .533 .612 .608 .608 .608 .001 .000 .000 .000 .000 .004 .003 .004 .000 .000	26 .587 .593 .589 .596 .596 .592 .599 .000 .000 .000 .000 .000 .000 .001 .002 .001 .002 .001 .002 .001 .000 .000	27 - - - - - - - - - - - - -	28 .365 .364 .3778 .363 .356 .346 .346 .475 .456 .480 .462 .491 .462 .491 .462 .494 .478 .462 .494 .478 .464 .478 .464 .474 .77 .905	29 .445 .417 .433 .415 .393 .369 .393 .369 .393 .411 .504 .515 .535 .415 .515 .515 .515 .515 .515 .513 .496 .513 .496 .514 .515 .515 .515 .513 .497 .499 .499 .499 .499 .499 .499 .499	30 .813 .824 .826 .835 .836 .838 .838 .838 .838 .841 .492 .492 .496 .479 .492 .496 .479 .492 .496 .479 .468 .477 .483 .478 .478 .479 .478 .479 .479 .478 .478 .478 .478 .479 .479 .478 .478 .478 .478 .478 .479 .479 .478 .478 .478 .478 .479 .478 .479 .479 .478 .478 .478 .478 .479 .479 .478 .479 .478 .479 .478 .479 .479 .478 .478 .479 .478 .479 .478 .479 .478 .479 .478 .479 .478 .479 .478 .478 .478 .478 .478 .479 .478 .571 .524 .524	31 .769 .784 .796 .793 .777 .714 .775 .508 .512 .504 .514 .505 .514 .505 .514 .513 .514 .513 .514 .503 .514 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .504 .504 .504 .504 .504 .504 .504	32 .827 .830 .828 .837 .846 .834 .837 .846 .822 .756 .823 .845 .845 .845 .845 .845 .845 .845 .481 .484 .484 .484 .484 .484 .485 .474 .485 .474 .465 .475 .509 .020	33 .638 .648 .646 .656 .642 .582 .645 .642 .582 .645 .443 .443 .443 .443 .443 .445 .448 .450 .442 .448 .450 .442 .447 .421 .437 .427 .513 .477	34 .751 .762 .759 .774 .688 .753 .754 .688 .753 .507 .503 .502 .503 .502 .508 .499 .546 .517 .512 .514 .505 .514 .505 .514 .505 .514 .505 .501 .501 .501 .501 .501 .501 .502 .514 .502 .514 .502 .514 .501 .501 .502 .514 .502 .514 .502 .514 .502 .514 .502 .514 .502 .514 .502 .514 .502 .514 .502 .514 .502 .514 .502 .503 .502 .503 .502 .503 .502 .503 .502 .503 .502 .503 .502 .503 .502 .504 .514 .502 .503 .502 .514 .502 .514 .502 .514 .502 .514 .502 .514 .502 .514 .502 .514 .502 .514 .514 .515 .502 .514 .515 .514 .514	35 .756 .779 .780 .781 .784 .773 .712 .774 .774 .519 .522 .511 .535 .522 .523 .501 .501 .502 .512 .512 .512 .512 .512 .512 .512 .51	36 .738 .752 .762 .767 .762 .767 .768 .765 .748 .680 .744 .540 .544 .532 .544 .532 .544 .527 .554 .547 .557 .554 .537 .554 .537 .534 .537 .534 .537 .534 .534	37 .810 .819 .822 .824 .824 .824 .824 .824 .535 .526 .525 .526 .525 .526 .525 .526 .525 .526 .526 .525 .526 .527 .526 .526 .526 .527 .526 .527 .527 .526 .527 .527 .526 .527 .527 .527 .526 .527 .526 .5	38 .809 .825 .827 .837 .836 .831 .818 .753 .818 .753 .818 .489 .483 .484 .483 .484 .485 .502 .516 .500 .478 .464 .478 .476 .478 .476 .527 .527 .001	39 .841 .855 .868 .868 .865 .862 .847 .783 .848 .847 .482 .487 .482 .484 .487 .482 .484 .475 .514 .504 .514 .514 .463 .471 .462 .467 .487 .487 .487 .514 .514 .514 .514 .476 .477 .521 .001	40 .872 .878 .880 .890 .897 .504 .504 .504 .504 .507 .504 .507 .500 .507 .500 .531 .538 .524 .538 .524 .538 .524 .538 .527 .507 .527 .006	.834 .841 .839 .844 .843 .834 .834 .827 .838 .991 .971 .971 .971 .971 .971 .971 .971
Population R. huanrenensis 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongchok 5 Pyeongchang 6 Hanso-ri 7 Oban-ri 8 Inje 9 Kapyeong 10 Donghae <i>R. dybowskii</i> 11 Yangpyeong 12 Cheongyang 13 Muju 14 Jangseong 15 Kurye 16 Haenam 17 Jeju 18 Keoje 19 Hadong 20 Yangsan 21 Donghae 22 Inje 23 Kanseong 24 Keojin 25 Kapyeong 26 Wonju 27 Tsushima Isl. <i>R. chensinensis</i> 28 Ninxia 29 Quing <i>R. amurensis</i> 30 Haenam 31 Kangwha	21 .610 .623 .621 .628 .627 .631 .626 .553 .634 .628 .006 .005 .006 .002 .012 .009 .029 .029 .029 .029 .029 .029 .02	22 .586 .598 .597 .604 .602 .606 .608 .604 .005 .004 .005 .004 .005 .004 .002 .010 .002 .011 .028 .005 .005 .005 .005 .005 .967 .949 .967 .588	23 .561 .568 .572 .574 .575 .576 .575 .006 .003 .004 .008 .004 .004 .004 .004 .004 .004	24 .570 .584 .581 .586 .513 .586 .514 .592 .590 .001 .001 .001 .001 .001 .001 .001 .0	25 .588 .602 .607 .609 .605 .533 .612 .608 .000 .000 .000 .000 .000 .003 .002 .000 .000	26 .587 .593 .596 .603 .529 .522 .599 .000 .000 .000 .000 .000 .000 .001 .002 .001 .003 .000 .004 .003 .000 .004 .004 .000 .000	27 - - - - - - - - - - - - -	28 .385 .364 .377 .378 .368 .366 .346 .348 .348 .368 .466 .475 .456 .480 .480 .480 .480 .481 .533 .410 .462 .474 .454 .454 .454 .454 .542	29 .445 .417 .434 .433 .466 .393 .369 .411 .504 .514 .515 .535 .535 .547 .499 .499 .504 .499 .504 .499 .504 .505 .574 .567	30 813 824 826 835 836 838 838 838 838 838 838 838	31 .769 .784 .787 .796 .793 .775 .775 .779 .512 .503 .512 .503 .512 .504 .513 .514 .505 .523 .513 .514 .513 .514 .513 .514 .503 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .505 .503 .504 .505 .503 .504 .505 .503 .504 .505 .505 .505 .505 .505 .505 .505	32 827 830 828 837 846 833 848 822 7566 823 843 483 484 484 486 