Brianna L. Peterson,[1] M.S.; Bing Su,[2] Ph.D.; Ranajit Chakraborty,[2] Ph.D.; Bruce Budowle,[3] Ph.D.; and R. E. Gaensslen,[1] Ph.D.

World Population Data for the HLA-DQA1, PM® and D1S80 Loci with Least and Most Common Profile Frequencies for Combinations of Loci Estimated Following NRC II Guidelines*

REFERENCE: Peterson BL, Su B, Chakraborty R, Budowle B, Gaensslen RE. World population data for the HLA-DQA1, PM® and D1S80 loci with least and most common profile frequencies for combinations of loci estimated following NRC II guidelines. J Forensic Sci 2000;45(1):118–146.

ABSTRACT: All published and unpublished gene frequency data for the PCR-based loci HLA-DQA1, LDLR, GYPA, HBGG, D7S8, GC, and D1S80 that could be located are presented in summary tables. These gene frequencies provide the data necessary for estimating probabilities of chance match according to NRC II guidelines for any DNA profile that includes any combination of these loci for any of the populations.

To illustrate the range of polymorphism for combined locus profiles, least and most common profile frequencies were estimated following NRC II guidelines for: the PM loci for all populations for which PM data were available; and for combinations of HLA-DQA1/PM, HLA-DQA1/D1S80, PM/D1S80, and HLA-DQA1/PM/D1S80 for populations for which data were available for the relevant combinations. The profile frequencies were calculated at θ values of zero and 0.01. Minimum allele frequencies (MAF) were calculated, and are shown, for each data set for which the MAF was greater than the lowest observed allele frequency. Least common profile frequencies were calculated using MAF in those cases to illustrate a conservative estimate. The effect of using MAF versus lowest observed allele frequency in estimating least common profile frequencies is briefly illustrated as well.

We finally show that aggregate U.S. gene frequency data for the classical MN and GC polymorphisms for both Caucasian and African-American populations is fully in accord with the DNA-based gene frequency data obtained from PM® reverse dot-blot strips for GYPA and GC, respectively.

KEYWORDS: forensic science, DNA typing, population data, population genetics, minimum allele frequency, world, HLA-DQA1, LDLR, GYPA, HBGG, D7S8, GC, D1S80, MN blood group system, NRC recommendations

Considerable allele and genotype frequency data have accumulated for world populations for the commonly used PCR-based loci HLA-DQA1, PM, and D1S80. Allele frequencies are needed to estimate the probability of a chance match for a DNA profile following guidelines 4.1 and 4.10 set forth in the second report of the National Research Council, or NRC II (1). So far as we know, no complete compilation of world population allele frequencies has been published to make the vast majority of the data available in one place. The primary purpose of this communication is to fulfill that need.

We also provide an estimate of the least and most common profile frequencies for the various locus combinations following NRC II guidelines to give an illustration of the ranges of the polymorphism. Least common profile frequencies were conservatively estimated using minimum allele frequencies (MAF) where applicable, and a brief illustration of the effect of MAF on the estimates is provided.

Finally, aggregate U.S. gene frequency data for the classical MN and GC polymorphisms for both Caucasian and African-American populations are shown to be fully in accord with the DNA-based gene frequency data obtained from PM® reverse dot-blot strips for GYPA and GC, respectively, based on the χ^2 statistic.

Methods

All the published communications known to us to containing relevant data that could be located were consulted. Relevant data from unpublished compilations to which we had access, as well as data personally communicated to one or more of the authors, were also included. World populations are organized according to the models followed by Mourant et al. (2) and Rivas et al. (3), i.e., by continent, then by country, then by major racial/ethnic group, then by population or location. Frequencies of all alleles observed, rounded to three places, are reported.

Minimum allele frequencies (MAF) were estimated with 95% confidence for HLA-DQA1, the PM®, and the D1S80 loci for each

[1] Graduate student and professor, respectively, Forensic Science Program, College of Pharmacy, University of Illinois at Chicago, Chicago IL. BLP's present address: Georgia Bureau of Investigation, Northwestern Regional Forensic Science Laboratory, Trion, GA.

[2] Post-doctoral research associate and the Allen King professor, respectively, Human Genetics Center, School of Public Health, University of Texas Health Sciences Center, Houston, TX.

[3] Senior scientist, Federal Bureau of Investigation, Laboratory Division, FBI Academy, Quantico, VA.

* Some of this work was presented to the faculty of the University of Illinois at Chicago by BLP in partial fulfillment of the requirements for the degree Master of Science.

Supported in part by interagency agreement 98-VB-R-018 between the Board of Trustees of the University of Illinois and the National Institute of Justice, U.S. Department of Justice, Washington, DC.

Opinions offered and conclusions reached herein are those of the authors, and do not represent the official views of the National Institute of Justice, the F.B.I. or the U.S. Department of Justice.

Received 12 Feb. 1999; and in revised form 3 May and 28 June 1999; accepted 29 June 1999.

TABLE 1—*HLA-DQA allele frequencies.*

NORTH AMERICA			Reference	N*	1.1	1.2	1.3	2	3	4	4.1	4.2/4.3	4.2	4.3	MAF†
	Canada														
		CAUCASIAN													
			8	187	0.139	0.153	0.06	0.133	0.212		0.246		0.019	0.008	
		Newfoundland	9	50	0.15	0.18	0.09	0.16	0.16		0.22		0.03	0.01	
		Ontario	‡	180	0.139	0.225	0.056	0.103	0.161	0.317					
		Ontario	‡	121	0.186	0.116	0.198	0.157	0.099	0.244					
		Toronto	Cited in 3	114	0.145	0.237	0.057	0.092	0.162	0.307					
		AFRICAN AMERICAN													
		Ontario	‡	111	0.135	0.320	0.045	0.126	0.117	0.257					
		Toronto	Cited in 3	108	0.134	0.319	0.042	0.125	0.116	0.264					
		ASIAN													
		Ontario	‡	109	0.124	0.206	0.078	0.046	0.216	0.33					
	U.S.	CAUCASIAN													
			10	174	0.126	0.244	0.043	0.135	0.167	0.285					
			10	413	0.137	0.197	0.085	0.109	0.201	0.271					
			11	161	0.168	0.196	0.056	0.134	0.168	0.28					
			8	224	0.144	0.119	0.073	0.154	0.188		0.207		0.03	0.027	
			Cited in 3	182	0.157	0.19	0.077	0.14	0.179	0.258					
			§	105	0.119	0.214	0.052	0.095	0.229	0.291					
			Cited in 3	928	0.136	0.204	0.073	0.112	0.188	0.287					
			Cited in 3	293	0.143	0.186	0.078	0.155	0.172	0.265					
			12	84	0.14	0.17	0.11	0.04	0.26	0.27					
			13	199	0.153	0.191	0.06	0.151	0.196		0.224	0.025			
			14	148	0.122	0.176	0.041	0.118	0.216	0.328					
			§	200	0.158	0.19	0.073	0.145	0.193		0.215	0.028			
		Alabama	Cited in 3	300	0.133	0.222	0.06	0.132	0.215	0.238					
		Alabama	‡	100	0.09	0.265	0.085	0.125	0.195	0.24					
		California	‡	151	0.139	0.166	0.063	0.149	0.219	0.265					
		Florida	15	914	0.131	0.2	0.053	0.137	0.187	0.292					
		Florida	‡	116	0.129	0.160	0.06	0.142	0.194	0.315					
		Illinois	Cited in 3	198	0.154	0.217	0.04	0.159	0.162	0.268					
		Indiana	Cited in 3	211	0.135	0.19	0.057	0.135	0.199	0.284					
		Indiana	‡	170	0.124	0.229	0.074	0.124	0.188	0.262					
		Indiana - Marion County	16	185	0.124	0.238	0.068	0.127	0.176	0.268					
		Maryland	‡	65	0.146	0.192	0.1	0.085	0.192	0.285					
		Minnesota	Cited in 3	100	0.11	0.155	0.065	0.13	0.2	0.34					
		Minnesota	‡	200	0.128	0.16	0.07	0.115	0.208	0.32					
		Missouri	‡	99	0.141	0.237	0.066	0.131	0.141	0.283					
		Nebraska	Cited in 3	212	0.134	0.219	0.073	0.123	0.163	0.288					
		Nevada	‡	113	0.146	0.199	0.071	0.111	0.124	0.35					
		New Jersey	17	164	0.152	0.207	0.07	0.152	0.146		0.247	0.024			
		New York City/Hasidic	18	101	0.14	0.1	0.15	0.13	0.21		0.23		0.03	0.01	0.015
		New York City/Non-Hasidic	18	107	0.15	0.12	0.08	0.15	0.21		0.25		0.02	0.01	0.014
		New York Buffalo	Cited in 3	104	0.144	0.183	0.063	0.13	0.159	0.322					
		New York Suffolk County	Cited in 3	343	0.128	0.188	0.074	0.136	0.179	0.294					
		New York Suffolk County	‡	538	0.131	0.180	0.079	0.125	0.176	0.31					
		Oregon	Cited in 3	103	0.126	0.17	0.087	0.15	0.194	0.272					
		Pennsylvania	‡	117	0.115	0.162	0.094	0.120	0.184	0.325					
		Utah	19	133	0.135	0.207	0.045	0.132	0.214		0.226	0.034			
		Virginia	20	150	0.123	0.18	0.087	0.147	0.15	0.313					
		Virginia	‡	90	0.139	0.217	0.044	0.139	0.2	0.261					

TABLE 1—*(Continued).*

	Reference	N*	1.1	1.2	1.3	2	3	4	4.1	4.2/4.3	4.2	4.3	MAF†
AFRICAN AMERICAN													
	10	172	0.113	0.294	0.038	0.111	0.122	0.323					
	11	61	0.197	0.262	0.049	0.09	0.074	0.328					
	8	129	0.128	0.262	0.047	0.105	0.093		0.212		0.135	0.014	
	Cited in 3	191	0.118	0.34	0.063	0.128	0.089	0.262					
	§	98	0.163	0.276	0.051	0.092	0.097	0.321					
	14	145	0.117	0.314	0.055	0.097	0.079	0.338					
	Cited in 3	199	0.143	0.317	0.038	0.106	0.085	0.312					
	13	206	0.112	0.308	0.051	0.078	0.148		0.189	0.114			
	20	193	0.137	0.256	0.044	0.117	0.101	0.345					
	§	200	0.125	0.33	0.058	0.13	0.09		0.185	0.083			
Alabama	‡	100	0.125	0.255	0.025	0.15	0.09	0.355					
California	10	224	0.15	0.263	0.045	0.121	0.118	0.304					
California - Oakland	Cited in 3	121	0.12	0.281	0.045	0.124	0.12	0.31					
California	‡	152	0.099	0.352	0.046	0.095	0.092	0.316					
Florida	15	734	0.154	0.294	0.041	0.102	0.089	0.32					
Florida	‡	100	0.13	0.305	0.065	0.11	0.085	0.305					
Florida	‡	67	0.157	0.321	0.03	0.090	0.075	0.328					
Illinois	Cited in 3	195	0.136	0.282	0.044	0.105	0.1	0.333					
Indiana	Cited in 3	235	0.157	0.323	0.04	0.098	0.113	0.268					
Indiana	‡	197	0.17	0.300	0.031	0.091	0.112	0.297					
Indiana - Marion County	16	203	0.167	0.310	0.022	0.089	0.111	0.300					
Maryland	‡	100	0.1	0.25	0.045	0.09	0.17	0.345					
Minnesota	Cited in 3	101	0.144	0.297	0.035	0.084	0.124	0.317					
Minnesota	‡	104	0.144	0.293	0.034	0.087	0.125	0.317					
Missouri	‡	100	0.12	0.3	0.055	0.09	0.105	0.33					
Nevada	‡	105	0.176	0.291	0.048	0.095	0.114	0.276					
New Jersey	17	285	0.139	0.281	0.042	0.119	0.081		0.211	0.128			
New York Buffalo	Cited in 3	92	0.12	0.293	0.027	0.152	0.109	0.299					
New York Suffolk County	Cited in 3	140	0.168	0.3	0.036	0.071	0.118	0.307					
NY - Suffolk County	‡	273	0.159	0.304	0.048	0.088	0.108	0.293					
Oregon	Cited in 3	111	0.095	0.23	0.063	0.099	0.077	0.437					
Pennsylvania	‡	100	0.13	0.28	0.065	0.11	0.12	0.295					
Virginia	‡	102	0.132	0.314	0.039	0.142	0.118	0.255					
HISPANIC													
	10	146	0.116	0.202	0.038	0.075	0.236	0.332					
	§	200	0.105	0.13	0.053	0.115	0.218		0.27	0.11			
	11	53	0.123	0.151	0.038	0.047	0.226	0.415					
	Cited in 3	100	0.14	0.105	0.065	0.11	0.21	0.37					
	Cited in 3	138	0.109	0.109	0.047	0.072	0.232	0.431					
	20	126	0.127	0.135	0.04	0.087	0.222	0.389					
California	‡	155	0.097	0.126	0.045	0.084	0.265	0.384					
Florida	‡	100	0.145	0.11	0.07	0.115	0.21	0.35					
Florida West Palm Beach	15	200	0.095	0.11	0.085	0.115	0.19	0.405					
Indiana	Cited in 3	30	0.133	0.117	0.1	0.067	0.267	0.317					
Nevada	‡	100	0.1	0.125	0.03	0.085	0.26	0.4					
New Jersey	17	127	0.154	0.146	0.059	0.122	0.213		0.228	0.079			
New York-Suffolk County	‡	184	0.145	0.167	0.068	0.090	0.216	0.314					
Oregon	Cited in 3	103	0.155	0.117	0.034	0.102	0.272	0.32					
Pennsylvania	‡	100	0.155	0.16	0.065	0.11	0.26	0.25					
Southeastern	14	94	0.181	0.154	0.08	0.16	0.191	0.234					
Southwestern	13	208	0.103	0.125	0.031	0.103	0.24		0.269	0.127			

TABLE 1—*(Continued)*

			Reference	N*	1.1	1.2	1.3	2	3	4	4.1	4.2/4.3	4.2	4.3	MAF†
		Southwestern	14	96	0.141	0.135	0.031	0.094	0.229	0.37					
		Virginia	‡	92	0.114	0.196	0.038	0.092	0.255	0.304					
		NATIVE AMERICAN													
		Alaska	‡	117	0.034	0.009	0	0.004	0.385	0.568					0.013
		Alaska Barrow Eskimo	Cited in 3	97	0.149	0.052	0.015	0.015	0.34	0.428					
		Alaska Bethel Eskimo	Cited in 3	103	0.029	0.005	0	0	0.369	0.597					
		Alaska-North Slope	21	102	0.147	0.049	0.015	0.015	0.338	0.436					
		Bethel-Wade Hampton	21	115	0.03	0.009	0	0	0.383	0.578					0.0129
		Minnesota	Cited in 3	199	0.121	0.078	0.033	0.055	0.384	0.329					
		Navajo	22	81	0.086	0.012	0.012	0	0.179	0.71					0.0183
		Navajo	Cited in 3	74	0.027	0	0	0.034	0.169	0.77					
		Pueblo	22	103	0.058	0.01	0.015	0.034	0.121	0.762					0.0144
		Sioux	22	79	0.038	0.051	0.006	0.019	0.494	0.392					0.023
		Sioux	Cited in 3	100	0.03	0.045	0.005	0.045	0.505	0.37					
		Tlingit	8	51	0.02	0.069	0.029	0.02	0.176		0.588		0.078	0.01	
		Tlingit	23	62	0.04	0.09	0.04	0.01	0.17		0.53		0.11	0.02	
		Zuni	Cited in 3	50	0.02	0	0	0	0.21	0.77					
MEXICO		Hispanic	10	169	0.08	0.056	0.012	0.05	0.435	0.367					
	Mexico City		10	100	0.09	0.09	0.04	0.08	0.295	0.405					
			§	230	0.085	0.085	0.020	0.054	0.317	0.439					
CARIBBEAN															
		Cartagena Mulatto	24	47	0.181	0.202	0.074	0.074	0.127	0.342					
		Florida Haitian	15	176	0.153	0.33	0.023	0.091	0.097	0.307					
		Haitian	Cited in 3	103	0.121	0.32	0.034	0.107	0.087	0.33					
		UK Afro-Caribbean	25	202	0.136	0.329	0.047	0.089	0.119	0.28					
		UK Jamaican	26	82	0.205	0.253	0.041	0.082	0.075		0.185		0.158		
		West Indies	Cited in 3	124	0.157	0.286	0.052	0.125	0.129	0.25					
SOUTH AMERICA															
	Argentina	Buenes Aires	§	99	0.152	0.116	0.091	0.076	0.202	0.364					
	Bolivia	Quechua	27	108	0.014	0.005	0.009	0.005	0.481	0.486					
	Brazil	Rio de Janeiro/Caucasian	28	95	0.163	0.142	0.074	0.147	0.221	0.253					
		Rio de Janeiro/African	28	72	0.139	0.243	0.049	0.083	0.125	0.361					
		Sao Paulo/Caucasian	29	144	0.184	0.125	0.087	0.125	0.163	0.316					
		Sao Paulo/Mulatto	29	53	0.104	0.283	0.066	0.085	0.132	0.33					
	Chile	Santiago	30	130	0.127	0.085	0.031	0.123	0.235	0.4					
	Columbia	Bogota	31	151	0.166	0.123	0.05	0.083	0.282	0.298					
	Ecuador	Capaya	Cited in 3	100	0	0	0	0	0.56	0.44					
AFRICA															
	Algeria		32	43	0.24	0.21	0.01	0.11	0.22		0.2		0.01	0	
	Algeria	Oran region	33	47	0.106	0.117	0.064	0.149	0.149		0.383		0.011	0.021	
	Algeria (West)		34	106	0.208	0.17	0.057	0.118	0.151	0.297					
	Nigeria		10	12	0.083	0.417	0.042	0.167	0	0.292					
			‡	67	0.127	0.418	0.03	0.164	0.060	0.202					
	South Africa		8	88	0.059	0.271	0.072	0.053	0.091		0.208		0.192	0	
		Khoi (Hottentot)	8	92	0.12	0.413	0.065	0.005	0.255		0.125		0.016	0	
		San (Bushman)	8	75	0	0.185	0.087	0	0.578		0.058		0.073	0.007	
	Zimbabwe		‡	106	0.132	0.344	0.123	0.057	0.047	0.297					
MIDDLE EAST															
		Arab	Cited in 3	195	0.115	0.297	0.074	0.095	0.118	0.3					
		Arab Moslems	35	94	0.085	0.138	0.165	0.096	0.138	0.378					
	Abu Dhabi	Pakistani	36	100	0.18	0.297	0.16	0.105	0.11	0.315					

TABLE 1—*(Continued)*.

				Reference	N*	1.1	1.2	1.3	2	3	4	4.1	4.2/4.3	4.2	4.3	MAF†
		Dubai	Arab	Cited in 3	132	0.083	0.337	0.057	0.087	0.117	0.318					
			Arab	37	173	0.09	0.306	0.055	0.113	0.116	0.321					
			Arab	38	195	0.115	0.297	0.074	0.095	0.118	0.3					
			Bedouin	10	33	0.076	0.242	0.121	0.197	0.136	0.227					
			Pakistani	38	117	0.197	0.128	0.162	0.098	0.073	0.342					
		Israel	Jewish	Cited in 3	107	0.187	0.089	0.07	0.164	0.196	0.294					
		Polish Jewish		12	33	0.17	0.3	0	0.14	0.2	0.21					
	Kuwaiti	Arab		39	220	0.152	0.211	0.057	0.168	0.136	0.275					
	Pakistan	Punjabi		40	115	0.127	0.118	0.18	0.149	0.075		0.325	0.026			
	Saudia Arabia			§	208	0.082	0.188	0.089	0.192	0.168	0.281					
	Qatar	Doha		41	200	0.078	0.213	0.085	0.193	0.15	0.283					
ASIA																
	China	Beijing,Guan County		42	91	0.121	0.148	0.115	0.137	0.286	0.192					
		Beijing, Xian		43	171	0.117	0.143	0.12	0.117	0.278	0.225					
		Hong Kong		44	95	0.121	0.195	0	0.026	0.342	0.316					
		Hong Kong, Singapore		43	135	0.096	0.23	0.059	0.048	0.285	0.281					
		Shanghai		45	89	0.045	0.163	0.163	0.096	0.287		0.157		0	0.09	
		Shenyang		46	250	0.112	0.174	0.092	0.128	0.258	0.236					
		Singapore		8	71	0.042	0.198	0.056	0.028	0.326		0.208		0.016	0.096	
		Uygur		43	92	0.136	0.12	0.152	0.19	0.147	0.255					
	India	Asian UK		25	191	0.17	0.136	0.202	0.107	0.086	0.298					
	India	Bengali		40	81	0.173	0.130	0.142	0.290	0.086		0.08	0.099			
		Hindu (Indiana US)		Cited in 3	420	0.21	0.102	0.233	0.144	0.118	0.193					
		South		47	495	0.2	0.101	0.238	0.143	0.122	0.195					
	Indonesia			10	144	0.226	0.469	0.028	0.024	0.056	0.198					
	Japan			48	916	0.123	0.121	0.169	0.008	0.423		0.087		0.031	0.031	
				49	86	0.105	0.279	0.064	0.006	0.430	0.116					
				50	290	0.11	0.162	0.195	0.004	0.407		0.066		0.04	0.017	
				10	92	0.087	0.12	0.228	0.005	0.446	0.114					
				§	89	0.084	0.118	0.236	0.006	0.444		0.073	0.039			0.017
		Gunma Prefecture		51	110	0.127	0.164	0.227	0.005	0.354	0.123					0.014
		Kanto		52	142	0.127	0.197	0.169	0.007	0.38	0.12					
		San Francisco		12	30	0.083	0.23	0.05	0	0.47	0.17					
		Wajin		8	334	0.124	0.126	0.198	0.006	0.394		0.103		0.025	0.019	
	Korea			8	100	0.152	0.192	0.116	0.075	0.282		0.108		0.01	0.025	
				53	206	0.136	0.167	0.133	0.053	0.337	0.172					
		Seoul		54	116	0.155	0.121	0.116	0.039	0.362	0.207					
	Malaysia	Chinese		55	125	0.104	0.176	0.076	0.04	0.288	0.316					
		Indians		55	137	0.204	0.124	0.226	0.131	0.157	0.157					
		Malay		55	130	0.181	0.192	0.069	0.077	0.1	0.381					
	Pakistan	Pakistani		Cited in 3	117	0.197	0.128	0.162	0.098	0.073	0.342					
	Phillipines	Filipino		Cited in 3	97	0.129	0.438	0.077	0.005	0.139	0.211					
	Taiwan			56	98	0.066	0.163	0.128	0.046	0.296	0.301					
		Chinese		57	305	0.093	0.164	0.085	0.028	0.328	0.302					
		Taipei		58	105	0.1	0.181	0.114	0.024	0.319	0.262					
		Taipei		Cited in 3	500	0.114	0.176	0.074	0.048	0.279	0.309					
	Thailand	Thai		8	139	0.295	0.22	0.014	0.044	0.197		0.107		0	0.083	
	Vietnam	Vietnamese		Cited in 3	215	0.163	0.116	0.058	0.07	0.272	0.321					
EUROPE																
	Austria			59	85	0.171	0.153	0.077	0.206	0.124	0.271					
	Belgium			60	200	0.154	0.204	0.092	0.131	0.128		0.273		0.016	0.002	
	Czechoslovakia			61	99	0.152	0.157	0.081	0.212	0.076	0.323					