502 521 485 500 491 486 500 491 486 500 491 486 500 491 480 480 480 480 480 480 480 480	33 .638 .648 .656 .656 .651 .642 .582 .645 .660 .442 .443 .446 .435 .440 .445 .440 .445 .440 .441 .445 .443 .441 .442 .443 .442 .443 .441 .442 .443 .442 .443 .442 .443 .442 .443 .442 .445 .513 .477 .074 .066	34 .751 .769 .759 .775 .763 .754 .688 .775 .503 .775 .503 .506 .502 .506 .540 .517 .512 .517 .512 .517 .512 .514 .505 .499	35 .756 .779 .780 .781 .784 .773 .712 .770 .794 .526 .519 .522 .511 .522 .511 .525 .511 .525 .511 .525 .512 .512	36 .738 .752 .751 .762 .762 .767 .767 .777 .748 .680 .544 .765 .544 .765 .544 .540 .544 .542 .547 .552 .546 .547 .552 .546 .547 .552 .547 .552 .547 .552 .546 .547 .552 .547 .552 .547 .552 .547 .552 .544 .547 .552 .546 .547 .552 .546 .547 .552 .546 .547 .552 .547 .552 .548 .547 .548 .547 .548 .548 .548 .548 .548 .548 .548 .548	37 810 819 832 824 832 824 834 535 531 525 533 524 552 545 537 545 537 545 537 545 545 552 510 528 529 510 528 528 529 500 519 528 548 548 548 548 548 548 548 54	38 .809 .825 .827 .837 .836 .831 .831 .848 .841 .489 .483 .486 .481 .484 .481 .485 .502 .516 .500 .488 .447 .502 .510 .473 .464 .475 .502 .517 .507 .572 .527 .001 .007	39 .841 .855 .858 .868 .868 .862 .847 .783 .848 .872 .484 .848 .872 .487 .481 .481 .487 .504 .514 .475 .504 .511 .477 .487 .487 .487 .487 .487 .487 .504 .514 .476 .515 .521 .001 .010	40 .872 .878 .880 .890 .890 .887 .873 .806 .887 .504 .503 .507 .504 .503 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .510 .511 .531 .531 .534 .524 .527 .527 .527 .006 .012	.834 .841 .839 .844 .843 .834 .834 .827 .838 .991 .971 .971 .971 .971 .971 .976 .996 .940 .950 .953 .958 .953 .955 .979 .953 .955 .979 .953 .955 .979 .953 .955 .979 .953 .955 .979 .953 .955 .979 .953 .956 .953 .956 .953 .956 .953 .956 .953 .956 .953 .956 .953 .956 .953 .956 .953 .956 .953 .955 .959 .955 .959 .955 .959 .955 .959 .955 .959 .955 .959 .955 .959 .955 .959 .955 .959 .955 .959 .955 .959 .955 .959 .955 .959 .955 .957 .956 .957 .957 .957 .957 .957 .957 .957 .957
Population R. huanrenensis 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongdeok 5 Pyeongchang 6 Hanso-ri 7 Oban-ri 8 Inje 9 Kapyeong 10 Donghae <i>R. dybowskii</i> 11 Yangseong 12 Cheongyang 13 Muju 14 Jangseong 15 Kurye 16 Haenam 17 Jeju 18 Keoje 19 Hadong 20 Yangsan 21 Donghae 22 Inje 23 Kanseong 24 Keojin 25 Kapyeong 26 Wonju 27 Tsushima Isl. <i>R. chensinensis</i> 28 Ninxia 29 Quing <i>R. amurensis</i> 30 Haenam 31 Kangwha 32 Sorae	21 .610 .623 .627 .631 .626 .553 .634 .628 .006 .005 .006 .002 .012 .010 .029 .024 .007 .029 .024 .007 .029 .029 .024 .007 .005 .950 .950 .958 .884 .589 .584 .681 .580 .601 .501 .501	22 .586 .597 .604 .602 .606 .608 .604 .005 .004 .005 .000 .010 .011 .028 .005 .000 .010 .010 .028 .005 .005 .005 .005 .005 .005 .005 .00	23 .561 .568 .572 .574 .576 .575 .006 .003 .004 .006 .008 .010 .004 .006 .008 .010 .005 .002 .949 .949 .949 .9452 .873 .614 .598	24 .570 .584 .586 .593 .586 .514 .586 .514 .592 .590 .001 .004 .001 .004 .000 .020 .020 .020 .001 .004 .000 .020 .021 .004 .004 .001 .004 .001 .004 .001 .001	25 .588 .602 .605 .533 .605 .533 .612 .533 .612 .000 .000 .000 .000 .000 .004 .016 .000 .004 .016 .000 .004 .004 .016 .000 .004 .000 .004 .007 .007 .007 .007	26 .587 .593 .599 .596 .603 .596 .522 .603 .599 .000 .000 .000 .000 .000 .000 .000	27 - - - - - - - - - - - - -	28 .385 .364 .377 .368 .363 .346 .317 .346 .456 .456 .450 .462 .491 .462 .491 .462 .491 .462 .491 .462 .444 .473 .465 .474 - .905 .548	29 445 417 433 415 383 369 .411 504 513 514 515 535 473 .496 513 496 513 496 513 497 498 .504 - .504 - .504 - .554	30 813 824 826 835 836 838 838 839 839 839 841 492 487 488 492 487 488 492 496 478 512 519 505 492 496 477 483 478 - 525 505 515 505 492 496 478 - 515 505 492 496 478 - 515 505 492 496 478 - 515 515 515 515 515 515 515	31 .769 .784 .796 .793 .787 .775 .775 .508 .512 .504 .514 .505 .523 .514 .513 .514 .505 .513 .514 .503 .504 .522 .504 .523 .504 .523 .504 .523 .504 .523 .504 .523 .504 .523 .504 .523 .504 .523 .504 .523 .504 .523 .504 .523 .504 .523 .504 .523 .504 .523 .504 .523 .504 .523 .504 .523 .504 .523 .504 .505 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .502 .504 .503 .504 .503 .504 .505 .504 .505 .504 .505 .504 .505 .504 .505 .504 .505 .504 .505 .504 .505 .505	32 827 830 828 837 846 834 834 834 845 845 484 484 486 484 486 484 486 494 496 491 495 521 500 491 495 502 521 500 849 491 495 850 80 80 80 80 80 80 80 80 80 80 80 80 80	33 .638 .648 .646 .656 .642 .582 .645 .642 .582 .645 .443 .443 .443 .443 .443 .445 .448 .450 .442 .448 .450 .442 .447 .421 .437 .427 .513 .477	34 .751 .769 .774 .763 .774 .688 .753 .503 .503 .502 .503 .502 .503 .502 .503 .502 .503 .502 .503 .502 .503 .502 .503 .502 .512 .512 .514 .505 .499 - .591 .541 .541 .541 .541 .541 .541 .541 .54	