TABLE 1—*(Continued).*

		Reference	N*	1.1	1.2	1.3	2	3	4	4.1	4.2/4.3	4.2	4.3	MAF†
Croatia	Dobrinj	62	28	0.161	0.268	0.143	0.071	0.036		0.304		0.018		
	Dubasnica	62	23	0.087	0.174	0.239	0.044	0.152		0.304		0		
	Northern	63	97	0.108	0.268	0.057	0.119	0.139	0.309					
	Omisalj	62	8	0.375	0.125	0.125	0	0		0.375		0		
	Poljica	62	11	0.182	0.182	0.136	0	0.091		0.409		0		
	Punat	62	8	0.25	0.438	0	0	0.063		0.25		0		
	Southern	63	94	0.133	0.266	0.096	0.064	0.07	0.372					
	Vrbnik	62	28	0.268	0.071	0.071	0.036	0		0.518		0.036		
Denmark		8	55	0.164	0.218	0.082	0.145	0.209		0.145		0.027	0.009	
		64	146	0.161	0.216	0.093	0.113	0.188	0.229					
		Cited in 3	67	0.172	0.209	0.112	0.127	0.157	0.224					
Finland		65	112	0.174	0.201	0.067	0.058	0.174	0.326					
	Oulu	66	76	0.16	0.14	0.13	0.06	0.22		0.2		0.05	0.02	
France		33	105	0.12	0.19	0.07	0.12	0.16		0.3		0.02	0.02	
		67	108	0.148	0.204	0.111	0.088	0.157	0.292					
		19	266	0.135	0.207	0.045	0.132	0.214		0.226	0.034			
		8	180	0.172	0.16	0.063	0.126	0.143		0.277		0.036	0.006	
		‡	45	0.111	0.167	0.067	0.167	0.1	0.389					
		68	110	0.164	0.173	0.08	0.208	0.132	0.243					
		69	73	0.158	0.185	0.110	0.144	0.137	0.267					
	Antilles	‡	124	0.157	0.286	0.052	0.125	0.129	0.25					
Germany		70	212	0.158	0.205	0.085	0.101	0.144	0.307					
		8	90	0.096	0.123	0.064	0.126	0.14		0.299		0.047	0.011	
		71	302	0.140	0.210	0.093	0.136	0.112	0.308					
	Aachen	72	107	0.126	0.215	0.014	0.136	0.108	0.402					
	S. Bavaria	73	213	0.106	0.185	0.08	0.134	0.16	0.336					
	Dusseldorf	72	579	0.143	0.223	0.050	0.127	0.151	0.307					
	Dusseldorf	74	163	0.166	0.181	0.055	0.117	0.160	0.322					
	Dusseldorf	75	159	0.154	0.230	0.069	0.104	0.135	0.308					
	Frankfurt	76	100	0.12	0.19	0.08	0.16	0.15	0.29					
	Ulm	72	168	0.122	0.226	0.086	0.158	0.098	0.310					
	Wuppertal	74	149	0.141	0.232	0.077	0.091	0.168	0.292					
Greece		8	54	0.185	0.167	0.056	0.093	0.148		0.333		0.019	0	
	Cyprus	77	107	0.192	0.313	0.042	0.047	0.121		0.28	0.005			0.0139
Greenland	Eskimo/Inuit	78	42	0.095	0.06	0.048	0	0.31	0.488					
Holland		‡	155	0.203	0.203	0.097	0.110	0.119	0.268					
		79	157	0.207	0.198	0.096	0.112	0.121	0.270					
Hungary	Baranya	80	135	0.23	0.144	0.185	0.078	0.044	0.319					
	Budapest	81	180	0.169	0.142	0.131	0.103	0.114	0.342					
	Caucasians	82	163	0.187	0.187	0.107	0.089	0.114	0.316					
	Caucasians	83	363	0.198	0.156	0.096	0.102	0.119	0.329					
Italy		84	117	0.154	0.154	0.051	0.158	0.056	0.427					
		85	1486	0.167	0.180	0.061	0.133	0.078	0.381					
		8	492	0.166	0.171	0.08	0.115	0.076		0.352		0.023	0.004	
		86	200	0.175	0.19	0.043	0.13	0.053	0.41					
		87	251	0.18	0.17	0.07	0.13	0.08	0.37					
	Ancona	88	103	0.185	0.209	0.063	0.160	0.044	0.34					
	Campania	89	110	0.14	0.1	0.04	0.18	0.12	0.42					
	N	90	227	0.152	0.163	0.053	0.15	0.081		0.357		0.029	0.015	
	Rome	91	100	0.145	0.193	0.07	0.123	0.079	0.39					
	Sardinia	8	91	0.138	0.233	0.022	0.055	0.097		0.421		0	0.005	

TABLE 1—*(Continued).*

		Reference	N*	1.1	1.2	1.3	2	3	4	4.1	4.2/4.3	4.2	4.3	MAF†
Norway		92	181	0.13	0.22	0.07	0.12	0.2		0.22		0.04	0	
	Trondheim	93	129	0.132	0.24	0.089	0.089	0.24	0.209					
Portugal	Alentejo	94	81	0.154	0.16	0.13	0.123	0.123	0.309					
	Algarve	94	31	0.194	0.194	0.048	0.081	0.145	0.339					
	Azores Islands	94	57	0.175	0.149	0.088	0.14	0.158	0.289					
	Coimbra	95	125	0.16	0.116	0.116	0.132	0.164	0.312					
	Estramadura	94	182	0.137	0.118	0.104	0.195	0.132	0.313					
	Lisbon	96	120	0.188	0.104	0.1	0.142	0.138	0.329					
	Madeira Island	94	149	0.171	0.138	0.091	0.191	0.121	0.289					
	North	97	325	0.172	0.154	0.092	0.175	0.159	0.248					
	Oporto	Cited in 3	325	0.172	0.154	0.092	0.175	0.158	0.248					
	South	96	104	0.135	0.164	0.115	0.188	0.139	0.26					
	South	98	106	0.208	0.113	0.113	0.170	0.090	0.307					
	South	99	234	0.192	0.143	0.1	0.160	0.113	0.291					
Romania		8	68	0.19	0.264	0.057	0.066	0.101		0.3		0.015	0	
Slovenia		§	535	0.173	0.202	0.064	0.122	0.110	0.330					
Spain		8	166	0.156	0.118	0.081	0.182	0.202		0.206		0.033	0.003	
		Cited in 3	206	0.16	0.153	0.087	0.167	0.109	0.323					
	Andalucia	100	120	0.157	0.183	0.079	0.187	0.104	0.287					
	Andalusia	101	174	0.201	0.121	0.081	0.147	0.132	0.319					
	Aragon	102	122	0.148	0.131	0.062	0.197	0.111	0.353					
	Asturias	102	194	0.18	0.129	0.106	0.116	0.126	0.343					
	Barcelona	103	178	0.163	0.146	0.098	0.124	0.124	0.345					
	Basque	Cited in 3	211	0.187	0.173	0.102	0.216	0.104	0.218					
	Basque-Alava	104	43	0.221	0.174	0.105	0.174	0.093	0.233					
	Basque-Guipuzcoa	104	47	0.202	0.181	0.096	0.223	0.138	0.16					
	Basque-Vizcaya	104	56	0.196	0.170	0.071	0.179	0.107	0.279					
	Basque	105	208	0.156	0.184	0.087	0.158	0.153		0.238		0.021	0.002	
	Basque	105	206	0.19	0.180	0.101	0.204	0.108		0.18		0.034	0.002	
	Cantabria	106	130	0.185	0.154	0.058	0.204	0.131	0.269					
	Catalonia	107	110	0.155	0.15	0.096	0.123	0.105	0.373					
	Catalonia	108	195	0.162	0.139	0.059	0.2	0.121	0.321					
	Central Pyrenees	109	106	0.137	0.217	0.066	0.16	0.17	0.25					
	Galicia	110	178	0.183	0.197	0.096	0.104	0.087		0.334				
	Gypsies	8	73	0.293	0.153	0.115	0.044	0.065		0.225		0.014	0	
	Madrid	111	237	0.116	0.162	0.063	0.154	0.133	0.371					
	North-East	112	244	0.162	0.143	0.066	0.203	0.125	0.301					
	Teruel	109	99	0.187	0.162	0.076	0.172	0.126	0.278					
	Valencia	113	107	0.182	0.098	0.075	0.201	0.154	0.29					
Sweden		8	99	0.157	0.212	0.025	0.086	0.242		0.227		0.045	0.005	
	Lund	114	177	0.102	0.249	0.062	0.088	0.24	0.26					
	Stockholm	114	84	0.137	0.214	0.083	0.071	0.268	0.226					
Switzerland		115	227	0.134	0.17	0.086	0.167	0.119	0.324					
	Basel	116	200	0.148	0.193	0.095	0.15	0.145	0.27					
Turkey		117	150	0.19	0.193	0.123	0.07	0.157	0.267					
		118	361	0.149	0.168	0.097	0.103	0.129	0.356					
U.K.		119	177	0.161	0.184	0.042	0.133	0.237		0.22		0.017	0.006	
	England	25	201	0.139	0.189	0.052	0.142	0.209	0.269					
	London	120	70	0.15	0.179	0.029	0.119	0.2	0.329					
OCEANIA														
Australia		10	16	0.188	0.063	0.188	0.063	0.281	0.219					
		12	18	0.056	0.056	0.17	0.083	0.36	0.22					

TABLE 1—*(Continued).*

		Reference	N*	1.1	1.2	1.3	2	3	4	4.1	4.2/4.3	4.2	4.3	MAF†
	Aborigine	121	38	0.303	0.132	0.329	0	0.132		0.105		0	0	
	Aborigine	Cited in 3	132	0.235	0.144	0.28	0.004	0.223	0.114					
	Victorian	122	250	0.129	0.194	0.061	0.146	0.159	0.311					
	White	121	280	0.15	0.195	0.082	0.148	0.164		0.261				
Guam	Chamorro	123	97	0.144	0.216	0.062	0.062	0.227		0.119	0.17			
	Filipino	123	97	0.098	0.351	0.082	0.057	0.211		0.062	0.139			
Melanesia	Fiji Viti Levu	124	57	0.026	0.219	0.114	0	0.246		0.395		0		
	Madang	124	65	0.031	0.385	0.015	0	0.046		0.523		0		
	New Caledonia	124	65	0.146	0.246	0.092	0.015	0.162		0.331		0.008		
	New Guinea	12	62	0.19	0.31	0.056	0.016	0.21	0.22					
	Papau New Guinean Highlan	124	57	0.228	0.465	0.097	0	0.149		0.061		0		
	Papua New Guinea Highland	8	191	0.202	0.444	0.073	0	0.111		0.131		0	0.003	
	Papua New Guinea	10	134	0.28	0.403	0.056	0.004	0.157	0.101					
	Rabaul	124	60	0.208	0.167	0.05	0	0.192		0.383		0		
Micronesia	Kiribati	125	62	0.153	0.129	0.113	0	0.202		0.024		0	0.379	
	Nauru	125	67	0.067	0.328	0.052	0	0.157		0.082		0.03	0.284	
Polynesia	Maori	126	177	0.127	0.057	0.088	0.025	0.24	0.463					
	Niue	125	70	0.093	0.036	0.1	0.014	0.314		0.378		0.05	0.021	
	Pacific Islander	126	98	0.087	0.051	0.133	0.01	0.434	0.286					
	Rarotonga	125	78	0.115	0.045	0.064	0.006	0.365		0.372		0.026	0.006	
	West Samo, Tokelau	125	51	0.108	0.098	0.098	0.02	0.353		0.314		0.01	0	
N. Zealand	Caucasians	126	127	0.138	0.205	0.047	0.15	0.177	0.283					
Java	frequency.	125	77	0.188	0.13	0.026	0.11	0.046		0.02		0	0.481	

* Represents number of individuals.
† Minimum allele frequency.
‡ TWDGAM data.
§ Personal communication.

population according to Budowle et al. (4), and are given in the tables in cases where MAF was greater than an observed allele frequency. In a few instances, MAF was estimated according to $5/2N$ (1) for purposes of illustration. For those populations where MAF was greater than one or more observed allele frequencies—those for which MAF are shown in the tables—the MAF was used in calculating the least common profile for that system or locus for that population.

In calculations based on Budowle et al. (4), the method based on the predictions of the infinite allele model was used for D1S80; the method based solely on sample size was used for HLA-DQA1 and PM loci.

Least common profiles were calculated assuming homozygosity for the least common allele, or the MAF, whichever was greater, at all the loci. Most common profiles were calculated using most common genotypes. Least common profiles for a few combinations of loci were calculated using MAF as well as the least common observed allele frequency to illustrate the effect of using MAF, as well as the effect of population size on MAF. All the estimated profile frequencies (probabilities of chance match among unrelated individuals in the population) were calculated using NRC, a computer program (and a component of the DNAType suite of programs) written by Ranajit Chakraborty and Yixi Zhong (5). Least common and most common profiles frequencies are abbreviated as LC and MC, respectively, in the tables, and all the values are reciprocal probability of chance match frequencies, i.e., they should be read as "1 in" the stated value. Briefly, NRC II 4.1 recommends calculating homozygous genotype frequencies as $p^2 + p(1-p)\theta$ and heterozygous genotype frequencies as $2p_ip_j$, where p is the allele frequency in the homozygous type, θ is a parameter to correct for potential population substructure, and p_i and p_j are allele frequencies for the alleles comprising a heterozygous genotype. A conservative value for θ for the U.S. population is 0.01 (1).

NRC II 4.10 recommends calculating homozygous genotype frequencies as:

$$P(A_iA_i|A_iA_i) = \frac{[2\theta + (1-\theta)p_i][3\theta + (1-\theta)p_i]}{(1+\theta)(1+2\theta)}$$

and heterozygous genotype frequencies as

$$P(A_iA_j|A_iA_j) = \frac{2[\theta + (1-\theta)p_i][\theta + (1-\theta)p_j]}{(1+\theta)(1+2\theta)}$$

where A_i and A_j designate the members of an allelic pair, p_i and p_j are their individual frequencies, respectively, and θ has the same meaning as described above. Least and most common profile frequencies were calculated with $\theta = 0$ and with $\theta = 0.01$. Because most common profile frequencies are calculated as heterozygotes for the most common alleles, the values are the same for NRC 4.1 and 4.10 when $\theta = 0$, but different for 4.10 when $\theta = 0.01$. Similarly, least common profile frequencies calculated as homozygotes for the least common allele (or MAF) are identical when $\theta = 0$, but different for 4.1 and 4.10 when $\theta = 0.01$. The least and most common profile frequencies were calculated to illustrate the

TABLE 2-1—*D1S80 allele frequencies—Part 1. Alleles 13–28.*

NORTH AMERICA			Reference	N*	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
	CANADA																			
		NATIVE AMERICAN																		
		Dogrib Indian	127	68	0			0		0.338	0.184	0	0.007	0	0.007	0.184	0.103	0	0	0
		CAUCASIAN																		
			128	99		0	0	0	0	0.293	0.01	0.02	0.025	0.045	0.02	0.328	0.035	0.015	0.056	0.066
			129	718			0	0.001	0.002	0.237	0.003	0.018	0.021	0.038	0.012	0.378	0.046	0.02	0.007	0.063
			130	94						0.293	0.011	0.021	0.032	0.043	0.016	0.335	0.037	0.016	0	0.059
			†	148				0.007	0.003	0.23	0.003	0.027	0.024	0.044	0.014	0.341	0.061	0.003	0.01	0.064
			†	193				0.003		0.259	0.003	0.036	0.016	0.036	0.008	0.355	0.047	0.016	0.003	0.042
			‡	200						0.238	0.01	0.043	0.015	0.03	0.008	0.35	0.038	0.015	0.013	0.063
		Alabama	†	100						0.25	0.015	0.025	0.02	0.015	0.01	0.355	0.03	0.035	0.005	0.025
		Alabama	†	151				0.01		0.225		0.02	0.027	0.036	0.02	0.354	0.05	0.02	0.01	0.053
		Minnesota	131	113		0.004		0	0	0.248	0.004	0.013	0.031	0.066	0.018	0.35	0.031	0.018	0.004	0.035
		Minnesota	†	145		0.004				0.252	0.004	0.021	0.031	0.055	0.014	0.345	0.045	0.024	0.004	0.041
		Nevada	†	104						0.284		0.024	0.019	0.024	0.014	0.317	0.043	0.01	0.005	0.053
		Texas	132	192				0.003	0	0.258	0.003	0.036	0.013	0.034	0.008	0.362	0.047	0.016	0.003	0.042
		Virginia	†	108					0.005	0.296		0.019	0.028	0.042	0.009	0.329	0.042	0.014		0.06
		AFRICAN AMERICAN	133	200		0	0	0.002	0.039	0.069	0	0.022	0.163	0.071	0.035	0.2	0.051	0.014	0.004	0.133
			129	606			0	0.002	0.028	0.073	0.003	0.032	0.115	0.081	0.014	0.234	0.045	0.006	0.008	0.13
			†	145					0.024	0.072		0.031	0.083	0.09	0.024	0.228	0.048		0.014	0.141
			‡	200					0.048	0.098	0.003	0.033	0.115	0.088	0.023	0.193	0.023	0.008	0.013	0.153
		Alabama	†	100				0.005	0.04	0.06		0.045	0.145	0.095	0.025	0.215	0.045	0.01	0.005	0.13
		California	†	152					0.053	0.099		0.023	0.102	0.079	0.007	0.214	0.043	0.01	0.013	0.132
		Minnesota	131	143		0		0.004	0.025	0.112	0.004	0.032	0.112	0.08	0.011	0.196	0.056	0	0.021	0.143
		Missouri	†	144				0.004	0.024	0.108	0.004	0.031	0.111	0.08	0.01	0.194	0.059		0.021	0.146
		Nevada	†	104		0.005		0.01	0.034	0.087		0.034	0.082	0.087	0.019	0.221	0.029		0.024	0.154
		Texas	132	193				0	0.031	0.08	0	0.034	0.135	0.052	0.018	0.199	0.057	0.01	0.016	0.148
		Virginia	†	116					0.035	0.052		0.039	0.095	0.091	0.022	0.237	0.069	0.013	0.009	0.116
		HISPANIC	133	200		0	0	0.009	0.007	0.266	0.007	0.02	0.031	0.049	0.011	0.268	0.069	0.027	0.025	0.065
			†	201				0.008	0.005	0.259	0.005	0.015	0.022	0.01	0.017	0.271	0.077	0.012	0.01	0.062
			‡	200		0.003		0.003	0.013	0.26	0.005	0.02	0.025	0.028	0.003	0.32	0.055	0.01	0.008	0.05
		California	†	155		0.003		0.026	0.003	0.284		0.013	0.029	0.039	0.007	0.281	0.071	0.003	0.013	0.023
		Florida	†	94					0.011	0.213	0.005	0.005	0.037	0.021	0.027	0.325	0.064	0.016	0.016	0.085
		Nevada	†	100				0.015	0.01	0.19	0.005	0.01	0.04	0.04	0.035	0.33	0.07	0.005	0.025	0.04
		Southeast	129	247			0	0.004	0.012	0.225	0.004	0.01	0.03	0.028	0.014	0.316	0.059	0.008	0.012	0.081
		Southwest	129	162			0.003	0.019	0.003	0.222	0.006	0.019	0.025	0.019	0	0.315	0.093	0.006	0.022	0.074
		Texas	†	96			0.005	0.021	0.005	0.229	0.01	0.016	0.016	0.016		0.302	0.068	0.01	0.026	0.078
		Texas	132	203				0.007	0.005	0.259	0.005	0.015	0.022	0.01	0.017	0.273	0.076	0.012	0.01	0.062
		Virginia	†	109				0.005	0.005	0.225		0.014	0.018	0.014	0.023	0.266	0.092	0.018	0.018	0.051
		NATIVE AMERICAN																		
		Alaska-North Slope	21	92					0.038	0.435	0.027	0	0.011	0	0	0.152	0.044	0	0.005	0.005
		Alaska -Bethel Wade	21	109					0.051	0.321	0.032	0	0.005	0.005	0.018	0.124	0.133	0	0.005	0.092
		Alaska	†	17					0.029	0.353	0.059		0.029		0.059	0.177	0.147			0.029
		Alaska	†	88					0.04	0.415	0.028		0.011			0.159	0.046		0.006	0.006
		Minnesota	131	149		0		0.02	0	0.329	0.034	0.017	0.017	0.027	0.013	0.322	0.024	0.02	0.007	0.027
		Navajo	22	72		0	0	0.049	0	0.153	0.104	0	0.042	0	0	0.215	0.153	0	0	0.028
		New Mexico	†	93				0.108	0.005	0.253	0.027	0.005	0.011	0.011		0.301	0.091		0.022	0.027
		New Mexico	†	72				0.049		0.153	0.104		0.042			0.215	0.153			0.028
		Pueblo	22	93		0	0	0.108	0.005	0.253	0.027	0.005	0.011	0.011	0	0.301	0.091	0	0.022	0.027
		Sioux	22	60		0	0	0.05	0	0.358	0.067	0.008	0.008	0.017	0	0.258	0.042	0.067	0	0.017
MEXICO	Mexico City		‡	230				0.022	0.004	0.322	0.004	0.009	0.013	0.015	0.002	0.209	0.096	0.017	0.015	0.059

TABLE 2-1—*(Continued)*.

			Reference	N*	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
CARIBBEAN																				
	Haiti		†	83					0.03	0.048		0.036	0.108	0.048	0.03	0.223	0.042	0.006	0.012	0.211
SOUTH AMERICA																				
	Argentina	Mapuche	134	61		0			0	0.238			0.041	0	0.008	0.369	0.123	0.025	0	0.098
		Mataco	134	42		0			0	0.345			0	0.012	0	0.179	0.036	0	0.024	0.274
	Brazil	Arara	135	21						0.333			0		0.143	0	0	0		0
		Awa Guaja	136	24						0.167				0	0	0.104	0.187			0
		Gaviao	134	30		0			0.017	0.333			0	0	0.033	0.083	0	0	0	0.033
		Katuena	136	27						0.518				0	0.018	0	0.056			0.093
		Kayapo	135	26						0.32			0		0.02	0.16	0.12	0.04		0.16
		Porto Alegre Black	137	53				0	0.028	0.066	0.009	0.009	0.066	0.104	0.028	0.293	0.038	0.009	0.009	0.113
		Porto Alegre White	137	75				0.007	0.007	0.28	0	0	0.033	0.02	0.04	0.353	0.06	0.02	0.007	0.04
		Surui	134	24		0			0	0.354			0	0	0	0.083	0.104	0.063	0	0
		Urubu Kaapor	136	29						0.569				0	0	0.173	0.017			0.017
		Wai-Wai	134	28		0.018			0	0.393			0	0	0	0.143	0.036	0.036	0	0.089
		Wayana Apalai	135	26						0.32			0.02		0.02	0.04	0.26	0.02		0.04
		Wayampi	135	25						0.56			0		0	0	0.04	0		0
		Xavante Indian	137	25				0	0	0.44	0	0	0	0	0	0.14	0.16	0.04	0	0
		Xikrin	136	29						0.638				0.017	0	0.052	0.121			0
		Yanomama	135	25						0.46			0		0	0.16	0.18	0		0
		Zoe	136	30						0.567				0	0	0	0.2			0.233
		Zoro Indian	137	25				0	0	0.32	0	0	0	0	0	0.06	0.04	0	0	0.02
	Chile	Pehuenche Indian	127	83	0			0		0.193	0	0	0	0.012	0.024	0.217	0.175	0.006	0.036	0.012
		Santiago	30	132				0.004	0	0.269	0	0.008	0.011	0.03	0.004	0.311	0.08	0.004	0	0.049
MIDDLE EAST																				
		Arab Moslems	35	94				0	0.005	0.147	0	0	0.049	0.06	0	0.418	0.043	0.038	0	0.076
	Dubai	Arab	37	93				0.011	0.022	0.269	0	0.011	0.043	0.016	0	0.419	0.022	0.022	0.005	0.065
	Israel	Caucasians	†	114				0.004		0.202			0.018	0.04	0.018	0.412	0.061	0.022		0.061
	Jordan		138	215		0.002	0	0.002	0	0.161	0.002	0.012	0.044	0.051	0.016	0.388	0.035	0.023	0.005	0.07
	Kuwait		139	200		0	0	0.01	0.013	0.188	0	0.025	0.028	0.043	0.015	0.408	0.028	0.03	0.005	0.055
	Palestine	Caucasians	†	92					0.005	0.147			0.049	0.06		0.419	0.044	0.038		0.076
	Saudi Arabi		140	220			0.009		0.014	0.141		0.005	0.014	0.032	0.009	0.550	0.032	0.018	0.009	0.045
		Riyadh	141	33			0.015			0.136				0.03		0.652	0.015	0.045	0.015	0.03
	Qatar		142	300		0	0.003	0.008	0.013	0.212	0.007	0.012	0.023	0.047	0.022	0.423	0.027	0.03	0.015	0.042
AFRICA																				
	Nigeria		†	67					0.052	0.03		0.03	0.119	0.097	0.008	0.239	0.045	0.015	0.015	0.134
	Zimbabwe		†	101				0.005	0.015	0.025		0.005	0.144	0.129	0.03	0.129	0.059		0.03	0.119
ASIA																				
	Bahrain		143	198		0	0.003	0.008	0.013	0.232	0.013	0.003	0.03	0.038	0.013	0.404	0.028	0.015	0.01	0.063
	China	Han	144	216		0.002	0.002	0.018	0.002	0.201	0.019	0.002	0.021	0.009	0.019	0.243	0.028	0.007	0.044	0.1
		Hui-Xining	141	48				0.021		0.25	0.021		0.01	0.031	0.01	0.24	0.01	0.01	0.073	0.052
		Kazakhs-Urumqi	141	38			0.013	0.092	0.013	0.184			0.013	0.026		0.25	0.013		0.026	0.079
		Northern Han	141	44				0.011		0.239	0.057		0.057	0.023		0.159	0.057		0.011	0.125
		Shenyang	46	301		0.003		0.025	0.008	0.211	0.03	0.005	0.025	0.015	0.022	0.198	0.033	0.003	0.027	0.085
		Uygur	141	58				0.034		0.25	0.017		0.009	0.034	0.017	0.267	0.043	0.017	0.017	0.052
	India	Kachari	127	53	0.009			0.019		0.396	0.028	0	0.019	0.009	0.009	0.151	0	0	0.028	0.047
	Japan		145	121				0.029	0.037	0.157	0.012	0.021	0.008	0.008		0.244	0.004	0.004	0.066	0.091
			146	111				0.023	0.032	0.176	0.014	0.023	0.009	0.009		0.233	0.005	0.005	0.072	0.095
			‡	89				0.045	0.006	0.146	0.017		0.017	0.023		0.219	0.011	0.006	0.034	0.09
		Chubu	147	751		7E-04		0.03	0.017	0.128	0.012	0.021	0.02	0.014	0.005	0.204	0.027	0.006	0.045	0.107
		Chugoku	147	279		0.002		0.029	0.027	0.165	0.014	0.023	0.014	0.011	0.009	0.197	0.031		0.036	0.108

TABLE 2-1—(*Continued*).

			Reference	N*	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
		Gifu Prefecture	147	377		0.003	0.004	0.038	0.021	0.147	0.016	0.019	0.023	0.009	0.007	0.2	0.024	0.008	0.045	0.092
		Gunma Prefecture	51	320		0.002	0	0.033	0.025	0.155	0.013	0.027	0.02	0.011	0.002	0.198	0.013	0.006	0.052	0.111
		Hokkaido	147	208				0.024	0.029	0.166	0.012	0.031	0.029	0.012	0.002	0.219	0.017	0.007	0.051	0.13
		Kantou	147	497		0.003	0.004	0.033	0.022	0.15	0.009	0.02	0.022	0.011	0.003	0.217	0.018	0.006	0.051	0.118
	Korea		148	377		0.003	0.004	0.038	0.021	0.147	0.016	0.019	0.023	0.009	0.007	0.2	0.024	0.008	0.045	0.092
		Seoul	54	116		0.004	0.004	0.047	0.004	0.19	0.03	0.004	0.022	0.009	0.017	0.172	0.013	0.004	0.052	0.125
	Malaysia	Malays	149	124				0.004		0.169	0.004	0.012	0.036	0.024	0.008	0.266	0.028	0.004	0.04	0.073
		Oriental	129	204			0	0.034	0.025	0.152	0.022	0.007	0.034	0.017	0.017	0.23	0.027	0	0.047	0.076
	Philippines	Metro Manila	150	103						0.16			0.034	0.024	0.005	0.316	0.039		0.083	0.015
	Singapore	Chinese	151	127		0	0	0.016	0	0.181	0.012	0	0.051	0.028	0.012	0.224	0.028	0.004	0.071	0.071
		Indians	151	170		0.003	0.003	0.018	0	0.329	0.018	0	0.009	0.032	0.012	0.338	0.041	0.012	0.012	0.047
		Malays	151	119		0	0	0.004	0	0.197	0.008	0	0.021	0.017	0	0.248	0.021	0	0.055	0.092
	Taiwan	Chinese	152	105		0.005	0	0.01	0	0.129	0.014	0	0.038	0.014	0.01	0.276	0.052	0.005	0.062	0.067
	Thailand	Chiang Mai	153	100				0	0	0.205	0.03	0.005	0.02	0.02	0.015	0.215	0.005	0	0.04	0.09
		Karen	154	89						0.219	0.051			0.017		0.230	0.079			0.011
EUROPE																				
	Austria		155	104						0.269	0.01	0.029	0.019	0.029	0.01	0.361	0.067	0.005	0.005	0.053
	Brussels	Belgians	156	119				0	0	0.273	0.008	0.042	0.029	0.029	0.013	0.311	0.034	0.025	0.008	0.029
		Moroccans	156	137				0.004	0.007	0.153	0	0.029	0.029	0.058	0.018	0.296	0.051	0.011	0.011	0.124
		Turks	156	120				0	0	0.211	0.017	0.033	0.012	0.045	0.017	0.335	0.062	0.017	0.012	0.062
	Croatia	Northern	63	98				0	0.01	0.198	0.01	0.015	0.02	0.041	0.01	0.352	0.071	0.02	0.01	0.051
		Southern	63	102				0	0	0.216	0.025	0.015	0.005	0.044	0.029	0.387	0.049	0.01	0.015	0.059
	Denmark	Danes	157	210					0.005	0.224	0.002	0.028	0.014	0.041	0.019	0.371	0.036	0.017	0.012	0.05
			158	372					0.004	0.222	0.003	0.027	0.026	0.036	0.022	0.360	0.034	0.019	0.008	0.055
			†	66					0.008	0.167		0.379	0.008	0.053		0.364	0.053	0.03	0.015	0.061
	England	NE	159	111					0	0.283	0	0.023	0	0.045	0.018	0.324	0.045	0.081	0.013	0.049
	Finland		130	140						0.307	0.011	0.032	0.018	0.014	0.014	0.311	0.075	0.011	0.007	0.068
	France	Caucasian	68	110				0	0.004	0.263	0.015	0.019	0.022	0.063	0.011	0.307	0.063	0.026	0.015	0.052
	France	Antilles	†	131				0.004	0.015	0.122	0.004	0.019	0.095	0.076	0.019	0.218	0.038	0.012	0.004	0.126
	Germany		160	218				0.002	0.007	0.245	0.002	0.037	0.018	0.031	0.016	0.367	0.052	0.007	0.007	0.06
			161	250		0	0	0.006	0	0.198	0.002	0.028	0.032	0.05	0.018	0.346	0.044	0.03	0.006	0.06
		Caucasians	127	87	0			0.011		0.172	0	0.034	0.034	0.063	0.017	0.379	0.034	0.04	0.006	0.069
		Dusseldorf	162	378				0.003	0.005	0.253	0.013	0.024	0.029	0.033	0.017	0.343	0.046	0.012	0.005	0.042
	Greece		163	156					0.003	0.167	0.019	0.023	0.013	0.045	0.019	0.362	0.08	0.029	0.032	0.074
			164	84					0.018	0.137		0.036	0.024	0.042	0.006	0.452	0.036	0.018	0.024	0.071
		Asia Minor	165	96				0.005	0	0.172	0	0.01	0.036	0.078	0.016	0.391	0.063	0.021	0.026	0.042
		Athens	141	59						0.212	0.008		0.025	0.034	0.008	0.398	0.059	0.025	0.025	0.051
		Cypriot	77	107					0.014	0.178	0.014	0.005	0.037	0.079	0.005	0.393	0.051	0.019	0.056	0.075
		Epirus	165	98				0	0	0.199	0.005	0.005	0.015	0.082	0.01	0.408	0.046	0.015	0.01	0.071
		Macedonia-Central	165	100				0	0	0.215	0.02	0.01	0.02	0.04	0.02	0.375	0.065	0.04	0.01	0.025
		Macedonia-Eastern	165	94				0	0	0.128	0.005	0.021	0.016	0.069	0.027	0.463	0.016	0.016	0.016	0.037
	Holland		166	150						0.217	0.003	0.023	0.013	0.033	0.017	0.38	0.02	0.007	0.007	0.057
	Hungary		81	189				0.003	0.003	0.265	0	0.021	0.029	0.037	0.013	0.368	0.045	0.013	0.008	0.058
			167	229		0.004			0.004	0.238	0.004	0.011	0.031	0.037	0.018	0.332	0.068	0.018	0.002	0.066
		Baranya	80	135					0.004	0.189	0.041		0.03	0.026	0.004	0.552	0.026	0.007		0.007
		Caucasian	83	661		0.002		0.002	0.005	0.245	0.003	0.026	0.024	0.042	0.011	0.340	0.062	0.017	0.006	0.062
	Italy		168	1621		0.001	0.001	0.003	0.002	0.204	0.004	0.021	0.027	0.056	0.015	0.378	0.042	0.02	0.013	0.053
		Calabria	169	219			0.002		0.016	0.196	0.007	0.018	0.025	0.046	0.014	0.384	0.043	0.021	0.009	0.073
		Messina	170	141						0.223	0.007	0.01	0.056	0.07	0.01	0.368	0.028	0.01	0.014	0.049
		Rome	91	100			0.037	0.018	0.027	0.037	0.06	0.009	0.05	0.097	0.041	0.087	0.087	0.111	0.061	0.111

TABLE 2-1—(*Continued*).

			Reference	N*	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
		Rome	133	60				0.008		0.217	0.008	0.008	0.008	0.017	0.008	0.408	0.075		0.008	0.083
		Southern	164	103					0.005	0.155		0.015	0.029	0.053	0.019	0.437	0.029	0.029	0.005	0.107
	Poland		171	48				0.021		0.208	0.01	0.031	0.052	0.052	0.052	0.26	0.073	0.052	0.01	0.042
			172	348					0.001	0.219	0.003	0.013	0.01	0.045	0.012	0.368	0.079	0.023	0.004	0.055
		N	173	207						0.201	0.002	0.027	0.007	0.046	0.039	0.362	0.063	0.029	0.017	0.051
		NE	174	116				0.003	0	0.263	0.002	0.016	0.019	0.038	0.004	0.323	0.065	0.022	0.007	0.061
		South	175	133		0.004		0	0	0.244	0.008	0.015	0.015	0.068	0.011	0.305	0.06	0.049	0.004	0.075
		SE Caucasian	176	208				0.005		0.267	0.002	0.01	0.022	0.036		0.301	0.07	0.029	0.002	0.063
	Portugal	Coimbra	94	110				0.005	0.005	0.291	0.005	0.036	0.05	0.036	0.023	0.336	0.036	0.014	0.009	0.036
		Galicia	94	109				0	0.009	0.298	0	0.037	0.028	0.041	0.018	0.339	0.037	0	0.023	0.023
		Lisbon	177	110				0.005	0.005	0.227	0.005	0.014	0.036	0.041		0.341	0.055	0.014	0.018	0.059
		North	178	227		0.002			0.007	0.308	0.009	0.018	0.026	0.035	0.007	0.308	0.031	0.009	0.009	0.037
	Slovenia		‡	291				0.005	0.002	0.213	0.002	0.026	0.017	0.057	0.012	0.364	0.065	0.014	0.012	0.038
	Spain		179	130				0.004	0.004	0.223	0.008	0.015	0.062	0.054	0.023	0.338	0.05	0.027	0.008	0.035
		Andalucia	100	120						0.229		0.008	0.004	0.054	0.012	0.408	0.037	0.016	0.012	0.07
		Andalusia	101	166				0.003	0.006	0.192		0.027	0.044	0.044	0.03	0.352	0.044	0.012	0.015	0.047
		Barcelona	180	216		0	0.002	0	0.005	0.206	0.002	0.021	0.025	0.042	0.021	0.356	0.053	0.023	0.044	0.081
		Basque	†	49						0.296		0.051	0.041	0.071	0.02	0.306	0.01	0.02	0.01	0.061
		Basque	181	257					0.006	0.249	0.014	0.029	0.019	0.029	0.027	0.346	0.066	0.006	0.018	0.043
		Cantabria	106	130						0.208	0.004	0.054	0.046	0.039	0.004	0.362	0.069	0.012	0.004	0.062
		Catalonia	182	183				0.003	0.003	0.227	0.014	0.027	0.033	0.06	0.011	0.333	0.057	0.019	0.016	0.055
		Galicia	110	149				0.003	0.007	0.262	0.003	0.034	0.03	0.044	0.024	0.356	0.03	0.003	0.02	0.027
		Madrid	183	203		0		0	0.005	0.224	0	0.025	0.047	0.037	0.01	0.372	0.052	0.017	0.012	0.017
		NE	112	249				0.002	0.004	0.213	0.01	0.022	0.03	0.054	0.01	0.37	0.056	0.024	0.014	0.054
		Valencia	113	115				0.004	0.004	0.217	0.004	0.022	0.017	0.03	0.03	0.387	0.03	0.03	0.026	0.026
		Zaragoza	184	166		0.003			0.006	0.232	0.009	0.018	0.063	0.03	0.006	0.358	0.048	0.012	0.018	0.036
	Slovakia	Caucasian	185	195				0.005	0.003	0.292	0.01	0.005	0.005	0.023	0	0.377	0.044	0.039	0.003	0.059
	Slovenia	East	186	100		0		0	0	0.235	0.03	0.025	0.015	0.045	0.025	0.375	0.045	0.025	0.04	0.045
	Switzerland		115	201					0.007	0.261	0.002	0.03	0.017	0.05	0.025	0.328	0.07	0.017	0.022	0.032
		Caucasian	116	100						0.23	0.005	0.03	0.02	0.025	0.02	0.345	0.03	0.025	0.005	0.09
OCEANIA																				
	Australia	Victorian	122	250				0.004		0.23	0.006	0.022	0.022	0.035	0.012	0.354	0.047	0.02	0.006	0.063
	Australia	NW	†	131				0.012	0.004	0.393		0.004	0.019	0.012	0.019	0.336	0.023	0.008	0.004	0.115
	Guam	Chamorro	123	99					0	0.111	0.005	0	0.061	0.01	0	0.424	0.04	0.015	0.03	0.02
		Filipino	123	97					0.005	0.16	0	0.005	0.052	0.026	0	0.258	0.036	0.005	0.01	0.041
	Polynesia	American Samoa	127	47	0			0		0.33	0.011	0.011	0.074	0	0	0.17	0.064	0.011	0	0
		N.G.Highlander	127	45	0			0		0.289	0	0.056	0.044	0	0.01	0.6	0	0	0	0
		Western Samoa	127	60	0			0		0.308	0.025	0.017	0.067	0	0	0.133	0.075	0.017	0	0.008

* Number of individuals.
† TWGDAM data.
‡ Personal communication.

range of polymorphism for each population using the methods specified.

The gene frequency data for the classical MN and GC polymorphisms for both Caucasian and African American U.S. populations, aggregated as the Weighted Mean of the Proportions (WMP), were taken from Gaensslen et al. (6,7). WMP was then calculated from all the U.S. Caucasian and African American population data for GYPA or GC in this communication, and the classical and DNA-based data compared using the χ^2 statistic.

Data Tables

World population allele frequency data for the HLA-DQA1, D1S80 and PM (LDLR, GYPA, HBGG, D7S8, GC) loci are shown in Tables 1 through 3, respectively. The least and most common profile frequencies for the PM loci are included in Table 3. In all tables showing least and most common profile frequencies, least common is designated "LC" and most common "MC." The least and most common profile frequency values are reciprocal proba-

TABLE 2-2—*D1S80 allele frequencies—Part 2. Alleles 29–46.*

NORTH AMERICA			Reference	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	46	MAF*
	CANADA																				
		NATIVE AMERICAN																			
		Dogrib Indian	127	0.037	0	0.139	0	0		0	0										
	U.S.	CAUCASIAN																			
			128	0.056	0.01		0.01	0.005	0.005												
			129	0.052	0.008	0.072	0.006	0.003	0.001	0.003	0.004	0.001	0	0.003	0	0					
			130	0.059	0.016	0.043						0									
			†	0.041	0.010	0.081	0.010		0.003	0.007	0.014					0.003					
			†	0.075	0.005	0.073		0.008	0.003		0.005	0.005									
			‡	0.053	0.008	0.08	0.013	0.003	0.003	0.003	0.005	0.008			0.003						0.014
		Alabama	†	0.09	0.005	0.085	0.01			0.005	0.005	0.01									0.027
		Alabama	†	0.04	0.03	0.066	0.017	0.003	0.003	0.003											
		Minnesota	131	0.04	0.009	0.066	0.009	0	0.018		0.013	0.013			0.004	0.004					
		Minnesota	†	0.041	0.007	0.066	0.007		0.014		0.010	0.010			0.004	0.004					
		Nevada	†	0.087	0.014	0.077	0.01	0.005				0.005			0.005						
		Texas	132	0.076	0.005	0.07	0	0.008	0.003	0	0.003	0.005	0.005	0	0	0					
		Virginia	†	0.056	0.005	0.065	0.005	0.009		0.009				0.005							
		AFRICAN AMERICAN	133	0.045	0.014	0.055	0.004	0.067	0.004	0.004	0	0	0.002	0	0	0					
			129	0.053	0.009	0.054	0.007	0.004	0.086	0.002	0.001	0	0	0.003	0	0.002					
			†	0.052	0.010	0.072			0.09	0.004						0.017					
			‡	0.055	0.008	0.048	0.005	0.005	0.073		0.003				0.003						0.015
		Alabama	†	0.025	0.015	0.03	0.01		0.075		0.005										0.03
		California	†	0.066	0.02	0.056		0.003	0.072		0.003										0.02
		Minnesota	131	0.066	0.014	0.059	0.011	0.004	0.042		0.004	0			0.007	0					
		Missouri	†	0.069	0.014	0.059	0.010	0.004	0.042		0.004				0.007						
		Nevada	†	0.039	0.014	0.063	0.010		0.082		0.005			0.005							
		Texas	132	0.067	0.01	0.044	0.01	0.003	0.075	0	0	0	0	0	0	0					
		Virginia	†	0.043	0.030	0.060	0.004		0.069		0.004	0.004	0.004								
		HISPANIC	133	0.06	0.031	0.047	0	0.007	0	0.002	0	0	0	0	0	0					
			†	0.020	0.077	0.105		0.003	0.005	0.003	0.005	0.003									
			‡	0.055	0.055	0.058	0.003		0.008			0.003	0.005		0.01						0.014
		California	†	0.065	0.052	0.058	0.003		0.019	0.003	0.003		0.003								0.018
		Florida	†	0.059	0.016	0.053	0.005	0.005	0.011		0.016			0.005		0.005					
		Nevada	†	0.03	0.065	0.06		0.005	0.02	0.005											0.028
		Southeast	129	0.079	0.018	0.051	0.006	0.004	0.008	0	0.014	0.006	0	0.002	0	0					
		Southwest	129	0.019	0.071	0.056	0.003	0.003	0.003	0	0.006	0	0	0.006	0	0.006					
		Texas	†	0.016	0.089	0.063	0.005	0.005	0.005		0.005			0.005		0.005					
		Texas	132	0.02	0.076	0.106	0	0.002	0.005	0.002	0.005	0.002	0	0	0	0					
		Virginia	†	0.069	0.069	0.069	0.009	0.005	0.014		0.014										
		NATIVE AMERICAN																			
		Alaska-North Slope	21	0.011	0.027	0.239	0.005														0.029
		Alaska-Bethel Wade	21	0.018	0.023	0.174	0														0.026
		Alaska	†		0.029	0.088															
		Alaska	†	0.011	0.023	0.256															
		Minnesota	131	0.034	0.020	0.077	0.007	0	0		0	0			0.003	0.003					
		Navajo	22	0.111	0.042	0.076	0	0	0	0	0	0	0	0	0	0					0.04
		New Mexico	†		0.059	0.075															
		New Mexico	†	0.111	0.042	0.076															
		Pueblo	22	0	0.059	0.075	0	0	0	0	0	0	0	0	0	0					0.03
		Sioux	22	0	0.025	0.067	0.017	0	0	0	0	0	0	0	0	0					0.045
MEXICO	Mexico City		‡	0.05	0.08	0.063	0.007	0	0.007	0.002	0.002	0	0.002								0.012

TABLE 2-2—(*Continued*).