35 .756	36 .738 .752 .751 .762 .767 .762 .767 .778 .765 .748 .680 .744 .540 .544 .540 .544 .542 .544 .542 .546 .545 .546 .547 .552 .548 .547 .531 .534 . .522 .528 .533 .012 .023 .012	37 810 819 832 824 824 824 824 834 535 531 525 525 525 537 5525 552 5520 5520 5526 5527 5525 528 5255 528 5255 528 5255 526 527 528 525 525 526 527 527 527 528 525 527 527 527 527 527 527 528 527 527 527 527 527 527 527 527	38 809 825 827 837 836 831 838 841 483 486 483 484 483 484 483 484 483 484 483 484 483 484 483 484 483 484 484	39 841 855 868 865 862 887 482 484 487 482 484 485 487 482 484 485 504 514 487 487 487 487 487 487 487 48	40 .872 .878 .889 .890 .890 .897 .504 .506 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .507 .504 .507 .504 .507 .504 .507 .504 .507 .507 .504 .512 .493 .494 .499 .496 .577 .527 .025 .025 .025 .025 .025 .025 .025 .025 .025 .025 .025 .025 .025 .025 .025 .025 .027 .507 .504 .524 .524 .524 .524 .527 .006 .012 .025 .025	.834 .841 .839 .844 .843 .834 .834 .827 .838 .991 .971 .971 .971 .971 .971 .971 .971
Population R. huanrenensis 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongchok 5 Pyeongchang 6 Hanso-ri 7 Oban-ri 8 Inje 9 Kapyeong 10 Donghae <i>R. dybowskii</i> 11 Yangpyeong 12 Cheongyang 13 Muju 14 Jangseong 15 Kurye 16 Haenam 17 Jeju 18 Keoje 19 Hadong 20 Yangsan 21 Donghae 22 Inje 23 Kanseong 24 Keojin 25 Kapyeong 26 Wonju 27 Tsushima Isl. <i>R. chensinensis</i> 28 Ninxia 29 Quing <i>R. amurensis</i> 30 Haenam 31 Kangwha	21 .610 .623 .621 .628 .627 .631 .626 .553 .634 .628 .006 .005 .006 .002 .012 .009 .029 .029 .029 .029 .029 .029 .02	22 .586 .598 .597 .604 .602 .606 .608 .604 .005 .004 .005 .004 .005 .004 .002 .010 .002 .011 .028 .005 .005 .005 .005 .005 .967 .949 .967 .588	23 .561 .568 .572 .574 .575 .576 .575 .006 .003 .004 .008 .004 .004 .004 .004 .004 .004	24 .570 .584 .581 .586 .513 .586 .514 .592 .590 .001 .001 .001 .001 .001 .001 .001 .0	25 .588 .602 .607 .609 .605 .533 .612 .608 .000 .000 .000 .000 .000 .003 .002 .000 .000	26 .587 .593 .596 .603 .529 .522 .599 .000 .000 .000 .000 .000 .000 .001 .002 .001 .003 .000 .004 .003 .000 .004 .004 .000 .000	27 - - - - - - - - - - - - -	28 .385 .364 .377 .378 .368 .366 .346 .348 .348 .368 .466 .475 .456 .480 .480 .480 .480 .481 .533 .410 .462 .474 .454 .454 .454 .454 .542	29 .445 .417 .434 .433 .466 .393 .369 .411 .504 .514 .515 .535 .535 .547 .499 .499 .504 .499 .504 .499 .504 .505 .574 .567	30 813 824 826 835 836 837 838 838 839 839 841 492 487 488 492 487 488 492 487 486 492 496 497 498 477 483 477 483 477 483 477 483 477 483 477 483 477 483 477 483 477 483 477 483 477 483 477 483 477 483 477 483 478 477 487 478 478 477 487 478 478	31 .769 .784 .787 .796 .793 .775 .775 .779 .512 .503 .512 .503 .512 .504 .513 .514 .505 .523 .513 .514 .513 .514 .513 .514 .503 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .505 .503 .504 .505 .503 .504 .505 .503 .504 .505 .505 .505 .505 .505 .505 .505	32 827 830 828 837 846 833 848 822 7566 823 843 483 484 484 486 502 521 485 500 491 486 500 491 486 500 491 486 500 491 480 480 480 480 480 480 480 480	33 .638 .646 .656 .656 .651 .642 .582 .645 .545 .645 .545 .645 .545 .443 .446 .443 .446 .442 .444 .452 .443 .421 .437 - 513 .477 .074	34 .751 .769 .7769 .7769 .776 .763 .775 .503 .775 .503 .502 .502 .502 .502 .502 .502 .502 .502	35 .756 .779 .780 .781 .784 .773 .712 .770 .794 .526 .519 .522 .511 .522 .511 .525 .511 .525 .511 .525 .512 .512	36 .738 .752 .751 .762 .762 .767 .767 .777 .777 .778 .680 .544 .765 .544 .540 .544 .542 .547 .552 .546 .547 .552 .546 .547 .552 .546 .547 .552 .546 .547 .552 .546 .547 .552 .546 .547 .552 .546 .547 .552 .548 .547 .548 .548 .548 .548 .548 .548 .548 .548	37 810 819 832 824 832 824 834 535 531 525 533 524 552 545 537 545 537 545 537 545 545 552 510 528 529 510 528 528 529 500 519 528 548 548 548 548 548 548 548 54	38 .809 .825 .827 .837 .836 .831 .831 .848 .841 .489 .483 .486 .481 .484 .481 .485 .502 .516 .500 .488 .447 .502 .510 .473 .464 .475 .502 .517 .507 .572 .527 .001 .007	39 .841 .855 .858 .868 .868 .862 .847 .783 .848 .872 .484 .848 .872 .487 .481 .481 .487 .504 .514 .475 .504 .511 .477 .487 .487 .487 .487 .487 .487 .504 .514 .476 .515 .521 .001 .010	40 .872 .878 .880 .890 .890 .887 .873 .806 .887 .504 .503 .507 .504 .503 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .510 .511 .531 .531 .534 .524 .527 .527 .527 .006 .012	.834 .841 .839 .844 .843 .834 .840 .827 .838 .991 .971 .971 .971 .971 .971 .976 .996 .940 .953 .959 .953 .955 .979 .953 .955 .979 .955 .975 .953 .955 .975 .953 .955 .975 .953 .955 .975 .953 .955 .975 .953 .955 .953 .955 .959 .953 .955 .959 .953 .956 .953 .955 .959 .953 .956 .953 .955 .959 .955 .959 .955 .959 .955 .959 .955 .959 .955 .959 .955 .959 .955 .959 .955 .959 .955 .959 .955 .959 .955 .959 .955 .959 .955 .955 .955 .957 .955 .957 .955 .955