			Reference	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	46	MAF*
CARIBBEAN																					
	Haiti		†	0.048	0.012	0.054			0.084												
SOUTH AMERICA																					
	Argentina	Mapuche	134	0.016	0.025	0.049				0	0.008										
		Mataco	134	0.059	0.059	0.012				0	0										
	Brazil	Arara	135	0	0.524	0		0												0	
		Awa Guaja	136	0	0.5	0.042															
		Gaviao	134	0.017	0.467	0.017				0	0										
		Katuena	136	0	0.222	0.093															
		Kayapo	135	0	0.1	0.08		0													
		Porto Alegre Black	137	0.028	0.009	0.038	0.009	0.019	0.123				0								
		Porto Alegre White	137	0.06	0.013	0.033	0.007	0	0.007				0.007							0	
		Surui	134	0	0.396	0				0	0										
		Urubu Kaapor	136	0.017	0.138	0.069															
		Wai-Wai	134	0	0.214	0.071				0	0										
		Wayampi	135	0	0.4	0		0													
		Wayana Apalai	135	0.02	0.26	0		0												0	
		Xavante Indian	137	0	0.1	0.12	0	0	0				0							0	
		Xikrin	136	0.069	0.103	0															
		Yanomama	135	0.06	0.02	0.06		0.02												0.04	
		Zoe	136	0	0	0															
		Zoro Indian	137	0	0.56	0	0	0	0				0								
	Chile	Pehuenche Indian	127	0.006	0.12	0.163	0	0		0.036	0										
		Santiago	30	0.042	0.076	0.095	0.004	0	0.008	0	0.008										0.021
MIDDLE EAST																					
		Arab Moslems	35	0.071	0.011	0.022	0.011	0	0.022	0	0.005	0	0.005	0	0	0					0.029
	Dubai	Arab	37	0.059	0	0.022	0.005	0	0.011												0.015
	Israel	Caucasians	†	0.092	0.018	0.04	0.004								0.004						
	Jordan		138	0.058	0.005	0.056	0.014	0	0.009	0.002	0.005	0.007	0	0.002	0	0					
	Kuwait		139	0.068	0.008	0.033	0.015	0	0.015	0.005	0.005	0.003	0	0	0	0.005					
	Palestine	Caucasians	†	0.071	0.011	0.022	0.011		0.022		0.005		0.005								
	Saudi Arabia		140	0.095		0.023			0.005												
	Saudi Arabia	Riyadh	141	0.045		0.015															
	Qatar		142	0.062	0.008	0.022	0.005	0	0.013	0	0.002	0	0	0.005	0	0					
AFRICA																					
	Nigeria		†	0.037		0.037	0.015		0.105	0.008					0.008						0.044
	Zimbabwe		†	0.02	0.015	0.069	0.015		0.163						0.02						0.029
ASIA																					
	Bahrain		143	0.035	0.005	0.046	0.003	0.003	0.023	0	0.003	0	0	0.005	0	0.005					
	China	Han	144	0.019	0.134	0.083	0.016			0.002	0.009	0.002			0.002	0.002		0.002			
		Hui-Xining	141	0.021	0.104	0.083	0.01				0.031										
		Kazakh-Urumqi	141	0.013	0.013	0.171	0.013				0.053	0.026									
		Northern Han	141	0.045	0.136	0.045					0.011										
		Shenyang	46	0.047	0.106	0.105	0.017		0.007	0.007	0.01		0.002	0.002		0.008			0.002		
		Uygur	141	0.026	0.069	0.095	0.009	0.009			0.017	0.009									
	India	Kachari	127	0.075	0.066	0.085	0.009	0.019		0.019	0.009										
	Japan		145	0.054	0.116	0.054	0.017	0.008	0.008		0.008	0.017		0.008		0.004	0.004	0.017			
			146	0.054	0.117	0.045	0.014	0.005	0.005		0.005	0.014		0.009		0.005	0.005	0.018			
			‡	0.051	0.146	0.124		0.017	0.011					0.017		0.006					0.033
		Chubu	147	0.051	0.162	0.091	0.02	0.005	0.008		0.002	0.005	0.003	0.003	0.001	0.004					
		Chugoku	147	0.052	0.126	0.104	0.018	0.005	0.007	0.004	0.005	0.002	0.002	0.004	0.002	0.004					

TABLE 2-2—(*Continued*).

		Reference	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	46	MAF*
	Gifu Prefecture	147	0.036	0.162	0.077	0.017	0.008	0.007	0.001	0.007	0.007	0.001	0.004	0	0.003	0.007	0.009			
	Gunma Prefecture	51	0.031	0.161	0.088	0.011	0.009	0.003	0.003	0.008	0.005	0	0.002	0.002	0					0.009
	Hokkaido	147	0.024	0.147	0.048	0.014	0.007	0.007	0.002	0.012	0.002				0.005					
	Kantou	147	0.049	0.142	0.080	0.012	0.006	0.003	0.002	0.005	0.001	0.001		0.002						
Korea		148	0.036	0.162	0.077	0.017	0.008	0.007	0.001	0.007	0.007	0.001	0.004	0	0.003	0.007	0.009			
	Seoul	54	0.052	0.138	0.047	0.013	0	0.004	0	0.026	0.004	0.004	0	0	0					0.026
Malaysia	Malays	149	0.044	0.149	0.121	0.004	0.004	0.004	0.004											
	Oriental	129	0.042	0.123	0.093	0.012	0.005	0.005	0.005	0.005	0.007	0	0.005	0	0.007					
Philippines	Metro Manila	150	0.024	0.18	0.107	0.01								0.005						
Singapore	Chinese	151	0.063	0.102	0.083	0.028	0.004	0.008	0	0.004	0.004			0						
	Indians	151	0.015	0.009	0.091	0.003	0.003	0	0	0	0	0.003		0.003						
	Malays	151	0.029	0.13	0.155	0.021	0	0	0	0	0	0	0	0						
Taiwan	Chinese	152	0.024	0.148	0.114	0.014	0	0	0	0.01	0	0	0	0	0					
Thailand	Chiang Mai	153	0.025	0.07	0.225	0.02	0	0	0	0	0.005	0	0	0						
	Karen	154	0	0.107	0.219	0.011	0.006	0.006		0.045										
EUROPE																				
Austria		155	0.019	0.01	0.077	0.005		0.005		0.005	0.014									
Brussels	Belgians	156	0.056	0.025	0.076	0	0.008	0.008		0	0.008			0.004						
	Moroccans	156	0.106	0.011	0.029	0.004	0.015	0.015		0.004	0.004			0						
	Turks	156	0.091	0	0.033	0.008	0.008	0.008		0.004	0			0						
Croatia	Northern	63	0.056	0.015	0.087	0	0.005	0.005	0	0.005	0.01									0.029
	Southern	63	0.039	0.02	0.049	0.005	0.015	0	0	0.01	0.005									0.027
Denmark	Danes	157	0.057	0.01	0.088	0.005	0	0.005	0.005	0.007	0.002				0.002					
		158	0.05	0.018	0.089	0.005	0.005	0.004	0.003	0.005	0.001			0.001	0.004					
		†	0.061	0.008	0.106	0.008	0.008			0.015										
England	NE	159	0.058	0.005	0.09	0.005	0.005	0	0.005	0.005	0.005									
Finland		130	0.032	0.043	0.079						0.007									
France	Caucasian	68	0.029	0.019	0.067	0.019														
France	Antilles	†	0.046	0.004	0.076	0.004	0.004	0.095	0.004	0.008										
Germany		160	0.039	0.007	0.048	0	0.002	0.009	0	0.002	0.009	0	0.002	0.002						
		161	0.058	0.01	0.058	0.012	0.004	0.008	0	0.01	0.016	0	0	0.004						
	Caucasians	127	0.034	0.017	0.052	0.017	0.006		0.006	0.006										
	Dusseldorf	162	0.081	0.012	0.057	0.007	0.005	0.005		0.001	0.007									
Greece		163	0.061	0.019	0.026	0.013			0.01	0.003			0.003							
		164	0.071	0	0.042		0.006	0.006		0.006					0.006					
	Asia Minor	165	0.068	0.005	0.042	0.016	0.005	0.005	0	0	0	0		0						
	Athens	141	0.059		0.051	0.008	0.008							0.025						
	Cypriot	77	0.042	0.014	0.019															0.026
	Epirus	165	0.071	0	0.036	0.015	0.005	0.005	0.005	0	0.02	0		0						
	Macedonia-Central	165	0.07	0.005	0.06	0	0.005	0	0.005	0.005	0.005	0		0						
	Macedonia-Eastern	165	0.09	0.016	0.043	0	0.005	0.005	0	0.005	0.016	0.005		0						
	Thessaly	165	0.069	0.005	0.064	0.005	0	0.005	0	0.005	0.01	0.005		0.01						
Holland		166	0.05	0.01	0.123	0.003	0.01	0.003		0.013	0.003	0.003								
Hungary		81	0.05	0.005	0.056	0.003	0	0.003	0	0.011	0.008									0.012
		167	0.052	0.009	0.061	0.002	0.004	0.004	0.004	0.013	0.004	0.002	0.002	0.007						
	Baranya	80	0.082	0.007	0.015	0.004					0.007									0.019
	Caucasian	83	0.038	0.011	0.062	0.006	0.005	0.002	0.002	0.008	0.012	0.001	0.001	0.003						
Italy		168	0.064	0.015	0.048	0.009	0.003	0.004	0.001	0.005	0.006	0.002		0.003	0					
	Calabria	169	0.068	0.007	0.043	0.002	0.002	0.011	0.002	0.002		0.007								
	Messina	170	0.085	0.028	0.021		0.007	0.007												

TABLE 2-2—(*Continued*).

		Reference	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	46	MAF*
	Rome	91	0.082	0.018	0.032	0.032	0.09	0.018	0	0.018										
		133	0.075	0.008	0.05				0.008	0.008										
	Southern	164	0.049	0.01	0.044		0.005	0.01		0					0					
		171	0.031	0.042	0.01	0.01	0	0.01	0	0	0.021									
		172	0.039	0.009	0.079	0.001	0.004		0.001	0.012	0.019				0.004					
	N	173	0.046	0.012	0.060	0.015	0.002			0.007	0.012				0.002					
	NE	174	0.048	0.013	0.09	0.003	0.005	0	0	0.001	0.014	0	0.003	0	0	0				
	South	175	0.03	0.004	0.06	0.004	0	0.004	0	0.004	0.03	0	0	0.004	0					
	SE Caucasian	176	0.046	0.017	0.099	0.005	0.005			0.002	0.019		0.002							
Portugal	Coimbra	94	0.055	0.032	0.023	0	0	0	0	0.005	0.005									
	Galicia	94	0.064	0.009	0.037	0.005	0.009	0.009	0	0.009	0.005									
	Lisbon	177	0.1	0.009	0.041	0.005	0.005	0.005		0.009	0.009									
	North	178	0.088	0.007	0.057	0.011		0.007		0.015	0.009									
Slovenia		‡	0.047	0.012	0.079	0.009	0.002	0.003		0.003	0.017		0.002	0.002						
Spain		179	0.039	0.004	0.062	0.015	0.008	0.004	0.004	0.008	0.008									
	Andalucia	100	0.05	0.02	0.041			0.008		0.004	0.008	0.012								
	Andalusia	101	0.092	0.009	0.041	0.021	0.006	0.003		0.003	0.006			0.003						
	Barcelona	180	0.046	0.009	0.06	0.007	0.005	0.002	0.002	0.002	0.005	0.002	0	0						
	Basque	†	0.01	0.01	0.082			0.01												
	Basque	181	0.058	0.019	0.051	0.004	0.004		0.002	0.004	0.002	0.002		0.002						
	Cantabria	106	0.039	0.023	0.073								0.004							
	Catalonia	182	0.038	0.008	0.068	0.008		0.005	0.003	0.003	0.005			0.003						
	Galicia	110	0.074	0.01	0.04	0.003	0.01	0.007		0.01	0.003									0.019
	Madrid	183	0.074	0.005	0.057	0.015	0.002	0.002	0	0.01	0.012	0	0	0.005	0					
	NE	112	0.044	0.008	0.06	0.006	0.002	0.004	0.002	0.002	0.006			0.002						0.011
	Valencia	113	0.07	0.017	0.061	0.009	0.004		0.004	0.004										
	Zaragoza	184	0.081	0.009	0.057			0.003		0.006		0.003								
Slovakia	Caucasian	185	0.013	0.033	0.049	0.018	0	0	0.008	0.015										
Slovenia	East	186	0.04	0.01	0.01	0.015	0.01	0.01	0	0	0	0	0	0	0					0.01
Switzerland		115	0.047	0.017	0.05	0.007	0.002	0.007		0.002	0.002									
	Caucasian	116	0.04	0.01	0.08	0.01	0.01	0.005	0	0.005	0.01	0	0	0	0					0.028
OCEANIA																				
Australia	Victorian	122	0.057	0.01	0.077	0.008	0.01	0.002	0.002	0.004	0.004									
Australia	NW	†	0.012	0.004	0.019			0.008							0.008					
Guam	Chamorros	123	0.015	0.152	0.106	0.005					0	0.005	0							0.028
	Filipinos	123	0.01	0.227	0.139	0.015					0	0	0.005							0.03
Polynesia	American Samoa	127	0.032	0.191	0.106	0	0		0	0										
	N.G Highlander	127	0	0	0	0	0		0	0										
	Western Samoa	127	0.042	0.275	0.033	0	0		0	0										

* Number of individuals
† TWGDAM data
‡ Personal communication

bilities of chance duplication, i.e., the values should be read as "one in" the value shown. Table 4 shows the least and most common profile frequencies for the combined HLA-DQA1 and PM loci. Table 5 shows the least and most common profile frequencies for the combined HLA-DQA1, PM and D1S80 loci. For the 6 populations for which data were available for the combined HLA-DQA1 and D1S80 loci, and for the one population for which data were available for the combined PM and D1S80 loci, the least and most common frequencies are shown in Table 6. As noted above, the least common profile frequencies for PM and all other combinations of loci were calculated using MAF when MAF was greater than the least common observed allele frequency. In Table 7, the effect of using and not using MAF to calculate least common profile frequency is shown for selected populations and combinations of loci. The MAF value is most influenced by N, the number of people typed. MAF is lower when N is larger, no matter which method is used to calculate it. Accordingly, MAF has a smaller effect on the reciprocal probability of chance match computation for least com-

TABLE 3—*Polymarker locus allele frequencies with most and least common profile frequencies.*

	Ref	N*	LDLR A	LDLR B	GYPA A	GYPA B	HBGG A	HBGG B	HBGG C	D7S8 A	D7S8 B	Gc A	Gc B	Gc C	MAF†	MC 4.1,4.10 θ=0.0	MC 4.10 θ=0.01	LC 4.1,4.10 θ=0.0	LC 4.10 θ=0.01	LC 4.1 θ=0.01
North America																				
Canada																				
ASIAN																				
Ontario	‡	102	0.226	0.775	0.598	0.402	0.211	0.789	0	0.613	0.387	0.186	0.441	0.373		36	35	5.3E+05	2.6E+05	4.6E+05
CAUCASIAN																				
Ontario	‡	179	0.472	0.528	0.564	0.436	0.458	0.522	0.020	0.629	0.372	0.332	0.140	0.528		52	54	2.3E+07	2.9E+06	1.4E+07
	‡	120	0.45	0.55	0.629	0.371	0.404	0.592	0.004	0.742	0.258	0.296	0.188	0.517	0.012	54	54	1.0E+08	7.2E+06	5.0E+07
AFRICAN AMERICAN Ontario	‡	100	0.19	0.81	0.485	0.515	0.35	0.145	0.505	0.64	0.36	0.085	0.76	0.155		32	32	6.0E+06	2.0E+06	4.8E+06
United States CAUCASIAN																				
	14	148	0.453	0.547	0.584	0.416	0.47	0.524	0.007	0.615	0.385	0.257	0.172	0.571	0.01	61	62	6.4E+07	3.6E+06	3.0E+07
	187	100	0.43	0.57	0.48	0.52	0.53	0.45	0.02	0.58	0.42	0.33	0.15	0.52		51	53	1.5E+07	2.0E+06	9.0E+06
	13	199	0.435	0.565	0.533	0.467	0.485	0.515	0	0.57	0.43	0.307	0.153	0.54		50	52	2.4E+04	1.5E+04	2.1E+04
	§	105	0.433	0.567	0.538	0.462	0.567	0.429	0.005	0.543	0.457	0.252	0.195	0.552	0.014	61	63	1.6E+07	1.5E+06	8.5E+06
	§	200	0.448	0.553	0.53	0.47	0.538	0.45	0.013	0.61	0.39	0.275	0.178	0.548		58	60	2.8E+07	2.3E+06	1.4E+07
Alabama	‡	100	0.42	0.58	0.545	0.455	0.555	0.445	0	0.645	0.355	0.28	0.105	0.615		53	55	1.0E+05	5.2E+04	8.7E+04
California	‡	151	0.507	0.493	0.543	0.457	0.573	0.411	0.017	0.583	0.417	0.334	0.169	0.497		53	55	1.4E+07	1.6E+06	8.0E+06
Florida	‡	116	0.453	0.547	0.582	0.418	0.513	0.479	0.009	0.569	0.431	0.272	0.151	0.578	0.013	55	57	3.9E+07	3.1E+06	2.0E+07
Indiana	‡	168	0.426	0.574	0.530	0.470	0.488	0.509	0.003	0.580	0.420	0.25	0.146	0.604	0.009	56	58	8.6E+07	3.9E+06	3.7E+07
Indiana	‡	202	0.433	0.567	0.535	0.465	0.587	0.406	0.007	0.619	0.381	0.312	0.156	0.532		55	57	1.3E+08	4.5E+06	4.9E+07
Maryland	‡	59	0.458	0.542	0.466	0.534	0.551	0.449	0	0.627	0.373	0.263	0.127	0.610		55	56	4.8E+04	2.8E+04	4.3E+04
Minnesota	‡	100	0.475	0.525	0.51	0.49	0.48	0.515	0.005	0.595	0.405	0.21	0.205	0.585	0.015	69	70	1.2E+07	1.2E+06	6.7E+06
Missouri	‡	100	0.495	0.505	0.61	0.39	0.45	0.54	0.01	0.59	0.41	0.28	0.125	0.595	0.015	54	55	4.6E+07	4.1E+06	2.5E+07
Nevada	‡	102	0.451	0.549	0.529	0.471	0.564	0.427	0.010	0.598	0.402	0.309	0.128	0.564	0.015	50	52	4.0E+07	3.5E+06	2.1E+07
New Jersey	17	164	0.412	0.588	0.564	0.436	0.436	0.561	0.003	0.628	0.372	0.268	0.14	0.591	0.009	58	60	1.4E+08	6.4E+06	6.1E+07
NY Hasidic	18	111	0.44	0.56	0.57	0.43	0.35	0.64	0.01	0.52	0.48	0.28	0.14	0.58	0.013	57	59	3.7E+07	2.9E+06	1.9E+07
NYNonHasidic	18	109	0.39	0.61	0.58	0.42	0.43	0.55	0.02	0.6	0.4	0.28	0.17	0.55		62	64	2.0E+07	2.7E+06	1.2E+07
NY-Suffolk	‡	145	0.445	0.555	0.579	0.421	0.517	0.462	0.021	0.617	0.383	0.279	0.159	0.562		59	60	1.8E+07	2.5E+06	1.1E+07
Pennsylvania	‡	167	0.474	0.526	0.556	0.444	0.530	0.470	0.000	0.586	0.415	0.316	0.137	0.547		49	50	3.2E+04	1.9E+04	2.8E+04
Vermont	‡	102	0.417	0.583	0.539	0.461	0.544	0.441	0.015	0.569	0.431	0.245	0.157	0.598		60	62	2.7E+07	2.6E+06	1.5E+07
Virginia	‡	90	0.456	0.544	0.556	0.444	0.544	0.429	0.028	0.622	0.378	0.289	0.178	0.533		61	62	6.9E+06	1.3E+06	4.7E+06
AFRICAN AMERICAN																				
	187	100	0.25	0.75	0.55	0.45	0.42	0.26	0.32	0.66	0.34	0.07	0.74	0.19		54	53	2.1E+06	7.6E+05	1.7E+06
	14	145	0.224	0.776	0.479	0.521	0.507	0.197	0.297	0.614	0.386	0.103	0.707	0.19		47	46	1.4E+06	5.9E+05	1.2E+06
	13	206	0.194	0.806	0.476	0.524	0.43	0.238	0.333	0.663	0.337	0.087	0.75	0.163		43	42	2.4E+06	9.3E+05	2.0E+06
	§	98	0.296	0.704	0.469	0.531	0.408	0.260	0.332	0.679	0.321	0.112	0.674	0.214		71	67	5.9E+05	2.8E+05	5.1E+05
	§	200	0.235	0.765	0.528	0.473	0.44	0.228	0.333	0.655	0.345	0.09	0.72	0.19		50	49	1.6E+06	6.6E+05	1.3E+06
Alabama	‡	100	0.19	0.81	0.495	0.505	0.415	0.2	0.385	0.64	0.36	0.12	0.76	0.12		36	35	1.5E+06	6.5E+05	1.3E+06
California	‡	152	0.201	0.799	0.493	0.507	0.431	0.257	0.313	0.655	0.345	0.115	0.720	0.165		50	49	9.8E+05	4.4E+05	8.3E+05
Florida	‡	67	0.134	0.866	0.575	0.425	0.433	0.164	0.403	0.612	0.388	0.164	0.739	0.097		30	30	8.1E+06	2.7E+06	6.4E+06
Florida	‡	100	0.19	0.81	0.49	0.51	0.405	0.2	0.395	0.66	0.34	0.065	0.81	0.125		32	32	5.9E+06	1.9E+06	4.6E+06
Indiana	‡	197	0.198	0.802	0.492	0.508	0.421	0.282	0.297	0.619	0.381	0.114	0.695	0.190		55	53	7.0E+05	3.2E+05	5.9E+05
Indiana	‡	230	0.215	0.785	0.476	0.524	0.426	0.257	0.317	0.628	0.372	0.1	0.746	0.154		46	45	1.0E+06	4.5E+05	8.8E+05
Maryland	‡	100	0.235	0.765	0.485	0.515	0.455	0.255	0.29	0.635	0.365	0.11	0.67	0.22		62	61	7.3E+05	3.3E+05	6.2E+05
Minnesota	‡	101	0.178	0.822	0.530	0.470	0.416	0.277	0.307	0.609	0.391	0.079	0.688	0.233		52	50	1.9E+06	7.3E+05	1.6E+06
Missouri	‡	100	0.235	0.765	0.5	0.5	0.475	0.17	0.355	0.58	0.42	0.145	0.69	0.165		44	43	6.8E+05	3.1E+05	5.8E+05
Nevada	‡	100	0.195	0.805	0.545	0.455	0.455	0.205	0.34	0.675	0.325	0.115	0.72	0.165		43	41	2.2E+06	9.0E+05	1.8E+06
New Jersey	17	285	0.174	0.826	0.533	0.467	0.412	0.255	0.333	0.649	0.351	0.107	0.716	0.177		46	45	1.7E+06	6.9E+05	1.4E+06
NY-Suffolk	‡	95	0.211	0.790	0.521	0.479	0.468	0.226	0.305	0.637	0.363	0.111	0.711	0.179		48	47	1.2E+06	5.2E+05	1.0E+06
Pennsylvania	‡	100	0.17	0.83	0.505	0.495	0.425	0.23	0.345	0.645	0.355	0.13	0.725	0.145		41	41	1.3E+06	5.5E+05	1.1E+06
Virginia	‡	102	0.240	0.760	0.490	0.510	0.441	0.221	0.338	0.588	0.412	0.132	0.706	0.162		48	47	5.0E+05	2.4E+05	4.3E+05