Population R. huanrenensis J Jangseong Pohang C Pohang C Pohang C Pohang C Pohang C Pongdeok Pereorgenation Per	21 .610 .623 .627 .631 .626 .553 .634 .628 .006 .005 .006 .002 .012 .010 .029 .024 .005 .950 .950 .950 .950 .955 .950 .958 .884 .589 .584 .601 .583 .601 .616 .583 .580	22 .586 .597 .604 .602 .606 .608 .604 .005 .004 .005 .004 .005 .002 .001 .010 .010 .010 .010 .028 .005 .000 .005 .000 .005 .000 .001 .005 .004 .005 .005	23 .561 .568 .572 .574 .576 .575 .575 .006 .003 .004 .006 .008 .010 .004 .018 .010 .005 .002 .002 .002 .002 .949 .949 .949 .949 .945 .873 .614 .598 .615 .591	24 .570 .584 .581 .586 .586 .586 .586 .586 .586 .590 .001 .004 .004 .001 .004 .005 .005 .006 .001 .004 .001 .004 .001 .004 .001 .004 .005 .599 .599 .599 .594	25 .588 .602 .607 .609 .605 .533 .612 .533 .612 .533 .612 .608 .000 .000 .000 .000 .000 .004 .016 .000 .000 .004 .003 .024 .016 .590 .000 .000 .000 .000 .000 .004 .005 .533 .584	26 .587 .593 .599 .596 .603 .596 .522 .599 .000 .000 .000 .000 .000 .000 .001 .003 .000 .001 .003 .000 .004 .004 .000 .000 .004 .000 .000 .000 .002 .589 .589 .000 .000 .000 .002 .019 .000 .000 .002 .019 .000 .000 .000 .000 .000 .000 .000	27 - - - - - - - - - - - - -	28 .385 .364 .3778 .363 .356 .346 .346 .475 .456 .462 .480 .462 .491 .462 .491 .462 .491 .462 .464 .473 .462 .464 .474 .475 .548 .554 .554 .554	29 445 417 433 415 406 393 369 399 411 504 513 535 473 491 553 535 473 496 513 496 513 496 513 496 513 496 514 504 - 554	30 813 824 826 835 836 837 838 839 839 839 841 492 487 488 4487 488 4487 488 4487 4488 4478 4487 4488 4478 4487 4488 4478 4478 4478 4488 44788 4478 4478	31 .769 .784 .796 .793 .796 .793 .777 .714 .775 .508 .512 .504 .514 .505 .514 .513 .544 .513 .514 .503 .504 .503 .504 .522 .504 .503 .504 .503 .504 .502 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .504 .504 .504 .504 .504 .505 .504 .504	32 827 .830 .828 .837 .846 .837 .846 .834 .843 .484 .484 .486 .484 .486 .484 .486 .420 .521 .521 .491 .491 .495 .474 .495 .509 .020 .019 .888 .952 .903	33 .638 .646 .656 .656 .656 .642 .582 .645 .645 .645 .443 .446 .443 .442 .443 .442 .443 .452 .448 .452 .448 .452 .448 .457 .477 .513 .477 .074 .074 .888	34 .751 .769 .774 .763 .774 .753 .503 .506 .502 .505 .502 .505 .502 .508 .540 .541 .512 .514 .505 .505 .505 .505 .505 .507 .512 .514 .505 .507 .501 .501 .501 .501 .501 .501 .501 .501	35 .756 .779 .780 .781 .784 .773 .712 .774 .526 .519 .522 .535 .551 .535 .551 .535 .551 .535 .551 .535 .522 .535 .551 .535 .522 .535 .512 .512 .512 .512 .512 .512 .512 .51	36 .738 .752 .762 .762 .767 .778 .765 .748 .680 .744 .540 .544 .540 .544 .542 .544 .545 .552 .544 .545 .552 .544 .547 .552 .528 .537 .534 - .532 .534 .533 .534 .533 .534 .533 .534 .533 .534 .535 .534 .537 .534 .532 .534 .532 .534 .534 .535 .534 .535 .534 .535 .534 .535 .534 .535 .534 .532 .534 .534 .534 .532 .534 .534 .534 .534 .545 .544 .540 .546 .546 .546 .546 .546 .546 .546 .546	37 810 819 832 824 824 824 834 834 535 525 525 570 545 552 570 545 552 570 545 552 570 545 525 570 545 525 527 537 535 525 527 537 535 525 527 537 535 525 527 537 537 535 525 525 527 537 537 535 525 527 537 537 537 537 537 537 537 53	38 809 825 827 837 836 831 838 831 841 483 486 475 502 516 500 488 489 473 484 475 502 516 500 473 473 464 472 527 500 1001 0072 001 0021 0021 0021 0021 002	39 841 855 868 865 862 847 783 848 848 848 848 848 848 848 848 447 544 4481 4481 4481 4481 504 514 4487 4487 4487 4487 4487 4487 4487 44	40 .872 .878 .8890 .890 .897 .873 .806 .877 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .512 .483 .494 .499 .496 .577 .527 .006 .0125 .092 .025 .036 .036	.834 .841 .839 .844 .843 .834 .840 .827 .838 .991 .971 .971 .971 .971 .971 .971 .971
Population R. huanrenensis 1 Jagseong 2 Pohang 3 Cheongsong 4 Yeongdeok 5 Pyeongchang 6 Hanso-ri 7 Oban-ri 8 Inje 9 Kapyeong 10 Donghae <i>R. dybowskii</i> 11 Yangpyeong 12 Cheongyang 13 Muju 14 Jangseong 15 Kurye 16 Haenam 17 Jeju 18 Keoje 19 Hadong 20 Yangsan 21 Donghae 22 Inje 23 Kanseong 24 Keojin 25 Kapyeong 26 Wonju 27 Tsushima Isl. <i>R. chensinensis</i> 29 Quing <i>R. amurensis</i> 30 Haenam 31 Kangwha 32 Sorae 33 Yangpyeong 34 Cheongjung 35 Yeongdong 36 Cheongyang	21 .610 .623 .627 .637 .626 .553 .634 .628 .006 .005 .006 .002 .012 .007 .029 .029 .029 .029 .029 .029 .029 .029	22 .586 .598 .597 .604 .602 .606 .608 .604 .005 .006 .005 .004 .005 .006 .005 .004 .005 .006 .005 .005	23 .561 .568 .565 .572 .574 .576 .577 .576 .003 .004 .003 .004 .004 .004 .004 .004	24 .570 .584 .581 .586 .513 .586 .514 .589 .589 .592 .590 .001 .001 .001 .001 .001 .001 .001 .0	25 .588 .602 .607 .609 .605 .533 .612 .616 .608 .000 .000 .000 .000 .003 .024 .016 .000 .000 .000 .000 .000 .000 .000	26 .587 .593 .596 .603 .599 .522 .603 .599 .000 .000 .000 .000 .000 .000 .000	27 - - - - - - - - - - - - -	28 .385 .364 .377 .378 .368 .366 .346 .348 .368 .466 .475 .456 .480 .462 .462 .464 .478 .464 .465 .474 .465 .474 .454 .454 .454 .454 .548 .548 .554 .554	29 .445 .417 .434 .433 .466 .393 .369 .411 .504 .514 .513 .535 .533 .535 .547 .499 .499 .504 .499 .504 .499 .505 .505 .544 .540	30 813 824 826 835 836 838 838 838 838 838 838 838	31 .769 .784 .787 .796 .793 .775 .775 .779 .512 .503 .512 .505 .512 .505 .512 .505 .512 .505 .512 .514 .514 .513 .514 .495 .503 .504 .514 .514 .515 .514 .516 .512 .518 .516 .512 .518 .516 .512 .518 .516 .518 .516 .518 .518 .518 .518 .519 .519 .519 .519 .519 .512 .512 .512 .512 .512 .512 .512 .512	32 .827 .830 .828 .837 .846 .834 .834 .833 .845 .483 .845 .483 .484 .486 .502 .521 .500 .495 .500 .495 .500 .495 .484 .474 .484 .475 .565 .509 .020 .019 .903 .916	33 .638 .648 .656 .656 .651 .642 .562 .645 .660 .442 .443 .446 .445 .440 .441 .478 .442 .443 .444 .452 .443 .447 .513 .442 .433 .447 .513 .447 .074 .060 .072 .917 .898	34 .751 .769 .769 .774 .763 .775 .503 .507 .503 .502 .503 .502 .503 .502 .503 .502 .503 .502 .503 .502 .503 .502 .503 .502 .503 .502 .503 .502 .503 .502 .503 .502 .505 .511 .511 .511 .014 .005 .012 .014 .005 .005 .005 .005 .005 .005 .005 .00	35 .756 .779 .780 .771 .784 .773 .712 .770 .794 .526 .511 .522 .511 .524 .511 .525 .511 .525 .511 .525 .511 .525 .512 .512	36 .738 .752 .751 .762 .762 .757 .777 .757 .748 .680 .544 .765 .544 .765 .544 .540 .544 .547 .552 .547 .552 .547 .552 .547 .531 .522 .546 .537 .534 .527 .534 .547 .532 .547 .531 .522 .547 .541 .542 .547 .544 .545 .547 .544 .545 .547 .545 .547 .545 .547 .545 .547 .545 .547 .545 .547 .545 .547 .545 .547 .545 .547 .545 .547 .545 .547 .545 .547 .545 .547 .545 .547 .545 .547 .545 .547 .545 .547 .545 .547 .547	37 .810 .819 .822 .824 .832 .824 .834 .535 .525 .524 .533 .525 .525 .526 .525 .526 .527 .525 .526 .527 .528 .525 .529 .528 .529 .528 .529 .529 .528 .529 .528 .529 .529 .528 .529 .528 .529 .529 .529 .528 .529 .529 .529 .528 .529 .000 .006 .018 .011	38 .809 .825 .827 .837 .836 .831 .848 .841 .489 .483 .486 .481 .484 .481 .484 .481 .484 .475 .502 .516 .500 .488 .473 .464 .473 .474 .572 .577 .001 .007 .021	39 .841 .855 .868 .868 .868 .862 .847 .783 .848 .872 .484 .481 .486 .475 .504 .514 .514 .514 .475 .504 .514 .471 .463 .471 .463 .471 .466 .474 .514 .515 .504 .551 .501 .551 .501 .010 .022 .021 .010 .021 .031	40 .872 .878 .889 .890 .890 .890 .873 .806 .873 .806 .870 .504 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .524 .510 .524 .512 .524 .512 .527 .006 .012 .028 .036 .036	.834 .841 .839 .844 .843 .834 .840 .827 .838 .991 .971 .971 .971 .971 .971 .976 .940 .950 .953 .975 .958 .953 .955 .959 .955 .955 .955 .955 .955
Population R. huanrenensis 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongdeok 5 Pyeongchang 6 Hanso-ri 7 Oban-ri 8 Inje 9 Kapyeong 10 Donghae <i>R. dybowskii</i> 11 Yangpyeong 12 Cheongyang 13 Muju 14 Jangseong 15 Kurye 16 Haenam 17 Jeju 18 Keoje 19 Hadong 20 Yangsan 21 Donghae 22 Inje 23 Kanseong 24 Keojin 25 Kapyeong 26 Wonju 27 Tsushima Isl. <i>R. chensinensis</i> 30 Haenam 31 Kangwha 32 Sorae 33 Yangpyeong 34 Cheongju 35 Yeongdong 36 Cheongyang 37 Yangsan	21 .610 .623 .627 .631 .626 .553 .634 .628 .006 .005 .006 .002 .012 .010 .029 .024 .005 .950 .950 .950 .950 .955 .950 .958 .884 .589 .584 .601 .583 .601 .616 .583 .580	22 .586 .597 .604 .602 .606 .608 .604 .005 .004 .005 .004 .005 .002 .001 .010 .010 .010 .010 .028 .005 .000 .005 .000 .005 .000 .001 .005 .004 .005 .005	23 .561 .568 .572 .574 .576 .575 .575 .006 .003 .004 .006 .008 .010 .004 .018 .010 .005 .002 .002 .002 .002 .949 .949 .949 .949 .945 .873 .614 .598 .614 .598 .615 .591	24 .570 .584 .581 .586 .586 .586 .586 .586 .586 .590 .001 .004 .004 .001 .004 .005 .005 .006 .001 .004 .006 .006 .001 .004 .006 	25 .588 .602 .607 .609 .605 .533 .612 .533 .612 .533 .612 .608 .000 .000 .000 .000 .000 .004 .016 .000 .000 .004 .003 .024 .016 .590 .000 .000 .000 .000 .000 .004 .005 .533 .584	26 .587 .593 .599 .596 .603 .596 .522 .599 .000 .000 .000 .000 .000 .000 .001 .003 .000 .001 .003 .000 .004 .004 .000 .000 .004 .000 .000 .000 .002 .589 .589 .000 .000 .000 .002 .019 .000 .000 .002 .019 .000 .000 .000 .000 .000 .000 .000	27 - - - - - - - - - - - - -	28 .385 .364 .3778 .363 .356 .346 .346 .475 .456 .462 .480 .462 .491 .462 .491 .462 .491 .462 .464 .473 .462 .464 .474 .475 .548 .554 .554 .554	29 445 417 433 415 406 393 369 399 411 504 513 535 473 491 553 535 473 496 513 496 513 496 513 496 513 496 514 504 - 554	30 813 824 826 835 836 837 838 839 839 839 841 492 487 488 4487 488 4487 488 4487 4488 4478 4487 4488 4478 4487 4488 4478 4478 4488 44788 4478 4478	31 .769 .784 .796 .793 .796 .793 .777 .714 .775 .508 .512 .504 .514 .505 .514 .513 .544 .513 .514 .503 .504 .503 .504 .522 .504 .503 .504 .503 .504 .502 