TABLE 3—(*Continued*).

		Ref	N*	LDLR A	LDLR B	GYPA A	GYPA B	HBGG A	HBGG B	HBGG C	D7S8 A	D7S8 B	Gc A	Gc B	Gc C	MAF†	MC 4.1,4.10 θ=0.0	MC 4.10 θ=0.01	LC 4.1,4.10 θ=0.0	LC 4.10 θ=0.01	LC 4.1 θ=0.01
	HISPANIC																				
		184	100	0.48	0.52	0.61	0.39	0.39	0.56	0.05	0.66	0.34	0.2	0.36	0.44		68	70	2.5E+06	7.6E+05	1.9E+06
		§	200	0.485	0.515	0.615	0.385	0.375	0.58	0.045	0.623	0.378	0.203	0.335	0.463		67	69	2.4E+06	7.0E+05	1.8E+06
	California	‡	155	0.471	0.529	0.661	0.339	0.371	0.603	0.026	0.561	0.439	0.232	0.326	0.442		71	72	5.6E+06	1.1E+06	3.8E+06
	Florida	‡	100	0.435	0.565	0.55	0.45	0.445	0.525	0.03	0.605	0.395	0.225	0.25	0.525		70	72	3.7E+06	8.0E+05	2.6E+06
	Indiana	‡	27	0.519	0.482	0.537	0.463	0.315	0.630	0.056	0.630	0.370	0.222	0.389	0.389		72	74	9.6E+05	3.4E+05	7.6E+05
	Nevada	‡	100	0.475	0.525	0.71	0.29	0.305	0.655	0.04	0.555	0.445	0.175	0.315	0.51		77	78	5.4E+06	1.4E+06	4.0E+06
	New Jersey	17	128	0.469	0.531	0.574	0.426	0.414	0.508	0.078	0.523	0.477	0.23	0.258	0.512		74	76	3.4E+05	1.5E+05	2.9E+05
	NY-Suffolk	‡	40	0.5	0.5	0.625	0.375	0.325	0.625	0.05	0.513	0.488	0.225	0.338	0.438		71	73	9.5E+05	3.1E+05	7.4E+05
	Pennsylvania	‡	100	0.48	0.52	0.565	0.435	0.38	0.48	0.14	0.63	0.37	0.26	0.325	0.415		89	91	1.3E+05	6.8E+04	1.1E+05
	Southeastern	14	94	0.415	0.585	0.532	0.468	0.426	0.548	0.027	0.585	0.415	0.277	0.223	0.5		66	68	4.2E+06	8.4E+05	2.9E+06
	Southwestern	14	96	0.563	0.438	0.656	0.344	0.344	0.609	0.047	0.682	0.318	0.271	0.208	0.521		82	81	4.6E+06	1.3E+06	3.5E+06
	Southwestern	13	208	0.521	0.478	0.635	0.365	0.334	0.647	0.019	0.587	0.413	0.207	0.269	0.524		73	75	1.2E+07	1.7E+06	7.6E+06
	Virginia	‡	92	0.462	0.538	0.587	0.413	0.386	0.533	0.082	0.603	0.397	0.207	0.315	0.478		70	72	6.0E+05	2.6E+05	5.0E+05
	NATIVE AMERICAN																				
	AK-N. Slope	21	96	0.552	0.448	0.792	0.208	0.177	0.823	0	0.568	0.432	0.281	0.281	0.438		39	39	2.5E+05	1.3E+05	2.2E+05
	B-W Hampton	21	112	0.616	0.384	0.629	0.371	0.156	0.844	0	0.558	0.442	0.299	0.326	0.375		53	53	1.2E+05	6.5E+04	1.0E+05
	Alaska	‡	100	0.55	0.45	0.805	0.195	0.175	0.825	0	0.56	0.44	0.28	0.27	0.45		37	36	3.0E+05	1.6E+05	2.6E+05
	Alaska	‡	117	0.603	0.397	0.637	0.363	0.158	0.842	0	0.551	0.449	0.308	0.333	0.359		54	54	1.0E+05	5.7E+04	9.0E+04
	Minnesota	‡	100	0.565	0.435	0.69	0.31	0.43	0.565	0.005	0.48	0.52	0.175	0.335	0.49	0.015	54	54	3.5E+07	3.3E+06	1.9E+07
	Navajo	22	81	0.537	0.463	0.741	0.259	0.315	0.685	0	0.636	0.364	0.056	0.34	0.604		41	40	1.7E+06	5.8E+05	1.3E+06
	Pueblo	22	103	0.602	0.398	0.738	0.262	0.218	0.772	0.01	0.515	0.485	0.102	0.374	0.524	0.014	33	33	1.9E+08	1.4E+07	9.8E+07
	Sioux	22	64	0.555	0.445	0.742	0.258	0.422	0.578	0	0.406	0.594	0.148	0.234	0.617		54	54	1.2E+05	6.5E+04	1.0E+05
MEXICO																					
	Mexico City	§	230	0.507	0.493	0.683	0.317	0.317	0.676	0.007	0.630	0.370	0.193	0.313	0.493		65	63	1.6E+08	5.4E+06	6.2E+07
CARRIBEAN																					
Haiti		‡	104	0.154	0.846	0.51	0.490	0.476	0.192	0.332	0.601	0.399	0.072	0.832	0.096		27	27	5.7E+06	1.9E+06	4.5E+06
South America																					
Argentina	Buenos Aires	§	109	0.45	0.55	0.61	0.39	0.459	0.532	0.009	0.564	0.436	0.321	0.202	0.477	0.014	58	60	2.3E+07	2.0E+06	1.2E+07
Chile	Santiago	30	129	0.547	0.453	0.574	0.426	0.434	0.531	0.035	0.671	0.329	0.229	0.167	0.605		72	71	7.3E+06	1.6E+06	5.2E+06
Columbia	Bogata	31	151	0.609	0.391	0.672	0.328	0.417	0.550	0.033	0.623	0.378	0.235	0.212	0.553		83	82	8.7E+06	1.9E+06	6.2E+06
AFRICA																					
Nigeria		‡	67	0.157	0.843	0.545	0.455	0.403	0.134	0.463	0.612	0.388	0.067	0.821	0.112		24	24	1.6E+07	4.6E+06	1.2E+07
Zimbabwe		‡	106	0.198	0.802	0.486	0.514	0.368	0.274	0.359	0.712	0.288	0.099	0.859	0.043		31	30	9.4E+06	2.4E+06	6.9E+06
MIDDLE EAST																					
	Arab Moslems	35	94	0.457	0.543	0.617	0.383	0.388	0.585	0.027	0.649	0.351	0.218	0.271	0.511		74	76	7.6E+06	1.5E+06	5.2E+06
Abu Dhabi	Arab	36	100	0.435	0.56	0.73	0.27	0.345	0.605	0.05	0.63	0.37	0.2	0.275	0.525		69	68	5.3E+06	1.6E+06	4.0E+06
	Pakistan	36	100	0.45	0.55	0.61	0.39	0.535	0.455	0.01	0.74	0.26	0.24	0.205	0.555	0.015	60	60	5.1E+07	4.8E+06	2.8E+07
Dubai	Arab	37	180	0.442	0.558	0.678	0.322	0.456	0.464	0.081	0.639	0.361	0.194	0.289	0.517		76	75	1.5E+06	6.0E+05	1.3E+06
	Caucasian	‡	132	0.424	0.576	0.682	0.318	0.474	0.443	0.083	0.633	0.367	0.174	0.314	0.511		70	70	1.9E+06	7.5E+05	1.6E+06
Israel	Caucasian	‡	113	0.438	0.562	0.593	0.407	0.381	0.615	0.004	0.642	0.358	0.266	0.124	0.611	0.013	60	62	9.2E+07	6.7E+06	4.7E+07
Pakistan	Punjabi	40	115	0.443	0.557	0.610	0.390	0.5	0.5	0	0.781	0.219	0.289	0.149	0.561		43	44	1.3E+05	6.8E+04	1.1E+05
Saudi Arabia		§	184	0.516	0.488	0.753	0.247	0.391	0.587	0.022	0.636	0.364	0.144	0.188	0.669		66	65	5.2E+07	6.9E+06	3.2E+07
ASIA																					
India	Bengali	40	81	0.463	0.537	0.586	0.414	0.426	0.574	0	0.784	0.216	0.321	0.179	0.5		43	43	1.0E+05	5.6E+04	8.9E+04
Japan		185	257	0.146	0.854	0.582	0.418	0.372	0.628	0	0.621	0.379	0.245	0.502	0.253		50	51	2.2E+05	1.2E+05	2.0E+05
	Gifu Prefect.	186	366	0.187	0.813	0.566	0.434	0.29	0.71	0	0.619	0.381	0.262	0.515	0.223		59	59	2.5E+05	1.3E+05	2.2E+05
	Gunma Perf.	51	74	0.162	0.838	0.595	0.405	0.311	0.689	0	0.608	0.392	0.284	0.473	0.243		49	48	2.6E+05	1.4E+05	2.3E+05
		§	89	0.202	0.798	0.517	0.483	0.331	0.669	0	0.612	0.388	0.287	0.472	0.242		55	53	1.1E+05	6.2E+04	9.6E+04

TABLE 3—(*Continued*).

	Ref	N*	LDLR A	LDLR B	GYPA A	GYPA B	HBGG A	HBGG B	HBGG C	D7S8 A	D7S8 B	Gc A	Gc B	Gc C	MAF†	MC 4.1,4.10 θ=0.0	MC 4.10 θ=0.01	LC 4.1,4.10 θ=0.0	LC 4.10 θ=0.01	LC 4.1 θ=0.01
Korea Seoul	54	116	0.164	0.836	0.534	0.466	0.289	0.711	0	0.513	0.487	0.284	0.474	0.241		42	42	1.5E+05	8.1E+04	1.3E+05
Taiwan Taipei	58	105	0.233	0.767	0.605	0.395	0.243	0.757	0	0.59	0.41	0.281	0.438	0.281		52	51	1.5E+05	8.5E+04	1.3E+05
EUROPE																				
Croatia Northern	63	98	0.413	0.587	0.52	0.48	0.556	0.444	0	0.658	0.342	0.296	0.117	0.587		54	55	8.1E+04	4.4E+04	7.1E+04
Southern	63	101	0.406	0.594	0.599	0.401	0.505	0.495	0	0.649	0.351	0.262	0.134	0.604		60	62	7.0E+04	3.9E+04	6.2E+04
Denmark Caucasian	‡	68	0.331	0.669	0.603	0.397	0.493	0.5	0.007	0.588	0.412	0.243	0.132	0.625	0.022	64	64	4.1E+07	5.5E+06	2.5E+07
France Antilles	‡	126	0.25	0.75	0.536	0.464	0.456	0.286	0.258	0.647	0.353	0.167	0.595	0.238		106	104	3.2E+05	1.7E+05	2.8E+05
Basque	‡	47	0.521	0.479	0.521	0.479	0.489	0.511	0	0.553	0.447	0.319	0.096	0.585		44	45	4.3E+04	2.3E+04	3.8E+04
Germany Aachen	72	107	0.467	0.533	0.542	0.458	0.444	0.547	0.009	0.575	0.425	0.280	0.122	0.598	0.014	51	53	4.2E+07	3.4E+06	2.2E+07
Bavaria	190	150	0.377	0.623	0.587	0.413	0.5	0.483	0.017	0.6	0.4	0.293	0.157	0.55		59	61	3.6E+07	3.9E+06	2.1E+07
Dusseldorf	72	371	0.450	0.550	0.551	0.449	0.503	0.489	0.008	0.615	0.385	0.257	0.146	0.597		57	59	1.2E+08	4.7E+06	4.8E+07
Dusseldorf	191	295	0.468	0.532	0.542	0.458	0.493	0.498	0.009	0.592	0.409	0.273	0.153	0.575		54	56	7.8E+07	3.4E+06	3.3E+07
Frankfurt	76	100	0.4	0.6	0.56	0.44	0.54	0.455	0.005	0.67	0.33	0.26	0.15	0.59	0.015	62	62	5.9E+07	5.3E+06	3.2E+07
Saarland	72	100	0.455	0.545	0.53	0.47	0.52	0.46	0.02	0.595	0.405	0.325	0.165	0.51		53	55	1.2E+07	1.7E+06	7.5E+06
Greece Cyprus	77	107	0.486	0.514	0.598	0.402	0.5	0.467	0.033	0.636	0.364	0.318	0.178	0.504		60	62	5.7E+06	1.3E+06	4.1E+06
Hungary	82	163	0.423	0.577	0.592	0.408	0.503	0.494	0.003	0.604	0.396	0.258	0.129	0.614	0.009	56	58	1.6E+08	7.0E+06	6.8E+07
	83	244	0.418	0.582	0.600	0.400	0.510	0.482	0.008	0.603	0.398	0.277	0.193	0.584		56	58	9.5E+07	3.9E+06	3.9E+07
Baranya	80	135	0.419	0.581	0.693	0.307	0.359	0.637	0.004	0.785	0.215	0.267	0.144	0.589	0.011	48	47	5.2E+08	2.8E+07	2.4E+08
Budapest	81	182	0.418	0.582	0.552	0.448	0.492	0.508	0	0.662	0.338	0.283	0.124	0.593		55	57	6.7E+04	3.7E+04	5.9E+04
Italy	192	157	0.465	0.535	0.535	0.465	0.439	0.545	0.016	0.637	0.363	0.248	0.166	0.586		63	65	2.3E+07	2.4E+06	1.3E+07
	193	374	0.414	0.586	0.547	0.453	0.492	0.496	0.012	0.602	0.398	0.29	0.151	0.559		55	57	5.5E+07	3.8E+06	2.7E+07
	86	200	0.47	0.53	0.55	0.45	0.44	0.55	0.01	0.54	0.46	0.3	0.16	0.54		52	54	4.1E+07	2.4E+06	1.9E+07
	87	100	0.355	0.645	0.625	0.375	0.495	0.5	0.005	0.555	0.445	0.29	0.2	0.51	0.015	64	66	3.2E+07	3.1E+06	1.8E+07
	‡	158	0.465	0.535	0.538	0.462	0.440	0.544	0.016	0.633	0.367	0.247	0.168	0.585		63	65	2.3E+07	2.4E+06	1.3E+07
	194	98	0.413	0.587	0.607	0.393	0.434	0.551	0.015	0.556	0.444	0.224	0.138	0.638		64	66	4.5E+07	4.1E+06	2.4E+07
Brescia	195	100	0.395	0.605	0.55	0.45	0.505	0.485	0.01	0.655	0.345	0.285	0.19	0.525	0.015	64	66	3.3E+07	3.2E+06	1.8E+07
Piedmont	196	100	0.44	0.56	0.54	0.46	0.45	0.545	0.005	0.635	0.365	0.305	0.155	0.54	0.015	55	56	3.4E+07	3.2E+06	1.9E+07
Netherlands	197	155	0.426	0.574	0.516	0.484	0.571	0.429	0	0.619	0.381	0.248	0.139	0.613		58	60	4.6E+04	2.6E+04	4.1E+04
Holland	‡	107	0.420	0.580	0.513	0.487	0.567	0.433	0	0.621	0.379	0.245	0.143	0.612		59	61	4.3E+04	2.5E+04	3.9E+04
Poland South	198	102	0.431	0.569	0.627	0.373	0.554	0.446	0	0.681	0.319	0.265	0.123	0.613		59	58	1.3E+05	6.7E+04	1.1E+05
Portugal Alentejo	94	89	0.461	0.539	0.624	0.376	0.489	0.494	0.017	0.635	0.365	0.326	0.129	0.545		54	56	5.2E+07	5.3E+06	2.9E+07
Algarve	94	31	0.306	0.694	0.484	0.516	0.516	0.435	0.048	0.677	0.323	0.274	0.226	0.5		74	71	3.7E+06	1.1E+06	2.8E+06
Azores Isds	94	58	0.509	0.491	0.448	0.552	0.517	0.466	0.017	0.543	0.457	0.241	0.172	0.586	0.026	60	62	4.9E+06	9.1E+05	3.3E+06
Coimbra	199	119	0.433	0.567	0.559	0.441	0.479	0.504	0.017	0.571	0.429	0.353	0.147	0.5		49	51	2.4E+07	2.6E+06	1.4E+07
Estremadura	94	187	0.42	0.58	0.516	0.484	0.532	0.463	0.005	0.604	0.396	0.275	0.142	0.583	0.008	54	56	1.2E+08	4.7E+06	4.8E+07
Madeire Isd	94	149	0.399	0.601	0.517	0.483	0.423	0.56	0.017	0.607	0.393	0.262	0.185	0.554		64	65	1.8E+07	2.0E+06	1.0E+07
South	99	121	0.384	0.616	0.533	0.467	0.517	0.463	0.021	0.562	0.438	0.310	0.157	0.533		55	56	1.5E+07	2.1E+06	9.5E+06
Slovenia	§	401	0.397	0.603	0.57	0.43	0.545	0.45	0.005	0.67	0.33	0.315	0.118	0.566		54	54	9.1E+08	1.5E+07	2.7E+08
Spain	199	132	0.439	0.561	0.508	0.492	0.477	0.519	0.004	0.576	0.424	0.277	0.155	0.568	0.011	53	55	3.9E+07	2.6E+06	1.9E+07
Andalusia	200	106	0.495	0.505	0.509	0.491	0.495	0.491	0.014	0.585	0.415	0.316	0.184	0.5		54	56	1.4E+07	1.4E+06	7.9E+06
Asturias	201	215	0.454	0.547	0.528	0.472	0.498	0.498	0.005	0.591	0.409	0.307	0.165	0.528	0.007	52	54	9.8E+07	3.3E+06	3.7E+07
Basque	105	208	0.438	0.562	0.514	0.486	0.534	0.459	0.007	0.575	0.425	0.339	0.096	0.565		44	46	2.7E+08	7.5E+06	9.8E+07
Basque	105	206	0.524	0.476	0.541	0.459	0.524	0.476	0	0.515	0.485	0.330	0.104	0.566		43	45	3.6E+04	2.0E+04	3.2E+04
Canary Island	200	52	0.423	0.577	0.462	0.539	0.548	0.433	0.019	0.471	0.529	0.221	0.212	0.567	0.028	69	71	3.3E+06	6.8E+05	2.3E+06
Catalonia	108	146	0.483	0.517	0.510	0.490	0.462	0.517	0.021	0.551	0.449	0.332	0.161	0.507		50	52	7.7E+06	1.1E+06	4.9E+06
Cntrl Pyrenee	109	106	0.459	0.505	0.524	0.476	0.524	0.472	0.005	0.462	0.538	0.354	0.165	0.481	0.014	52	54	1.8E+07	1.7E+06	9.9E+06
Galicia	110	143	0.399	0.601	0.483	0.517	0.591	0.399	0.010	0.559	0.441	0.276	0.175	0.549		59	61	3.7E+07	2.5E+06	1.8E+07
Madrid	202	207	0.447	0.553	0.517	0.483	0.512	0.481	0.007	0.522	0.478	0.319	0.155	0.527		49	51	7.4E+07	2.6E+06	2.9E+07
Madrid	111	202	0.450	0.550	0.527	0.473	0.498	0.493	0.010	0.564	0.436	0.297	0.163	0.540		52	54	4.4E+07	2.5E+06	2.0E+07

TABLE 3—(*Continued*).