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .504 .504 .504 .504 .504 .505 .504 .504	32 827 .830 .828 .837 .846 .837 .846 .834 .843 .484 .484 .486 .484 .486 .484 .486 .502 .521 .471 .491 .495 .473 .475 - .509 .020 .019 .888 .952 .903	33 .638 .646 .656 .656 .656 .642 .582 .645 .645 .645 .443 .446 .443 .442 .443 .442 .443 .452 .448 .452 .448 .452 .448 .457 .477 .513 .477 .074 .074 .888	34 .751 .769 .774 .763 .774 .753 .503 .506 .502 .505 .502 .505 .502 .508 .502 .503 .502 .503 .502 .503 .503 .503 .503 .504 .511 .511 .501 .501 .501 .501 .501 .501	35 .756 .779 .780 .781 .784 .773 .712 .774 .526 .519 .522 .535 .551 .535 .551 .535 .551 .535 .551 .535 .522 .535 .551 .535 .522 .535 .512 .512 .512 .512 .512 .512 .512 .51	36 .738 .752 .762 .762 .767 .778 .765 .748 .680 .744 .540 .544 .540 .544 .542 .544 .545 .552 .544 .545 .552 .544 .547 .552 .528 .537 .534 .537 .534 .537 .534 .537 .534 .537 .534 .537 .534 .537 .534 .537 .534 .537 .534 .540 .541 .541 .541 .542 .544 .540 .542 .544 .540 .544 .540 .544 .540 .544 .540 .544 .540 .552 .544 .540 .552 .544 .540 .544 .541 .541 .541 .541 .541 .541 .541	37 810 819 832 824 824 824 834 834 535 525 525 570 545 552 570 545 552 570 545 552 570 545 525 570 545 525 527 537 535 525 527 537 535 525 527 537 535 525 527 537 537 535 525 525 527 537 537 535 525 527 537 537 537 537 537 537 537 53	38 809 825 827 837 836 831 838 831 841 483 486 475 502 516 500 488 489 473 484 475 502 516 500 473 473 464 472 527 500 1001 0072 001 0021 0021 0021 0021 002	39 841 855 868 865 862 847 783 848 848 848 848 848 848 848 848 447 544 4481 4481 4481 4481 4481 504 514 4487 4487 4487 4487 4487 4487 4487 44	40 .872 .878 .8890 .890 .897 .873 .806 .877 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .512 .483 .494 .499 .496 .577 .527 .006 .0125 .092 .025 .036 .036	.834 .841 .839 .844 .843 .834 .834 .827 .838 .991 .971 .971 .971 .971 .971 .971 .971
Population R. huanrenensis 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongdeok 5 Pyeongchang 6 Hanso-ri 7 Oban-ri 8 Inje 9 Kapyeong 10 Donghae <i>R. dybowskii</i> 11 Yangpyeong 12 Cheongyang 13 Muju 14 Jangseong 15 Kurye 16 Haenam 17 Jeju 18 Keoje 19 Hadong 20 Yangsan 21 Donghae 22 Inje 23 Kanseong 24 Keojin 25 Kapyeong 26 Wonju 27 Tsushima Isl. <i>R. ehensinensis</i> 28 Oirae 39 Quing <i>R. amurensis</i> 30 Haenam 31 Kangwha 32 Sorae 33 Yangsan 34 Cheongju 35 Yeongdong 36 Cheongyang 37 Yangsan 38 Kyeongju <	21 .610 .623 .627 .637 .626 .553 .634 .628 .006 .005 .006 .002 .012 .005 .006 .002 .012 .007 .012 .007 .029 .029 .029 .029 .029 .029 .029 .029	22 .586 .598 .597 .604 .602 .606 .608 .604 .005 .006 .005 .004 .005 .006 .005 .596 .005 .596 .596 .557 .558 .606 .005 .558 .557 .558 .557 .558 .557 .558 .557 .558 .557 .558 .557 .558 .557 .558 .557 .558 .557 .558 .557 .558 .557 .558 .557 .558 .557 .558 .557 .558 .557 .558 .5578 .55	23 .561 .568 .565 .572 .574 .576 .577 .576 .003 .004 .003 .004 .003 .004 .004 .004	24 .570 .584 .581 .586 .514 .586 .514 .590 .001 .000 .001 .599 .599 .599 .599 .599 .599 .599 .599	25 .588 .602 .607 .609 .605 .533 .612 .608 .000 .000 .000 .000 .000 .000 .000	26 .587 .593 .596 .603 .529 .522 .603 .529 .000 .000 .000 .000 .000 .000 .000 .0	27 - - - - - - - - - - - - -	28 .385 .364 .377 .378 .368 .356 .346 .377 .368 .466 .475 .456 .480 .462 .480 .462 .481 .462 .464 .474 .465 .474 .465 .474 .542 .548 .542 .553 .520 .513 .518 .553	29 .445 .417 .434 .433 .466 .393 .369 .411 .504 .514 .515 .535 .535 .535 .473 .535 .535 .473 .491 .496 .513 .535 .535 .549 .540 .540 .544 .540 .544 .540 .548	30 813 824 826 835 836 837 838 838 838 838 838 838 838	31 .769 .784 .787 .796 .793 .775 .779 .512 .503 .512 .504 .513 .514 .513 .514 .513 .514 .513 .514 .513 .514 .513 .514 .513 .514 .513 .514 .513 .514 .513 .514 .513 .514 .515 .512 .518 .514 .514 .515 .514 .515 .514 .515 .515	32 827 830 828 837 846 833 845 483 483 484 484 484 484 484 484 484 484	33 .638 .648 .656 .656 .656 .642 .582 .645 .660 .442 .443 .446 .435 .442 .443 .446 .435 .442 .444 .433 .441 .432 .443 .441 .432 .443 .442 .433 .421 .433 .421 .513 .477 .074 .060 .072 .917 .893 .882 .888 .878	34 .751 .769 .7759 .7754 .688 .7754 .503 .775 .503 .775 .503 .505 .506 .502 .506 .517 .512 .514 .517 .512 .514 .505 .499 .555 .499 .555 .507 .512 .511 .511 .511 .511 .511 .511 .511	35 .756 .779 .780 .781 .784 .773 .712 .770 .794 .526 .519 .527 .511 .522 .511 .521 .551 .551 .551 .551	36 .738 .752 .751 .762 .762 .767 .767 .777 .748 .680 .544 .765 .544 .765 .544 .540 .544 .540 .544 .540 .544 .545 .547 .552 .546 .547 .552 .546 .547 .552 .546 .547 .552 .546 .547 .552 .546 .547 .552 .546 .547 .552 .546 .547 .552 .548 .547 .552 .548 .547 .552 .548 .547 .552 .548 .547 .552 .548 .547 .558 .548 .548 .548 .548 .548 .548 .548	37 810 819 832 824 832 824 834 535 531 525 533 525 534 552 570 510 519 528 528 529 510 519 528 528 529 