	Ref	N*	LDLR A	LDLR B	GYPA A	GYPA B	HBGG A	HBGG B	HBGG C	D7S8 A	D7S8 B	Gc A	Gc B	Gc C	MAF†	MC 4.1,4.10 θ=0.0	MC 4.10 θ=0.01	LC 4.1,4.10 θ=0.0	LC 4.10 θ=0.01	LC 4.1 θ=0.01
North-East	112	197	0.457	0.543	0.528	0.472	0.447	0.538	0.015	0.551	0.449	0.307	0.168	0.525		53	55	1.7E+07	1.7E+06	9.3E+06
Teruel	109	99	0.449	0.551	0.535	0.465	0.404	0.586	0.01	0.566	0.434	0.379	0.111	0.51	0.015	45	47	4.4E+07	3.8E+06	2.4E+07
Zaragoza	184	201	0.443	0.557	0.507	0.493	0.51	0.488	0.002	0.517	0.483	0.328	0.127	0.545	0.007	46	47	1.0E+08	3.5E+06	3.9E+07
Switzerland Basel Cauc	116	100	0.435	0.565	0.525	0.475	0.475	0.525	0	0.585	0.415	0.28	0.175	0.545		55	57	2.0E+04	1.2E+04	1.8E+04
Turkey	118	260	0.438	0.562	0.618	0.382	0.435	0.551	0.014	0.617	0.383	0.27	0.19	0.54		65	67	3.4E+07	3.1E+06	1.9E+07
	203	157	0.378	0.622	0.566	0.434	0.405	0.592	0.003	0.643	0.357	0.259	0.166	0.575	0.009	66	68	1.3E+08	6.1E+06	5.6E+07
OCEANIA																				
Guam Chamorro	123	97	0.232	0.768	0.505	0.495	0.227	0.773	0	0.459	0.541	0.258	0.423	0.32		42	42	1.0E+05	6.0E+04	9.3E+04
Filipino	123	96	0.292	0.708	0.5	0.5	0.182	0.818	0	0.542	0.458	0.224	0.474	0.302		42	41	1.3E+05	7.4E+04	1.2E+05
Australia NW	‡	131	0.225	0.775	0.336	0.664	0.450	0.550	0	0.721	0.279	0.141	0.332	0.527		41	41	5.6E+05	2.7E+05	4.8E+05

* Number of individuals
† Minimum allele frequency
‡ TWGDAM data
§ Personal communication

TABLE 4—*Profile frequencies for PM loci/HLA-DQA1.*

			Reference	N*	MC 4.1, 4.10 θ=0.0	MC 4.10 θ=0.01	LC 4.1, 4.10 θ=0.0	LC 4.10 θ=0.01	LC 4.1 θ=0.01
NORTH AMERICA									
	U.S.	CAUCASIAN							
			14	148	428	429	3.8E+10	8.7E+08	1.4E+10
			‡	105	459	460	5.9E+09	2.7E+08	2.7E+09
			13	199	573	569	3.8E+07	6.1E+06	2.5E+07
		California	†	151	458	460	3.6E+09	2.2E+08	1.8E+09
		Florida	†	116	450	450	1.1E+10	4.5E+08	4.9E+09
		New Jersey	17	164	567	562	4.1E+11	2.8E+09	7.5E+10
		NY Hasidic Jews	18	Vary	590	585	1.6E+11	1.9E+09	5.1E+10
		NY Non-Hasidic	18	Vary	588	583	1.0E+11	1.9E+09	3.7E+10
		Virginia	†	90	535	533	3.5E+09	2.9E+08	2.0E+09
		AFRICAN AMERICA							
			‡	98	403	372	2.3E+08	5.0E+07	1.6E+08
			14	145	220	213	4.7E+08	9.7E+07	3.3E+08
			13	206	368	350	9.3E+08	1.7E+08	6.4E+08
		Florida	†	67	143	141	9.0E+09	9.5E+08	5.4E+09
		Florida	†	100	174	170	1.4E+09	2.5E+08	9.6E+08
		Indiana	†	197	306	294	7.5E+08	1.1E+08	4.8E+08
		Maryland	†	100	361	344	3.6E+08	7.1E+07	2.5E+08
		Missouri	†	100	221	214	2.2E+08	5.1E+07	1.6E+08
		New Jersey	17	285	387	368	9.3E+08	1.6E+08	6.3E+08
		Pennsylvania	†	100	249	241	3.0E+08	7.1E+07	2.2E+08

TABLE 4—*(Continued).*

			Reference	N*	MC 4.1, 4.10 θ = 0.0	MC 4.10 θ = 0.01	LC 4.1, 4.10 θ = 0.0	LC 4.10 θ = 0.01	LC 4.1 θ = 0.01
		Virginia	†	102	300	289	3.2E+08	6.1E+07	2.2E+08
		HISPANIC							
		Florida	†	100	477	477	7.5E+08	9.3E+07	4.6E+08
		New Jersey	17	Vary	762	752	9.8E+07	2.2E+07	7.1E+07
		Pennsylvania	†	100	683	681	3.0E+07	8.9E+06	2.3E+07
		Southeastern	14	94	737	726	6.6E+08	8.0E+07	4.1E+08
		Southwestern	14	96	482	468	4.7E+09	4.4E+08	2.7E+09
		Southwestern	13	208	567	564	1.4E+10	5.8E+08	6.3E+09
		Virginia	†	92	453	456	4.3E+08	6.9E+07	2.9E+08
		NATIVE AMERICAN							
		Alaska	†	117	123	125	6.2E+08	4.2E+07	3.1E+08
SOUTH AMERICA									
	Argentina	Buenos Aries	‡	Vary	393	395	3.9E+09	2.1E+08	1.9E+09
	Columbia	Bogota	31	151	493	478	3.5E+09	3.6E+08	2.1E+09
MIDDLE EAST									
	Abu Dhabi	Pakistan	36	100	320	315	4.7E+09	3.0E+08	2.4E+09
	Pakistan	Punjabi	40	115	445	429	1.9E+08	2.7E+07	1.2E+08
ASIA									
	India	Bengali	40	81	428	416	1.6E+07	5.4E+06	1.2E+07
	Taiwan	Taipei	58	105	312	299	2.6E+08	3.7E+07	1.7E+08
EUROPE	Germany	Aachen	72	107	294	298	2.2E+11	2.4E+09	6.7E+10
		Frankfurt	76	100	567	545	9.3E+09	5.1E+08	4.5E+09
	Hungary		82	163	476	475	2.0E+10	5.7E+08	7.8E+09
	Italy		86	200	334	337	2.3E+10	5.4E+08	8.6E+09
			87	Vary	484	482	6.5E+11	9.0E+09	2.2E+11
	Portugal	Alentejo	94	Vary	545	540	3.4E+09	2.5E+08	1.8E+09
		Algarve	94	31	561	526	1.6E+09	2.2E+08	1.0E+09
		Azores Islands	94	Vary	592	586	6.6E+08	7.7E+07	4.0E+08
		Estremadura	94	Vary	445	446	1.1E+10	2.9E+08	4.1E+09
		Madeire Island	94	149	576	572	1.1E+09	8.8E+07	6.0E+08
		South	99	Vary	488	487	1.5E+09	1.4E+08	8.5E+08
	Spain	Basque	105	208	506	503	5.5E+12	7.9E+09	8.3E+11
		Basque	105	206	559	554	7.4E+08	2.1E+07	2.7E+08
		Catalonia	108	Vary	484	482	2.2E+09	1.7E+08	1.2E+09
		Central Pyrenees	109	106	476	477	4.2E+09	2.1E+08	2.0E+09
		Teruel	109	99	434	435	7.6E+09	3.9E+08	3.7E+09
	Turkey		118	Vary	544	540	3.7E+09	2.2E+08	1.8E+09

* Number of individuals.
† TWGDAM data.
‡ Personal communication.

TABLE 5—*Least and most common profile frequencies for HLA-DQA1/PM loci/D1S80.*

			Reference	N*	MC 4.1, 4.10 θ = 0.0	MC 4.10 θ = 0.01	LC 4.1, 4.10 θ = 0.0	LC 4.10 θ = 0.01	LC 4.1 θ = 0.01
NORTH AMERICA									
	U.S.	CAUCASIAN							
			†	200	3733	3621	1.8E+14	6.0E+11	4.1E+13
		Alabama	‡	100	2896	2828	1.9E+10	1.7E+09	1.1E+10
		AFRICAN AMERICA							
			†	200	18242	15429	2.1E+12	6.6E+10	9.1E+11
		Alabama	‡	100	3175	2899	3.8E+12	9.6E+10	1.3E+12
		California	‡	152	3944	3566	1.2E+12	4.8E+10	5.6E+11
		HISPANIC							
			†	200	2413	2385	4.2E+12	8.3E+10	1.6E+12
		California	‡	155	2181	2166	8.7E+10	4.2E+09	4.2E+10
		Nevada	‡	100	2944	2874	7.6E+12	1.8E+11	3.2E+12
		NATIVE AMERICAN							
		Navajo	22	Vary	1238	1121	3.1E+12	8.0E+10	1.3E+12
		Pueblo	22	Vary	371	354	9.5E+14	3.1E+12	2.2E+14
		Sioux	22	Vary	756	748	1.1E+11	6.4E+09	5.7E+10
	Alaska	North Slope Native	21	Vary	1011	958	1.3E+12	3.2E+10	5.3E+11
		BW - Hampton	21	Vary	1496	1430	1.1E+12	2.0E+10	3.9E+11
MEXICO									
		Mexico City	†	230	1741	1633	2.7E+15	2.1E+12	3.8E+14
SOUTH AMERICA									
	Chile	Santiago	30	Vary	2281	2184	1.7E+13	2.7E+11	6.3E+12
AFRICA	Nigeria		‡	67	2196	2015	9.4E+12	3.5E+11	4.5E+12
	Zimbabwe		‡	106	3282	2895	4.9E+12	1.7E+11	2.3E+12
MIDDLE EAST									
		Arab Moslems	35	94	4855	4607	1.2E+12	4.5E+10	5.7E+11
	Dubai	Arab	37	Vary	1707	1658	2.3E+12	6.6E+10	9.7E+11
ASIA									
			†	89	8099	7540	3.4E+11	1.1E+10	1.5E+11
	Japan	Gunma Perfecture	51	Vary	4743	4274	1.6E+13	8.9E+10	4.0E+12
	Korea	Seoul	54	116	4316	3903	1.5E+11	8.5E+09	7.6E+10
EUROPE									
	Croatia	Northern	63	Vary	2318	2283	3.0E+10	2.5E+09	1.7E+10
		Southern	63	Vary	1809	1795	2.4E+10	2.0E+09	1.4E+10
	Cyprus	Greek	77	107	2449	2410	4.6E+13	3.7E+11	1.4E+13
	Hungary	Baranya	80	135	1576	1471	7.7E+14	3.4E+12	1.9E+14
		Budapest	81	Vary	2455	2404	3.0E+10	1.6E+09	1.4E+10
	Spain	Galicia	110	Vary	2424	2387	1.4E+13	1.1E+11	4.1E+12
		North-East	112	Vary	2736	2684	3.0E+13	1.7E+11	7.8E+12
	Slovenia		†	401	2625	2497	2.4E+15	1.8E+12	3.1E+14
	Switzerland	Basel Caucasians	116	Vary	3337	3250	2.9E+09	3.5E+08	1.8E+09
OCEANIA	Guam	Chamorro	123	Vary	3270	2984	3.5E+10	3.1E+09	2.0E+10
		Filipino	123	Vary	2418	2247	4.8E+10	4.1E+09	2.7E+10

* Number of individuals
† Personal communication ‡ TWGDAM data

TABLE 6—*Least and most common profile frequencies for HLA-DQA1-D1S80 and for PM-D1S80 loci.*

Population			Reference	N	Most Common 4.1/4.10 $\theta = 0$ 4.1 $\theta = 0.01$	Most Common 4.10 $\theta = 0.01$	Least Common 4.1/4.10 $\theta = 0$	Least Common 4.10 $\theta = 0.01$	Least Common 4.1 $\theta = 0.01$
For HLA-DQA1-D1S80									
Europe	Italy		93	100	270	232	2.2×10^5	4.0×10^4	1.5×10^5
	Spain	Andalusia	102	120	51	48	3.2×10^5	4.5×10^4	2.0×10^5
	Spain	Andalusia	103	Varies	58	54	5.3×10^5	5.6×10^4	3.0×10^5
	Switzerland		116	227	53	50	7.0×10^5	5.9×10^4	3.7×10^5
Oceania	Australia	Victoria	123	250	51	48	2.2×10^6	1.1×10^5	1.0×10^5
Asia	China	Shenyang	48	250	98	91	1.2×10^6	6.7×10^4	5.5×10^5
For PM-D1S80									
Europe	Spain	Zaragoza	185	Varies	274	280	4.1×10^{11}	2.2×10^9	9.6×10^{10}

TABLE 7—*Effect of MAF on the estimate of least common profile frequencies.*

Population/Reference	MAF *	MAF †	N	Without MAF 4.1/4.10 $\theta = 0$	Without MAF 4.10 $\theta = 0.01$	Without MAF 4.1 $\theta = 0.01$	With MAF* 4.1/4.10 $\theta = 0$	With MAF* 4.10 $\theta = 0.01$	With MAF* 4.1 $\theta = 0.01$	With MAF† 4.1/4.10 $\theta = 0$	With MAF† 4.10 $\theta = 0.01$	With MAF† 4.1 $\theta = 0.01$
PM Loci												
Hungary Caucasian/84	0.009	0.015	163	1.4×10^9	1.0×10^7	3.0×10^8	1.6×10^8	7.0×10^6	6.8×10^7	5.7×10^7	5.1×10^6	3.1×10^7
Denmark Caucasian/§	0.022	0.037	68	4.0×10^8	1.2×10^7	1.5×10^8	4.1×10^7	5.5×10^6	2.5×10^7	1.4×10^7	3.1×10^6	1.0×10^7
HLA-DQA1-PM-D1S80 Loci												
U.S. Caucasian/‡	0.014	0.013	200	3.9×10^{15}	1.2×10^{12}	3.5×10^{14}	1.8×10^{14}	6.0×10^{11}	4.1×10^{13}	2.3×10^{14}	6.4×10^{11}	4.9×10^{13}
Alabama Caucasian/§	0.027	0.025	100	5.5×10^{11}	5.3×10^9	1.4×10^{11}	1.9×10^{10}	1.7×10^9	1.1×10^{10}	2.2×10^{10}	1.9×10^9	1.2×10^{10}

* According to Budowle et al. (4).
† According to 5/2N.
‡ Personal communication.
§ TWGDAM.

TABLE 8—*Weighted means of proportions comparisons for MN blood group and PCR-based GYPA and for GC serum group and PCR-based GC for U.S. Caucasian and African-American populations.*

	Caucasian	African American		Caucasian	African American
MN blood groups*	n = 28,779	n = 7,478	GC Serum groups†	n = 7,357	n = 987
M	0.305	0.256	2	0.075	0.01
MN	0.5	0.48	2-1F	0.087	0.156
N	0.2	0.27	2-1S	0.322	0.029
			1F	0.024	0.5
GYPA types	n = 2,738	n = 2,578	1F–1S	0.175	0.229
A	0.3	0.255	IS	0.318	0.033
AB	0.494	0.499			
B	0.21	0.25	GC PCR Dot blot	n = 2,738	n = 2,578
			A	0.081	0.012
χ^2_{1df}	0.0006562	0.002327	AB	0.087	0.153
P	> 0.99	> 0.99	AC	0.317	0.036
			B	0.025	0.521
			BC	0.174	0.248
			C	0.317	0.031
			χ^2_{3df}	0.00054	0.00409
			P	> 0.99	> 0.99

* Data from Reference 6.
† Data from Reference 7.

mon profile in larger populations, compared with using the lowest allele frequency actually observed.

Table 8 shows the comparison between the weighted means of the proportions, or WMP (6), for the classical MN blood groups and the GYPA locus, and for the classical (serum protein) GC subtypes and the PCR-based (dot blot) GC types, using the chi square statistic. WMP was computed for the dot-blot based frequencies in the same manner as was done for the classical data originally. It is obvious that the statistical test does not reveal any significant difference between the data sets combined in the manner described.

Acknowledgments

We acknowledge with our gratitude those investigators who shared their data as personal communications, and the TWGDAM laboratories who also contributed data.

References

1. National Research Council. Committee on DNA forensic science: an update. The evaluation of forensic DNA evidence. Washington DC: National Academy Press, 1996.
2. Mourant AE, Kopec AC, Domaniewska-Sobczak K. The distribution of the human blood groups and other polymorphisms. 2nd ed, London: Oxford University Press, 1976.
3. Rivas F, Zhong Y, Olivares N, Cerda-Flores RM, Chakraborty R. Worldwide genetic diversity at the HLA-DQA1 locus. Am J Hum Biol 1997;9:735–49.
4. Budowle B, Monson KL, Chakraborty R. Estimating minimum allele frequencies for DNA profile frequency estimates for PCR-based loci. Int J Legal Med 1996;108:173–6.
5. Chakraborty R, Zhong Y. DNAType. A suite of computer programs for population genetics calculations. A version of DNAType running under Windows 95NT was prepared under an IAI between the Board of Trustees of the University of Illinois and the National Institute of Justice, and submitted to NIJ in November, 1998.
6. Gaensslen RE, Bell SC, Lee HC. Distributions of genetic markers in United States populations. I. Blood group and secretor systems. J Forensic Sci 1987;32(4):1016–58.
7. Gaensslen RE, Bell SC, Lee HC. Distributions of genetic markers in United States populations. III. Serum group systems and hemoglobin variants. J Forensic Sci 1987;32(6):1754–74.
8. Imanashi T, Azaka T, Kimura A, Tokunaga K, Gojobori T. Allele and haplotype frequencies for HLA and complement loci in various ethnic groups. In: Tsuji K, Aizawa M, Saszuki T, editors. HLA 1991. Proceedings of the 4th International Histocompatibility Workshop and Conference; 1991 Nov 6–13; Yokohama. New York: Oxford University Press, 1991;1:1165–220.
9. Shi Y, Zou M, Robb D, Farid NR. Typing for major histocompatibility complex class II antigens in thyroid tissue blocks: Association of Hashimoto's thyroiditis with HLA-DQA0301 and DQB0201 alleles. J Clin Endocrinol Metab 1992;75:943–6.
10. Helmuth R, Fildes N, Blake E, Luce MC, Chimera J, Madej R, et al. HLA-DQA allele and genotype frequencies in various human populations, determined by using enzymatic amplification and oligonucleotide probes. Am J Hum Genet 1990;47:515–23.
11. Fernandez-Vina MA, Gao X, Moraes JR, Salatiel 1, Miller S, et al. Alleles at four HLA class II loci determined by oligonucleotide hybridization and their associations in five ethnic groups. Immunogenetics 1991;34:299–312.
12. Kurth JH, Bowcock AM, Erlich HA, Cavalli-Sforza LL. HLA-DQA allelic frequencies detected with PCR in a variety of human populations. Gene Geogr 1992;6:175–83.
13. Budowle B, Koons BW, Moretti TR. Subtyping of HLA-DQA1 locus and independence testing with PM and STR/VNTR loci. J Forensic Sci 1998 May;43(3):657–60.
14. Budowle B, Lindsey JA, DeCou JA, Koons BW, Giusti AM, Comey CT. Validation and population studies of the loci LDLR, GYPA, HBGG, D7S8, and Gc(PM loci), and HLA-DQ (using a multiplex amplification and typing procedure). J Forensic Sci 1995 Jan;40(1):45–54.
15. Crouse CA, Feuer WJ, Nippes DC, Hutto SC, Barnes KS, Coffman D, et al. Analysis of HLA DQu allele and genotype frequencies in populations from Florida. J Forensic Sci 1994 May;39(3):731–42.
16. Tahir MA, Hamby PP, Asghar A, Caruso JF, Budowle B. Distribution of HLA-DQA alleles in deoxyribonucleic acid (DNA) from Caucasian and Black populations of Marion County, Indiana, USA. In: Bär W, Fiori A, Rossi U, editors. Advances in Forensic Haemogenetics. 15th Congress of the International Society for Forensic Haemogenetics; 1993 Oct 13–15; Venice. Berlin: Springer Verlag 1994;5:596–8.
17. Jankowski LB, Budowle B, Swec NT, Pino JA, Freck-Tootell S, Corey HW, et al. New Jersey Caucasian, African American, and Hispanic population data on the PCR-based loci HLA-DQA1, LDLR, GYPA, HBGG, D7S8, and Gc. J Forensic Sci 1998 Sep;43(5):1033–6.
18. Medintz I, Levine L, McCurdy L, Chiriboga L, Kingston C, Desnick R, et al. HLA-DQA1 and polymarker allele frequencies in two New York City Jewish populations. J Forensic Sci 1997 Sep;42(5):919–22.
19. Begovich AB, McClure GR, Suraj VC, Helmuth RC, Fildes N, Bugawan TL, et al. Polymorphism, recombination, and linkage disequilibrium within the HLA class II region. J Immunol 1992;148(1):249–58.

20. Comey CT, Budowle B. Validation studies on the analysis of the HLA DQ (locus using the polymerase chain reaction). J Forensic Sci 1991 Nov;36(6):1633–48.
21. Walkinshaw M, Strickland L, Hamilton H, Denning K, Gayley T. DNA profiling in two Alaskan Native populations using HLA-DQA1, PM, and D1S80 loci. J Forensic Sci 1996 May;41(3):478–84.
22. Scholl S, Budowle B, Radecki K, Salvo M. Navajo, Pueblo, and Sioux population data on the loci HLA-DQA1, LDLR, GYPA, HBGG, D7S8, Gc, and D1S80. J Forensic Sci 1996 Jan;41(1):47–51.
23. Nelson JL, Boyer G, Templin D, Lanier A, Barrington R, Nisperos B, et al. HLA antigens in Tlingit Indians with rheumatoid arthritis. Tissue Antigens 1992;40:57–63.
24. Caraballo LR, Marrugo J, Erlich H, Pastorizo M. HLA alleles in the population of Cartagena (Columbia). Tissue Antigens 1992;39:128–33.
25. Sullivan KM, Gill P, Lingard D, Lygo JE. Characterization of HLA DQA for forensic purposes. Allele and gentoype frequencies in British Caucasian, Afro-Caribbean and Asian populations. Int J Legal Med 1992;105:17–20.
26. Mijovic CH, Jenkins D, Jacobs KH, Penny MA, Fletcher JA, Barnett AH. HLA-DQA1 and -DQB1 alleles associated with genetic susceptibility to IDDM in a Black population. Diabetes 1991;40:748–53.
27. Gene M, Fuentes M, Huguet E, Pique E, Bert F, Corella A, et al. Quechua Amerindian population characterized by HLA-DQα, YNZ22, 3'APO B, HUMTH01, and HUMVWA31A polymorphisms. J Forensic Sci 1998 Mar;43(2):403–5.
28. Moraes ME, Fernandez-Vina M, Salatiel I, Tsai S, Moraes JR, Stastny P. HLA class II DNA typing in two Brazilian populations. Tissue Antigens 1993;41:238–42.
29. Soares-Vieira JA, Billerbeck AEC, Iwamura ESM, Otto PA, Munoz DR. Gene and genotype frequencies for HLA-DQA1 in Caucasians and Mulattoes in Brazil. J Forensic Sci 1999 Sep;44(5):1051–2.
30. Jorquera H, Budowle B. Chilean population data on ten PCR-based loci. J Forensic Sci 1998 Jan;43(1):171–3.
31. Castillo MI, Paredes M, Penuela C, Bustos 1, Jimenez M, Galindo A. Determination of the allele and genotype frequencies of loci HLA-DQA1, LDLR, GYPA, HBGG, D7S8 and Gc in Bogota-Columbia. In: Carracedo A, Brinkmann B, Bär W, editors. Advances in Forensic Haemogenetics. 16th Congress of the International Society for Forensic Haemogenetics; 1995 Sept 12–16; Santiago de Compostela. Berlin: Springer Verlag 1996;6:503–5.
32. Gu XF, Larger E, Clauser E, Bessaoud K, Krishnamoorthy R, Elion J, et al. HLA-DQA1 and DQB1 alleles in French and Algerian Type 1 Diabetic subjects. Diabetes Res 1991;17:189–97.
33. Djoulah S, Sanchez-Mazas A, Khalil 1, Benhamamouch S, Degos L, Deschamps I, et al. HLA-DRB1, DQA1 and DQB1 DNA polymorphisms in healthy Algerian and genetic relationships with other populations. Tissue Antigens 1994;43:102–9.
34. Amaiz-Villena A, Benmamar D, Alvarez M, Diaz-Campos N, Varela P, Gomez-Casado E, et al. HLA allele and haplotype frequencies in Algerians. Hum Immunol 1995;43:259–68.
35. Hayes JM, Budowle B, Freund M. Arab population data on the PCR-based loci: HLA-DQA1, LDLR, GYPA, HBGG, D7S8, Gc, and D1S80. J Forensic Sci 1995 Sep;40(5):888–92.
36. Tahir MA, Caruso J, Budowle B, Aziz N, Novick GE. Distribution of HLA-DQA1 and polymarker (LDLR, Gc, GYPA, HBGG, and D7S8) alleles in Arab and Pakistani populations living in Abu Dhabi, United Arab Emirates. J Forensic Sci 1997 Sep;42(5):914–8.
37. Alkhayat A, Alshamali F, Budowle B. Population data on the PCR-based loci LDLR, GYPA, HBGG, D7S8, Gc, HLA-DQA1, and D1S80 from Arabs from Dubai. Forensic Sci Int 1996;81:29–34.
38. Tahir MA, Al Khayat A, Al Shamali F, Budowle B, Novick G. Distribution of HLA-DQA1 alleles in Arab and Pakistani individuals from Dubai, United Arab Emirates. Forensic Sci Int 1997;85:219–23.
39. Al-Nassar K, Mathew J, Thomas N, Fatania H. HLA-DQa allele and genotype frequencies in a native Kuwaiti population. Forensic Sci Int 1995;72:65–9.
40. Tahir MA, Herrera RJ, Khan AA, Kashyap VK, Duncan G, Barna C, et al. Distribution of HLA-DQA1, Polymarker and STR (CSF1PO, vWA, THO1, TPOX, D16S539, D7S820, D13S317, and D5S818) loci in East Bengali and West Punjabi populations from Indo-Pak subcontinent. Personal communication.
41. Sebetan IM, Hajar H. HLA DQa genotype and allele frequencies in Qatari population. Forensic Sci Int 1997;90:11–5.
42. Gao X, Sun Y, An J, Fernandez-Vina M, Qou J, Lin L, et al. DNA Typing for HLA-DR, and -DP in a Chinese population using the polymerase chain reaction (PCR) and oligonucleotide probes. Tissue Antigens 1991;38:24–30.
43. Sun Y, Gao X, An J, Tan Y, Li H, Stastny P, et al. HLA class 11 polymorphisms in five Chinese populations detected by polymerase chain reaction and sequence specific ollonucleotide probes. In: Tsuji K, Aizawa M, Sasazuki T: HLA 1991. Proceedings of the 11th International Histocompatibility Workshop and Conference, Vol. 2. New York: Oxford University Press 1991;237–40.
44. Penny MA, Jenkins D, Mijovic CH, Jacobs KH, Cavan DA, Yeung V, et al. Susceptibility to IDDM in a Chinese population. Diabetes 1992; 41:914–9.
45. Wang FQ, Semana G, Fauchet R, Genetet B. HLA-DR and -DQ genotyping by PCR-SSO in Shanghai Chinese. Tissue Antigens 1993;41: 223–6.
46. Tie J, Oshida S, Chiba S, Tsukamoto S, Sebetan 1. Frequency of D1S80 and HLA DQA alleles in a Chinese population. Int J Legal Med 1995; 108:170–1.
47. Tahir MA, Caruso J, Hamby P, Sharma VK. Deoxyribonucleic acid (DNA) HLA-DQα allele frequency distribution in various sects of South Indian population. In: Bär W, Fiori A, Rossi U, editors. Advances in Forensic Haemogenetics. 15th Congress of the International Society for Forensic Haemogenetics; 1993 Oct 13–15; Venice. Berlin: Springer Verlag 1994;5:593–5.
48. Hashimoto M, Kinoshita T, Yamasaki M, Tanaka H, Imanshi T, Ihara H, et al. Gene frequencies and haplotypic associations within the HLA region in 916 unrelated Japanese individuals. Tissue Antigens 1994; 44:166–73.
49. Awata T, Kuzuya T, Matsuda A, Iwamoto Y, Kanazawa Y. Genetic analysis of HLA class II alleles and susceptibility to Type 1 (insulin-dependent) diabetes mellitus in Japanese subjects. Diabetologia 1992; 35:419–24.
50. Tamaki K, Yamamoto T, Uchihi R, Katsumata Y, Kondo K, Mizuno S, et al. Frequency of HLA-DQA1 alleles in the Japanese population. Hum Hered 1991;41:209–14.
51. Najima T, Matsuki T, Ohkawara H, Nara M, Furukawa K, Kishi K. Evaluation of 7 DNA markers (D1S80, HLA-DQα, LDLR, GYPA, HBGG, D7S8 and Gc in a Japanese population. Int J Legal Med 1996; 109:47–8.
52. Katsuren E, Awata T, Matsumoto C, Yamamoto K. HLA class II alleles in Japanese patients with Graves' Disease: weak associations of HLA-DR and -DQ. Endocrine J 1994;41(6):599–603.
53. Seon MS, Han MS, Park KW, Lee YH, Choi SK, Kang SJ. HLA-DQcc allele and genotype frequencies in the Korean population. Korean J Genet 1993;15:31–8.
54. Woo KM, Budowle B. Korean population data on the PCR-based loci LDLR, GYPA, HBGG, D7S8, Gc, HLA-DQA1, and D1S80. J Forensic Sci 1995 Jul;40(4):645–8.
55. Koh C, Benjamin DG. HLA-DQu. genotype and allele frequencies in Malays, Chinese, and Indians in the Malaysian population. Hum Hered 1994;44:150–5.
56. Hu C, Allen M, Chuang L, Lin B, Gyllensten U. Association of insulin-dependent diabetes mellitus in Taiwan with HLA class II DQB1 and DRB1 alleles. Hum Immunol 1993;38:105–14.
57. Lee JC, Chang JG. HLA-DQA allele and genotype frequencies of Chinese in Taiwan. J Police Sci 1992;21:151–6.
58. Huang N, Budowle B. Chinese population data on the PCR-based loci HLA-DQ alpha, low-density-lipoprotein receptor, glycophorin A, hemoglobin, D7S8, and group-specific component. Hum Hered 1995; 45:34–40.
59. Ambach E, Zehethofer K, Scheithauer R. HLA-DQA genotype and allele frequencies in an Austrian population. Hum Hered 1996;46:71–5.
60. Decorte R, Buyse 1, Zamani M, Gu XX, Spaepen M, Marynen P, et al. Distribution of HLA class II genes in a Caucasian population as determined by PCR and reversed-dot-blot typing. In: Bär W, Fiori A, Rossi U, editors. Advances in forensic haemogenetics. 15th Congress of the International Society for Forensic Haemogenetics; 1993 Oct 13–15; Venice. Berlin: Springer Verlag 1994;5:490–2.
61. Cerna M, Fernandez-Vina M, Ivaskova E, Stastny P. Comparison of HLA class II alleles in gypsy and Czech populations by DNA typing with oligonucleotide probes. Tissue Antigens 1992;39:111–6.
62. Martinovic I, Bakran M, Chaventre A, Janicijevic B, Smolej-Narancic N, Jovanovic V, et al. Application of HLA class II polymorphism analysis to the study of the population of the island of Krk, Croatia. Human Biol 1997;69(6):819–29.

63. Keys K, Budowle B, Andelinovic S, Definis-Gojanovic M, Drmic I, Mladen M, et al. Northern and Southern Croatian population data on seven PCR-based loci. Forensic Sci Int 1996;81:191–9.
64. Cowland JB, Madsen HO, Morling N. HLA-DQA1 typing in Danes by two polymerase chain reaction (PCR) based methods. Forensic Sci Int 1995;73:1–13.
65. Sajantila A, Strom M, Budowle B, Tienari PJ, Ehnholm C, Peltonen L. The distribution of the HLA DQa alleles and genotypes in the Finnish population as determined by the use of DNA amplification and allele specific oligonucleotides. Int J Legal Med 1991;104:181–4.
66. Ikaheimo 1, Tiilikainen A, Karvonen J, Silvennoinen-Kassinen S. HLA-DQA1 and -DQB1 loci in nickel allergy patients. Int Arch Allergy Immunol 1993;100:248–50.
67. Khalil I, Deschamps I, Lepage V, Al-Daccak R, Degos L, Hors J. Dose effect of cis- and trans-encoded HLA-DQα heterodimers in IDDM susceptibility. Diabetes 1992;41:378–84.
68. Pascal O, Levayer T, Aubert T, Peneau A, Markey P, Moisan JP. French population data of 6 AMPFLP's. In: Bär W, Fiori A, Rossi U, editors. Advances in Forensic Haemogenetics. 15th Congress of the International Society for Forensic Haemogenetics; 1993 Oct 13–15; Venice. Berlin: Springer Verlag 1994;5:542–4.
69. Khalil I, d'Auriol L, Gobet M, Morin L, Lepage V, Deschamps I, et al. A combination of HLA-DQα Asp57-Negative and HLA-DQα Arg52 confers susceptibility to insulin-dependent diabetes mellitus. J Clin Invest 1990;85:1315–9.
70. Schneider M, Prager-Eberle M, Rittner C. Zur anwendung der Polymerase Kettenreaktion (PCR) des HLA-DQA-systems in der forensischen spunenkunde. Arch Kriminol 1991;188(5–6):167–74.
71. Reinhold J, Arnold J. PCR based analysis of HLA-DQα, D1S80, and Apo B loci in paternity testing. In: Bär W, Fiori A, Rossi U, editors. Advances in forensic haemogenetics. 15th Congress of the International Society for Forensic Haemogenetics; 1993 Oct 13–15; Venice. Berlin: Springer Verlag 1994;5:229–31.
72. Huckenbeck W, Scheil HG, Cremer U, Makuch D, Eiennann TH, Kuntze K, et al. German data on the loci low-density lipoprotein receptor, glycophorin A, hemoglobin G, D7S8, group-specific component and HLA-DQα. In: Carracedo A, Brinkmann B, Bär W, editors. Advances in forensic haemogenetics. 16th Congress of the International Society for Forensic Haemogenetics; 1995 Sept 12–16; Santiago de Compostela. Berlin: Springer Verlag 1996;6:523–5.
73. Weichhold GM, Keil W, Eulitz A, Bayer B. HLA-DQα PCR system: frequencies of a South Bavarian population and family data. In: Bär W, Fiori A, Rossi U, editors. Advances in forensic haemogenetics. 15th Congress of the International Society for Forensic Haemogenetics; 1993 Oct 13–15; Venice. Berlin: Springer Verlag 1994;5:599–602.
74. Huckenbeck W, Zens V, Scheil HG. HLA-DQα system: Allelefrequenzen und genotypenverteilung in den grobraumen Dusseldorf and Wuppertal. Rechtsmedizin 1994;4:107–9.
75. Schneider PM, Veit A, Rittner C. PCR typing of the human HLA-DQA locus: population genetics and application in forensic casework. In Berghaus, Brinkmann, Rittner and Staak: DNA technology and its forensic application. Berlin, Heidelbergh: Springer-Verlag, 1991;85–91.
76. Zehner R, Mebs D, Bratzke H. Population genetic study of the simultaneously amplified loci HLA-DQA1, LDLR, GYPA, HBGG, D7S8, Gc in a German population sample. J Forensic Sci 1998 Jul;43(4):913–4.
77. Cariolou MA, Manoli P, Christophorou M, Bashiardes E, Karagrigoriou A, Budowle B. Greek Cypriot allele and genotype frequencies for Amplitype PM-DQA1 and D1S80 loci. J Forensic Sci 1998 May;43 (3):661–4.
78. Grunnet N, Steffensen R. Local analysis of 11th International Histocompatibility Workshop PCR oligonucleotides for HLA-DQ in a population of Inuits. Tissue Antigens 1991;38:45–51.
79. Kloosterman AD, Budowle B, Riley EL. Population data of the HLA-DQα locus in Dutch Caucasians. Comparison with other population studies. Int J Legal Med 1993;105:233–8.
80. Woller J, Budowle B, Angyal M, Furedi S, Padar Z. Population data on the loci HLA-DQA1, LDLR, GYPA, HBGG, D7S8, GC and D1S80 in a Hungarian Romany population. In: Olaisen B, Brinkmann B, Lincoln PJ, editors. Advances in Forensic Haemogenetics. 17th Congress of the International Society for Forensic Haemogenetics; 1997 Sept 2–6; Oslo. Berlin: Springer Verlag 1998;7:381–3.
81. Budowle B, Woller J, Koons B, Furedi S, Errera J, Padar Z. Hungarian population data on seven PCR-based loci. J Forensic Sci 1996 Jul;41 (4):667–70.
82. Woller J, Budowle B, Furedi S, Padar Z. Hungarian population data on the loci HLA-DQα, LDLR, GYPA, HBGG, D7S8 and GC. Int J Legal Med 106;108:280–2.
83. Woller J, Furedi S, Padar Z. Hungarian population data for 11 PCR-based polymorphisms. In: Carracedo A, Brinkmann B, Bär W, editors. Advances in Forensic Haemogenetics. 16th Congress of the International Society for Forensic Haemogenetics; 1995 Sept 12–16; Santiago de Compostela. Berlin: Springer Verlag 1996;6:647–9.
84. Pera C, Delfino L, Angelini G, Longo A, Ferrara GB. DNA typing of HLA-DQ alleles by gene amplification of DQA and DQB variable exons: analysis of DQA/DQB haplotypes. Eur J Immunogenet 1992;19:373–80.
85. Presciuttini S, De Stefano F. An Italian collaborative study on the HLA-DQA1 locus (GEFI's "Garda 2" project). In: Bär W, Fiori A, Rossi U, editors. Advances in forensic haemogenetics. 15th Congress of the International Society for Forensic Haemogenetics; 1993 Oct 13–15; Venice. Berlin: Springer Verlag 1994;5:438–40.
86. Spinella A, Marsala P, Biondo R, Montagna P. Italian population allele and genotype frequencies for the Ampli-Type PM and the HLA-DQ-alpha, loci. J Forensic Sci 1997 May;42(3):514–8.
87. Trabetti E, Galavotti R, Casartelli A, Magalini G, De Leo D, Pignatti PF. Allele and genotype frequencies of eight DNA polymorphisms in the Italian population. Mol Cell Probes 1995;9:183–8.
88. Tagliabracci A, Giorgetti R, Agostini A, Buscemi L, Cingolani M, Ferrara SD. Frequency of HLA DQA1 alleles in an Italian population. Int J Legal Med 1992;105:161–4.
89. Pastore L, Vuttariello E, Sarrantonio C, Coto I, Roviello S, Fortunato G, et al. Allele frequency distributions at several variable number of tandem repeat (VNTR) loci in a restricted Caucasian population from South Italy and their evaluation for paternity and forensic use. Mol Cell Probe 1996;10:299–308.
90. De Stefano F, Casarino L, Mannucci A, Delfino L, Canale M, Ferrara GB. HLA-DQA1 allele and genotype frequencies in a Northern Italian population. Forensic Sci Int 1992;55:59–66.
91. Novelli G, Spinella A, Gennarelli M, Mingarelli R, Dallapiccola B. Analysis of apoB, HLADQalpha and D1S80 polymorphisms in the Italian population using the polymerase chain reaction. Am J Hum Biol 1992;4:381–6.
92. Ronningen KS, Spurkland A, Markussen G, Iwe T, Vartdal F, Thorsby E. Distribution of HLA class II alleles among Norwegian Caucasians. Hum Immunol 1990;29:275–81.
93. Skarsvag S, Hansen KE, Holst A, Moen T. Distribution of HLA class II alleles among Scandinavian patients with systemic lupus erythematosus (SLE): an increased risk of SLE among non[DRB1*03,DQA1*0501,DQB1*0201]class II homozygotes? Tissue Antigens 1992;40:128–33.
94. Brito R, Ribeiro T, Espinheira R, Geada H. South Portuguese population data on the loci HLA-DQA1, LDLR, GYPA, HBGG, D7S8 and Gc. J Forensic Sci 1998 Sep;43(5):1027–32.
95. Lareu MV, Munoz 1, Pestoni C, Rodriguez MS, Vide C, Carracedo A. The distribution of HLA DQA1 and D1S80 (pMCT1 18) alleles and genotypes in the populations of Galicia and Central Portugal. Int J Legal Med 1993;106:124–8.
96. Santos SM, Simoes F, Armada A, Clemente A, Correia MC. HLA-DQA1 polymorphism in two Portugese population samples from Lisbon and the South of Portugal. In: Carracedo A, Brinkmann B, Bär W, editors. Advances in Forensic Haemogenetics. 16th Congress of the International Society for Forensic Haemogenetics; 1995 Sept 12–16; Santiago de Compostela. Berlin: Springer Verlag 1996;6:616–8.
97. Pinheiro MF, Pontes ML. The distribution of HLA DQA1 alleles in the population of the North of Portugal. In: Bär W, Fiori A, Rossi U, editors. Advances in Forensic Haemogenetics. 15th Congress of the International Society for Forensic Haemogenetics; 1993 Oct 13–15; Venice. Berlin: Springer Verlag 1994;5:559–61.
98. Espinheira R, Geada H, Ribeiro T, Reys L. HLA-DQA1 polymorphism in a Portugese population. In: Bär W, Fiori A, Rossi U, editors. Advances in forensic haemogenetics. 15th Congress of the International Society for Forensic Haemogenetics; 1993 Oct 13–15; Venice. Berlin: Springer Verlag 1994;5:499–501.
99. Espinheira R, Ribeiro T, Geada H, Reys L. Polymarker and HLA DQA1 genetic markers in forensic casework. Acta Med Leg 1994;44:37–9.
100. Lorente M, Lorente JA, Wilson MR, Budowle B, Villanueva E. Spanish population data on seven loci. D1S80, D17S5, HumTHO1, HumVWA, ACTBP2, D21S11 and HLA-DQA1. Forensic Sci Int 1997;86:163–71.