510 519 528 528 529 510 519 528 528 529 510 519 528 528 529 510 519 528 528 529 510 519 528 528 529 510 519 528 528 529 510 519 528 528 529 510 519 528 528 529 510 510 510 510 510 510 510 510	38 .809 .825 .827 .837 .836 .831 .831 .841 .489 .483 .486 .481 .481 .483 .484 .483 .484 .483 .484 .485 .502 .516 .500 .488 .473 .464 .472 .527 .527 .001 .072 .001 .013 .010 .215 .011 .072	39 841 855 858 868 865 847 783 848 847 484 484 484 484 484 484	40 .872 .878 .889 .890 .890 .890 .873 .806 .873 .807 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .524 .506 .524 .507 .527 .006 .012 .025 .036 .012 .025 .036 .036 .036 .012 .025 .006 .036 .036 .036 .036 .036 .002 .006	.834 .841 .839 .844 .843 .834 .840 .827 .838 .991 .971 .971 .971 .971 .976 .940 .950 .953 .955 .979 .950 .953 .955 .955 .955 .955 .955 .955 .955
Population R. huanrenensis 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongdeok 5 Pyeongchang 6 Hanso-ri 7 Oban-ri 8 Inje 9 Kapyeong 10 Donghae <i>R. dybowskii</i> 11 Yangpyeong 12 Cheongyang 13 Muju 14 Jangseong 15 Kurye 16 Haenam 17 Jeju 18 Keoje 19 Hadong 20 Yangsan 21 Donghae 22 Inje 23 Kanseong 24 Keojin 25 Kapyeong 26 Wonju 27 Tsushima Isl. <i>R. chensinensis</i> 30 Haenam 31 Kangwha 32 Sorae 33 Yangpyeong 34 Cheongju 35 Yeongdong 36 Cheongyang 37 Yangsan 38 Kyeongju 39 Kangnung 40 Koseong	21 .610 .623 .627 .631 .626 .553 .634 .628 .006 .005 .006 .002 .012 .010 .029 .024 .0005 .020 .012 .010 .029 .024 .005 .950 .950 .9550 .9550 .9550 .9558 .884 .589 .584 .589 .584 .601 .580 .571 .580 .571 .580 .571 .580 .571 .580 .571 .580 .571 .580 .571 .580 .571 .571 .580 .575 .580 .575 .580 .575 .580 .575 .580 .575 .580 .575 .580 .575 .580 .575 .580 .575 .580 .575 .580 .575 .580 .575 .575 .575 .575 .575 .575 .575 .57	22 .586 .597 .604 .602 .606 .608 .604 .005 .004 .005 .004 .005 .002 .005 .002 .005 .002 .005 .002 .005 .002 .005 .002 .005 .002 .005 .002 .005 .002 .005 .002 .005 .002 .005 .002 .005 .002 .005 .002 .005 .004 .005 .002 .005 .002 .005 .004 .005 .002 .005 .004 .005 .002 .005 .004 .005 .002 .005 .004 .005 .004 .005 .004 .005 .004 .005 .002 .005 .004 .005 .004 .005 .004 .005 .004 .005 .002 .005 .004 .005 .004 .005 .004 .005 .002 .005 .004 .005 .002 .005 .005 .005 .005 .005 .005	23 .561 .568 .572 .574 .576 .575 .575 .575 .575 .575 .006 .003 .004 .006 .008 .010 .006 .003 .004 .006 .003 .004 .005 .002 .0002 .002 .002 .002 .002 .00	24 .570 .584 .586 .586 .586 .586 .586 .586 .586 .590 .001 .000 .001 .004 .003 .001 .004 .003 .001 .004 .003 .001 .004 .001 .004 .001 .004 .002 .001 .004 .001 .004 .002 .001 .004 .001 .004 .002 .001 .004 .005 .586 .586 .599 .595 .595 .595 .595 .595 .505 .505	25 .588 .602 .607 .609 .605 .533 .612 .608 .001 .000 .000 .000 .000 .004 .003 .004 .003 .004 .000 .000	26 .587 .593 .589 .596 .522 .603 .599 .599 .000 .000 .000 .000 .001 .002 .001 .003 .001 .002 .001 .003 .000 .004 .004 .004 .000 .000 .000	27 - - - - - - - - - - - - -	28 .385 .364 .377 .363 .356 .346 .346 .346 .455 .456 .480 .462 .491 .453 .450 .462 .491 .454 .454 .453 .464 .474 .454 .454 .548 .548 .548	29 445 417 433 415 509 411 504 509 498 514 515 515 515 515 515 515 515 515 513 492 499 499 499 499 504 - 504 504 505 - 574 558 558 554 554 554 570	30 813 824 826 835 836 830 818 752 816 487 488 487 488 486 477 488 477 488 477 488 477 488 477 488 478 - 505 505 479 492 496 479 498 477 488 479 498 479 499 499 499 499 499 499 499	31 .769 .784 .796 .793 .776 .793 .777 .714 .775 .508 .512 .504 .512 .504 .514 .505 .514 .505 .514 .505 .514 .513 .542 .513 .514 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .512 .514 .503 .514 .503 .514 .503 .514 .503 .514 .503 .514 .503 .514 .503 .514 .503 .514 .503 .514 .503 .514 .503 .504 .503 .514 .503 .504 .503 .514 .503 .504 .503 .504 .503 .514 .503 .504 .504 .503 .504 .504 .504 .504 .504 .504 .504 .504	32 827 830 828 837 846 833 845 845 845 845 845 845 845 845	33 638 646 656 656 656 642 582 582 582 582 582 582 582 582 582 58	34 .751 .769 .774 .763 .774 .763 .754 .688 .753 .507 .507 .507 .503 .508 .505 .502 .512 .512 .514 .505 .512 .514 .505 .514 .505 .512 .514 .505 .512 .514 .505 .512 .505 .512 .514 .505 .512 .505 .514 .505 .514 .505 .505 .514 .505 .514 .505 .514 .505 .505 .514 .505 .514 .505 .514 .505 .514 .505 .514 .505 .514 .505 .514 .505 .514 .514 .505 .514 .514 .505 .514 .514 .514 .514 .505 .514 .514 .514 .505 .514 .514 .505 .514 .515 .514 .505 .514 .515 .515 .515 .515 .515 .515 .51	35 .7566 .779 .780 .784 .773 .774 .526 .519 .522 .535 .551 .535 .551 .535 .551 .551 .551	36 .738 .752 .762 .762 .762 .765 .748 .680 .744 .540 .544 .547 .544 .532 .546 .547 .531 .546 .547 .531 .547 .531 .547 .531 .546 .547 .531 .546 .547 .534 .537 .534 .534 .537 .534 .537 .534 .537 .534 .537 .534 .532 .534 .537 .534 .534 .537 .534 .532 .534 .534 .532 .534 .534 .532 .534 .532 .534 .532 .534 .532 .534 .532 .534 .532 .534 .532 .534 .532 .534 .532 .534 .534 .532 .534 .532 .534 .534 .532 .534 .534 .534 .532 .534 .534 .534 .534 .534 .534 .534 .534	37 810 819 832 824 822 824 832 824 834 535 525 525 525 525 525 533 524 537 535 525 537 535 525 537 535 525 537 537 535 548 548 010 006 006 006 011 - 393	38 809 825 827 837 836 831 838 753 818 753 818 841 483 484 475 502 516 500 473 488 475 502 516 6 488 473 464 472 476 527 527 001 007 021 007 021 0021 0021 0021 00	39 841 855 868 865 862 847 783 848 848 848 848 848 848 848 848 848 447 504 4481 4481 4481 4481 4485 4474 4514 4487 4489 4471 4487 4483 4471 4483 4471 4483 4471 4483 4471 4484 504 504 504 504 504 504 504 1001 001 001 001	40 .872 .878 .880 .890 .890 .873 .806 .873 .806 .877 .504 .503 .507 .504 .503 .504 .503 .507 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .504 .503 .527 .504 .512 .483 .494 .496 - .577 .527 .006 .012 .025 .036 .036 .012	.834 .841 .839 .844 .843 .834 .834 .838 .840 .827 .838 .991 .971 .971 .971 .971 .971 .971 .971
Population R. huanrenensis 1 Jangseong 2 Pohang 3 Cheongsong 4 Yeongdeok 5 Pyeongchang 6 Hanso-ri 7 Oban-ri 8 Inje 9 Kapyeong 10 Donghae <i>R. dybowskii</i> 11 Yangpyeong 12 Cheongyang 13 Muju 14 Jangseong 15 Kurye 16 Haenam 17 Jeju 18 Keoje 19 Hadong 20 Yangsan 21 Donghae 22 Inje 23 Kanseong 24 Keojin 25 Kapyeong 26 Wonju 27 Tsushima Isl. <i>R. ehensinensis</i> 28 Oirae 39 Quing <i>R. amurensis</i> 30 Haenam 31 Kangwha 32 Sorae 33 Yangsan 34 Cheongju 35 Yeongdong 36 Cheongyang 37 Yangsan 38 Kyeongju <	21 .610 .623 .627 .637 .626 .553 .634 .628 .006 .005 .006 .002 .012 .005 .006 .002 .012 .007 .012 .007 .029 .029 .029 .029 .029 .029 .029 .029	22 .586 .598 .597 .604 .602 .606 .608 .604 .005 .006 .005 .004 .005 .006 .005 .596 .005 .596 .596 .557 .558 .558 .557 .558 .557 .558 .557 .558 .557 .558 .557 .558 .557 .558 .557 .558 .557 .558 .557 .558 .557 .558 .557 .558 .557 .558 .557 .558 .557 .558 .557 .558 .557 .558 .558	23 .561 .568 .565 .572 .574 .576 .577 .576 .003 .004 .003 .004 .003 .004 .004 .004	24 .570 .584 .581 .586 .514 .586 .514 .590 .001 .000 .001 .599 .599 .599 .599 .599 .599 .599 .599	25 .588 .602 .607 .609 .605 .533 .612 .608 .000 .000 .000 .000 .000 .000 .000	26 .587 .593 .596 .603 .529 .522 .603 .529 .000 .000 .000 .000 .000 .000 .000 .0	27 - - - - - - - - - - - - -	28 .385 .364 .377 .378 .368 .356 .346 .377 .368 .466 .475 .456 .480 .462 .480 .462 .481 .462 .464 .474 .464 .474 .465 .474 .542 .548 .542 .553 .520 .513 .518 .553	29 .445 .417 .434 .433 .466 .393 .369 .411 .504 .514 .515 .535 .535 .535 .473 .535 .535 .473 .491 .496 .513 .535 .535 .549 .540 .540 .544 .540 .544 .540 .548	30 813 824 826 835 836 837 838 838 838 838 838 838 838	31 .769 .784 .787 .796 .793 .775 .779 .512 .503 .512 .504 .513 .514 .513 .514 .513 .514 .513 .514 .513 .514 .513 .514 .513 .514 .513 .514 .513 .514 .513 .514 .513 .514 .515 .512 .518 .514 .514 .515 .514 .515 .514 .515 .515	32 827 830 828 837 846 833 845 483 483 484 484 484 484 484 484 484 484	33 .638 .648 .656 .656 .656 .642 .582 .645 .660 .442 .443 .446 .435 .442 .444 .445 .440 .445 .440 .442 .443 .441 .452 .444 .433 .421 .433 .421 .513 .477 .074 .060 .072 .917 .898 .882 .888 .878	34 .751 .769 .7759 .7754 .688 .7754 .503 .775 .503 .775 .503 .505 .506 .502 .506 .517 .512 .514 .517 .512 .514 .505 .499 .555 .499 .555 .507 .512 .511 .511 .511 .511 .511 .511 .511	35 .756 .779 .780 .781 .784 .773 .712 .770 .794 .526 .519 .521 .511 .522 .523 .551 .551 .551 .551 .551 .551 .551 .55	36 .738 .752 .751 .762 .762 .767 .767 .777 .748 .680 .544 .765 .544 .765 .544 .540 .544 .540 .544 .540 .544 .545 .547 .552 .546 .547 .552 .546 .547 .552 .546 .547 .552 .546 .547 .552 .546 .547 .552 .546 .547 .552 .546 .547 .552 .548 .547 .552 .548 .547 .552 .548 .547 .552 .548 .547 .552 .548 .547 .558 .548 .548 .548 .548 .548 .548 .548	37 810 819 832 824 832 824 834 535 531 525 533 525 534 552 537 535 524 537 535 524 537 535 526 537 535 527 535 545 537 535 545 537 535 546 519 528 528 529 510 519 528 528 529 510 519 528 528 528 510 519 528 528 529 510 519 528 528 529 510 519 528 528 528 531 536 537 535 537 535 537 535 537 535 537 535 538 539 539 539 539 539 539 539 539	38 .809 .825 .827 .837 .836 .831 .831 .841 .489 .483 .486 .481 .481 .483 .484 .483 .484 .483 .484 .485 .502 .516 .500 .488 .473 .464 .472 .527 .527 .001 .072 .001 .013 .010 .215 .011 .072 .011 .072	39 841 855 858 868 865 862 847 783 848 847 484 484 484 484 484 484	40 .872 .878 .889 .890 .890 .890 .873 .806 .873 .807 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .504 .503 .507 .524 .506 .524 .507 .527 .006 .012 .025 .036 .012 .025 .036 .036 .036 .012 .025 .006 .036 .036 .036 .036 .036 .002 .006	.834 .841 .839 .844 .843 .834 .840 .827 .838 .991 .971 .971 .971 .971 .971 .976 .940 .950 .953 .955 .979 .950 .953 .955 .955 .955 .955 .955 .955 .955