101. Sanz P, Repetto G, Prieto V, Flores I. HLA DQA1 and D1S80 polymorphisms in the population of Andalusia (Southern Spain). In: Bär W, Fiori A, Rossi U, editors. Advances in forensic haemogenetics. 15th Congress of the International Society for Forensic Haemogenetics; 1993 Oct 13–15; Venice. Berlin: Springer Verlag 1994;5:572–4.
102. Martinez-Jarreta B, Bolea M, Castellano M, Hinojal R, Abecia E. Distribution of HLA-DQA1 alleles and genotypes in two Spanish populations (Aragon and Asturias). Forensic Sci Int 1996;81:185–90.
103. Huguet E, Gene M, Corbella J, Moreno P. Distribution of the HLA-DQα alleles and genotypes in a sample of a population from Barcelona (Spain). Hum Hered 1993;43:326–8.
104. Esparza B, Pestom C, Martin MD, Merino F, Carracedo A. Distribution of the HLA-DQA1 polymorphism in the population of the Basque Country (Spain). Gene Geogr 1995;9:53–8.
105. Garcia O, Martin P, Budowle B, Albarran C, Alonso A. Allele frequencies of HLA-DQα, LDLR, GYPA, HBGG, D7S8 and Gc in the resident and autochthonous populations of the Basque Country. In: Carracedo A, Brinkmann B, Bär W, editors. Advances in forensic haemogenetics. 16th Congress of the International Society for Forensic Haemogenetics; 1995 Sept 12–16; Santiago de Compostela. Berlin: Springer Verlag 1996;6:532–4.
106. Sanchez-Molina I, Calvet R. Allelic frequencies for the HLA-DQA1, D1S80, HUMTH01, HUMTPOX, HUMCSF1PO and HUMVWA loci in Cantabria (middle north Spain). J Forensic Sci 2000;45(1):167–169.
107. Gene M, Huguet E, Carracedo A, Mezquita J. Study of the HLA DQcc polymorphism in the population of Catalonia (Spain). In: Rittner C, Schneider PM, editors. Advances in forensic haemogenetics. 14th Congress of the International Society for Forensic Haemogenetics; 1991 Sept 18–21; Mainz. Berlin: Springer Verlag 1992;4:70–1.
108. Crespillo M, Luque JA, Garcia P, Ramirez E, Fernandez RM, Valverde JL. Population study for the HLA-DQA1, LDLR, GYPA, HBGG, D7S8 and Gc loci in North-East of Spain. In: Carracedo A, Brinkmann B, Bär W, editors. Advances in forensic haemogenetics. 16th Congress of the International Society for Forensic Haemogenetics; 1995 Sept 12–16; Santiago de Compostela. Berlin: Springer Verlag 1996;6: 517–9.
109. Bell B, Budowle B, Martinez-Jarreta B, Casalod Y, Abecia E, Castellano M. Distribution of types for six PCR-based loci: LDLR, GYPA, HBGG, D7S8, Gc and HLA-DQA1 in Central Pyrenees and Teruel (Spain). J Forensic Sci 1997 May;42(3):510–3.
110. Pestoni C, Garcia-Rivero A, Bellas S, Lareu MV, Rodriguez-Calvo MS, Barros F, et al. Allele frequency distribution of 15 PCR-based DNA polymorphisms in the population of Galicia (NW Spain). In: Carracedo A, Brinkmann B, Bär W, editors. Advances in forensic haemogenetics. 16th Congress of the International Society for Forensic Haemogenetics; 1995 Sept 12–16; Santiago de Compostela. Berlin: Springer Verlag 1996;6:595–7.
111. Martin P, Alonso A, Budowle B, Albarran C, Garcia O, Sancho M. Spanish population data on 13 PCR-based systems. In: Carracedo A, Brinkmann B, Bär W, editors. Advances in forensic haemogenetics. 16th Congress of the International Society for Forensic Haemogenetics; 1995 Sept 12–16; Santiago de Compostela. Berlin: Springer Verlag 1996;6:578–80.
112. Crespillo M, Luque JA, Fernandez R, Ramirez E, Garcia P, Valverde JL. Allele frequency distributions of 13 PCR-based systems in a population from North-East Spain. Int J Legal Med 1997;110:223–5.
113. Aler M, Lareu MV, Verdu F, Pestoni C, Gisbert MS. HLA DQA1 and D1S80 in the population of Valencia (Spain). In: Carracedo A, Brinkmann B, Bär W, editors. Advances in forensic haemogenetics. 16th Congress of the International Society for Forensic Haemogenetics; 1995 Sept 12–16; Santiago de Compostela. Berlin: Springer Verlag 1996;6:478–9.
114. Allen M, Saldeen T, Pettersson U, Gyllensten U. Genetic typing of HLA class II genes in Swedish populations: Application to forensic analysis. J Forensic Sci 1993 May;38(3):554–70.
115. Kratzer A, Granacher A, Jamnicki M, Bar W. Swiss population data for 3 STR-systems (SE33, HUMTH01, D21S11), HLADQcc and D1S80. In: Bär W, Fiori A, Rossi U, editors. Advances in forensic haemogenetics. 15th Congress of the International Society for Forensic Haemogenetics; 1993 Oct 13–15; Venice. Berlin: Springer Verlag 1994; 5:515–7.
116. Hochmeister M, Budowle B, Borer U, Dirnhofer R. Swiss population data on the loci HLA-DQα, LDLR, GYPA, HBGG, D7S8, Gc and DIS80. Forensic Sci Int 1994;67:175–84.
117. Menevse S, Ulkuer U. The distribution of the HLA-DQA alleles and genotypes in the Turkish population as determined by the use of DNA amplification and allele-specific oligonucleotides. Sci Justice 1995; 35(4):259–62.
118. Vural B, Atlioglu E, Kolusayin O, Togan 1, Buyukdevrim S, Ozcelik T. Turkish population data on the HLA-DQa, LDLR, GYPA, HBGG, D7S8, and Gc loci. Int J Legal Med 1998;111:43–5.
119. Doherty DG, Vaughan RW, Donaldson PT, Mowat AP. HLA DQA, DQB, and DRB genotyping by oligonucleotide analysis: distribution of alleles and haplotypes in British Caucasoids. Hum Immunol 1992; 34:53–63.
120. Farrant JM, Doherty DG, Donaldson PT, Vaughan RW, Hayllar KM, Welsh KI, et al. Amino acid substitutions at position 38 of the DRP polypeptide confer susceptibility to and protection from primary sclerosing cholangitis. Hepatology 1992;16(2):390–5.
121. Harrington CS, Dunaiski V, Williams KE, Fowler C. HLA DQA typing of forensic specimens by amplification restriction fragment polymorphisms (ARFP) analysis. Forensic Sci Int 1991;51:147–57.
122. Gutowski S, Budowle B, Auer J, van Oorschot R. Statistical analysis of an Australian population for the loci Gc, HLA-DQA1, D1S80 and HUMTHO1. Forensic Sci Int 1995;76:1–6.
123. Budowle B, Baechtel S, Fejeran R. Polymarker, HLA-DQA1, and D1S80 allele frequency data in Chamarro and Filipino populations from Guam. J Forensic Sci 1998 Nov;43(6):1195–8.
124. Gao X, Bliatia K, Trent RJ, Setjeantson SW. HLA-DR,DQ nucleotide sequence polymorphisms in five Melanesian populations. Tissue Antigens 1992;40:31–7.
125. Gao X, Zimmet P, Seri eantson SW. HLA-DR, DQ sequence polymorphisms in Polynesians, Micronesians, and Javanese. Hum Immunol 1992;34:153–61.
126. Stringer P, Triggs CM, Baldwin LC, Melia LM, Savill MG. Distribution of HLA DQA1 alleles in New Zealand Caucasian, Maori and Pacific Islander populations. Int J Legal Med 1995;108:2–7.
127. Deka R, DeCroo S, Jin L, McGarvey S, Rothhammer F, Ferrell R, et al. Population genetic characteristics of the D1S80 locus in seven human populations. Hum Genet 1994;94:252–8.
128. Budowle B, Chakraborty R, Giusti AM, Eisenberg AJ, Allen RC. Analysis of the VNTR locus D1S80 by the PCR followed by high-resolution PAGE. Am J Hum Gen 1991;48:137–44.
129. Budowle B, Baechtel S, Smerick JB, Presley KW, Giusti AM, Parsons G, et al. D1S80 population data in African Americans, Caucasians, Southeastern Hispanics, Southwestern Hispanics, and Orientals. J Forensic Sci 1995 Jan;40(1):38–44.
130. Sajantila A, Budowle B, Strom M, Johnsson V, Lukka M, Peltonen L, et al. PCR amplification of alleles at the D1S80 locus: comparison of a Finnish and North American Caucasian population sample, and forensic casework evaluation. Am J Hum Genet 1992;50:816–25.
131. Gross AM, Carmody G, Guerrieri RA. Validation studies for the genetic typing of the D1S80 locus for implementation into forensic casework. J Forensic Sci 1997;42(6):1140–6.
132. Budowle B, Smerick JB, Keys KM, Moretti TR. United States population data on the multiplex short tandem repeat loci-HUMTHO1, TPOX, and CSF1PO-and the variable number tandem repeat locus D1S80. J Forensic Sci 1997 Sep;42(5):846–9.
133. Eisenberg M, Maha GM. AMPFLP analysis in parentage testing. Proceedings of the 2nd International Symposium on Human Identification 1991:129–154. Cited in reference 137.
134. Hutz MH, Mattevi VS, Callegari-Jacques SM, Salzano FM, Coimbra CEA, Santos RV, et al. D1S80 locus variability in South American Indians. Ann Hum Biol 1997;24(3):249–55.
135. Zago M, Silva W, Tavella M, Santos S, Guerreiro J, Figueiredo M. Interpopulational and intrapopulational genetic diversity of Amerindians as revealed by six variable number of tandem repeats. Hum Hered 1996;46:274–89.
136. Vallinoto ACR, Cayres-Vallinoto IMV, Zago MA, Santos SEB, Guerreiro JF. D1S80 polymorphism in Amerindians from the Amazon region of Brazil. Hum Biol 1998;70(3):507–16.
137. Heidrich EM, Hutz MH, Salzano FM, Coimbra CEA, Santos RV. D1S80 locus variability in three Brazilian ethnic groups. Hum Biol 1995;67(2):311–9.
138. Balamurugan K, Abdel-Rehman H, Duncan GT, Budowle B, Anderson S, Macechko J, et al. Distribution of D1S80 alleles in the Jordanian population. Int J Legal Med 1998;111:276–7.
139. Al-Nassar K, Mathew J, Thomas N, Fatania H. Analysis of the D1S80 (pMCT118) VNTR locus polymorphism in a native Kuwaiti population by the polymerase chain reaction. Forensic Sci Int 1996;78:131–8.

140. Tahir MA, Sinha SK, A-Al-Kubaidan N, Al-Otabe K, Gundi SE, Tahir UA, et al. Distribution of amplified fragment length polymorphism D1S80 alleles in Saudi Arabian population. Personal communication.
141. Katsuyama Y, Inoko H, Imanshi T, Mizuki N, Goj obori T, Ota M. Genetic relationships among Japanese, Northern Han, Hui, Uygur, Kazakh, Greek, Saudi Arabian, and Italian populations based on allelic frequencies at four VNTR (D1S80, D4S43, COL2A1, D17S5) and one STR (ACTBP2) loci. Hum Hered 1998;48:126–37.
142. Sebetan IM, Hajar H, Isobe E. Frequency distribution of D1S80 (MCT118) locus polymorphism in a Qatan' population. Hum Biol 1998;70(1):129–35.
143. Tahir MA, Rogers C, Alkhayyat M, El-Gohary M, Budowle B, Balamurugan K. Distribution of D1S80 alleles in the Bahrainian population. J Forensic Sci 1999 Nov;44(6): in press.
144. Cong B, Harashima N, Katsuyama Y, Tsuchikane A, Fukushima H. Chinese Han population study of the D1S80 (pMCT118) locus polymorphisms. Jpn J Legal Med 1996;50(1):23–6.
145. Sugiyama E, Honda K, Katsuyama Y, Uchiyama S, Tsuchikane A, Ota M, et al. Allele frequency distribution of the D1S80 (pMCT118) locus polymorphism in the Japanese population by the polymerase chain reaction. Int J Legal Med 1993;106:111–4.
146. Arakura A, Liu C, Ota M, Fukushima H. Subtyping and characterization of D1S80 alleles in a Japanese population using PCR-RFLP. Int J Legal Med 1998;111:183–7.
147. Akasaka H, Araki N, Fujii T, Itohara K, Iwase S, Kasai K, et al. Frequency distribution of MCT118 types in Japanese populations. Forensic Science Report of National Research Institute of Police Science 1994;47(3):45–51.
148. Nagai A, Yamada S, Bunai Y, Ohyal. Analysis of the VNTR locus D1S80 in a Japanese population. Int J Legal Med 1994;106:268–70.
149. Koh C, Lim M, Ng H, Sam C. D1S80 (pMCT118) allele frequencies in a Malay population sample from Malaysia. Int J Legal Med 1997;110:39–40.
150. Halos SC, Fortuno ES, Ferreon ACM, Chu JY, Miranda J, Harada S, et al. Allele frequency distributions of the polymorphic STR loci HUMVWA, HUMFES, HUMF13A01 and the VNTR D1S80 in a Filipino population from Metro Manila. Int J Legal Med 1998;111:224–6.
151. Chuah SY, Tan WF, Yap KII, Tai HE, Chow ST. Analysis of the D1S80 locus by amplified fragment length polymorphism technique in the Chinese, Malays and Indians in Singapore. Forensic Sci Int 1994;68: 169–80.
152. Huang N, Chakraborty R, Budowle B. D1S80 allele ftequencies in a Chinese population. Int J Leg Med 1994;107:118–20.
153. Bhoopat T, Steger HF. Frequency distribution of D1S80 alleles in the Northern Thai population analyzed by amplified fragment length polymorphism technique. Forensic Sci Int 1996;81:149–55.
154. Steger HF, Bhoopat T, Sridoungkaew S, Sanguansermsri T. The distribution of D1S80 and VWA alleles in a Karen population from Northern Thailand. J Forensic Sci. 2000;45(2):in press.
155. Klintschar M, Kubat M, Ebersold A. The distribution of D1S80 (pMCT118) alleles in an Austrian population sample. Description of two new alleles. Int J Legal Med 1995;107:225–6.
156. Sepulchre MA, Wiegand P, Brinkmann B. D1S80 (pMCT1 18) analysis of 3 ethnic subpopulations living in Brussels. Int J Legal Med 1995;108:45–7.
157. Thymann M, Nellemann, LJ, Masumba G, Irgens-Moller L, Morling N. Analysis of the locus D1S80 by amplified fragment length polymorphism technique (AMP-FLP). Frequency distribution in Danes. Intra and inter laboratory reproducibility of the technique. Forensic Sci Int 1993;60:47–56.
158. Hansen HE, Thymann M. Paternity testing with DNA systems: applications of D1S80 phenotyping to Danish paternity cases analysed with five VNTR single locus systems. In: Bär W, Fiori A, Rossi U, editors. Advances in forensic haemogenetics. 15th Congress of the International Society for Forensic Haemogenetics; 1993 Oct 13–15; Venice. Berlin: Springer Verlag 1994;5:210–3.
159. Papiha SS, Thymann M. Analysis of the locus D1S80: frequency distribution in North-East England and application to paternity testing. In: Bär W, Fiori A, Rossi U, editors. Advances in forensic haemogenetics. 15th Congress of the International Society for Forensic Haemogenetics; 1993 Oct 13–15; Venice. Berlin: Springer Verlag 1994;5:193–5.
160. Skowasch K, Wiegand P, Brinkmann B. pMCT 118 (D1S80): a new allelic ladder and an improved electrophoretic separation lead to the demonstration of 28 alleles. Int J Legal Med 1992;105:165–8.
161. Schnee-Griese J, Bla G, Herrmann S, Schneider HR, Forster R, Basler G, et al. Frequency distribution of D1S80 alleles in the German population. Forensic Sci Int 1993;59:131–6.
162. Huckenbeck W, Scheil HG, Kuntze K, Stancu V, Bonte W. VNTR locusD1S80: Allele frequencies and genotype distribution in the region of Dusseldorf. Anthropol Anz 1996;54(1):7–17.
163. Hatzaki A, Loukopoulus D, Spiliopoulou H, Koutselinis A. A study of five variable number tandem repeat (VNTR) loci in the Greek population. Mol Cell Probes 1995;9:129–33.
164. Falcone E, Spadafora P, De Luca M, Ruffolo R, Brancati C, De Benedictis G. DYS19, D12S67, and D1S80 polymorphisms in population samples from Southern Italy and Greece. Hum Biol 1995;67(5):689–701.
165. Kondopoulou H, Loftus R, Kouvatsi A, Triantaphyllidis C. Genetic studies in 5 Greek population samples using 12 highly polymorphic DNA loci. Hum Biol 1999;71(1):27–42.
166. Kloosterman AD, Budowle B, Daselaar P. PCR amplification and detection of the human D1S80 VNTR locus. Int J Legal Med 1993;105: 257–64.
167. Woller J, Furedi S, Padar Z. AMPFLP analysis of the VNTR loci D1S80 and ApoB in Hungary. Int J Legal Med 1995;107:273–4.
168. Graziosi G. Collaborative study on the polymorphism of the D1S80 locus in the Italian population. In: Carracedo A, Brinkmann B, Bär W, editors. Advances in forensic haemogenetics. 16th Congress of the International Society for Forensic Haemogenetics; 1995 Sept 12–16; Santiago de Compostela. Berlin: Springer Verlag 1996;6:471–4.
169. Rose G, De Luca M, Falcone E, Spadafora P, Carrieri G, De Benedictis G. Allele frequency distributions at seven DNA hypervariable loci in a population sample from Calabria (Southern Italy). Gene Geogr 1996;10:135–45.
170. Alessio A, Claudio C. The distribution of D1S80 (pMCT118) alleles in a Southern Italian population sample. J Forensic Sci 1998 Jul;43(4): 911–2.
171. Koziol P, Ciesielska M. Detection of genotypes at the D1S80 locus after PCR. Arch Med Sad Krym 1993;43:206–11.
172. Jaroszewski J, Schutte U, Schuren-kamp M, Krajewski P, Kempa J, Przyblski Z, et al. D1S80 alleles in the Wielkopolska (Poland) population. In: Carracedo A, Brinkmann B, Bär W, editors. Advances in forensic haemogenetics. 16th Congress of the International Society for Forensic Haemogenetics; 1995 Sept 12–16; Santiago de Compostela. Berlin: Springer Verlag 1996;6:552–4.
173. Pawlowski R, Paszkowska R, Hauser R. Brinkmann B. Population studies of three AMPFLPs systems in a North Polish population. Int J Legal Med 1996;109:155–6.
174. Pepinski W, Skawronska M, Janica J. Human population genetics of the VNTR locus D1S80 in the North-Eastern Poland. Roczniki Akad Med Bialymstoku 1996;41(2):316–20.
175. Turowska B, Sanak M. D1S80 VNTR locus genotypes in population of South Poland; meta-analysis pointer to genetic disequilibrium of human populations. Forensic Sci Int 1995;75:207–16.
176. Ciesielka M, Koziol P, Kraj'ka A. Allele frequency distributions of D1S80 in the Polish population. Forensic Sci Int 1996;81:141–7.
177. Santos SM, Simoes F, Armada A, Clemente A, Correia MC. D1S80 locus polymorphism in a population sample from Lisbon. In: Carracedo A, Brinkmann B, Bär W, editors. Advances in forensic haemogenetics. 16th Congress of the International Society for Forensic Haemogenetics; 1995 Sept 12–16; Santiago de Compostela. Berlin: Springer Verlag 1996;6:619–21.
178. Pontes ML, Pinheiro MF. Study of D1S80 locus polymorphism in the North of Portugal. In: Bär W, Fiori A, Rossi U, editors. Advances in forensic haemogenetics. 15th Congress of the International Society for Forensic Haemogenetics; 1993 Oct 13–15; Venice. Berlin: Springer Verlag 1994;5:562–4.
179. Cabrero C, Diez A, Valverde E, Carracedo A, Alemany J. Allele frequency distribution of four PCR-amplified loci in the Spanish population. Forensic Sci Int 1995;71:153–64.
180. Gene M, Moreno P, Huguet E, Corbella J, Mezquita J. D1S80 polymorphism, including a new variant, in a population sample from Barcelona (Spain) using polymerase chain reaction. Am J Hum Biol 1993;5:691–5.
181. Castro A, Fernandez-Fernandez I, Alonso S, Barbero C, Garcia-Orad A, Tamayo G, et al. D1S80 locus typing by microthermal cycler. Application to genetic identity testing. J Forensic Sci 1995 July;40(4): 546–50.

182. Crespillo M, Luque JA, Fernandez RM, Garcia P, Ramirez E, Valverde JL. D1S80 population data in North-East of Spain. In: Carracedo A, Brinkmann B, Bär W, editors. Advances in forensic haemogenetics. 16th Congress of the International Society for Forensic Haemogenetics; 1995 Sept 12–16; Santiago de Compostela. Berlin: Springer Verlag 1996;6:514–6.
183. Alonso A, Martin P, Albarran C, Sancho M. Amplified fragment length polymorphism analysis of the VNTR locus D1S80 in central Spain. Int J Legal Med 1993;105:311–4.
184. Martinez-Jarreta B, Budowle B, Abecia E, Bell B, Casalod Y, Castellano M. PM and D1S80 loci gene frequencies in the Zaragoza population of northern Spain. J Forensic Sci 1998 Sep;43(5):1090–2.
185. Kadasi L, Gecz J, Ferakova 1, Lubyova B, Bohusova T, Ferakova E, et al. Distribution of ApoBII, MCT118 (D1S80), YNZ22 (D17S30), and COL2A1 amp-FLPs (amplified fragment length polymorphisms) in Caucasoid population of Slovakia. Gene Geogr 1994;8:121–7.
186. Nosikov VV, Chistyakov DA, Gavrilov DK, Ovchinnikov IV, Chelnokova MW. Analysis of PCR based VNTR polymorphism within an East Slavonic population. European Society of Human Genetics 24th Annual Meeting, Helsinger, Denmark, 1992.
187. Perkin Elmer Corporation and Roche Molecular Systems, Inc. Amplitype and PM and DQA1 PCR amplification and typing kit users manual.
188. Hara M, Kido A, Saito K, Takada A, Yabe K, Murai T, et al. Allele frequency distribution of five loci (LDLR, GYPA, HBGG, D7S8 and Gc) in a Japanese population. In: Carracedo A, Brinkmann B, Bär W, editors. Advances in forensic haemogenetics. 16th Congress of the International Society for Forensic Haemogenetics; 1995 Sept 12–16; Santiago de Compostela. Berlin: Springer Verlag 1996;6:544–6.
189. Watanbe Y, Yamada S, Nagai A, Takayama T, Hirata K, Bunai Y, et al. Japanese population DNA typing data for the loci LDLR, GYPA, HBGG, D7S8, and Gc. J Forensic Sci 1997 Sep;42(5):911–3.
190. Hausmann R, Hantschel M, Lotterle J. Frequencies of the 5 PCR-based genetic markers LDLR, GYPA, HBGG, D7S8, and GC in a North Bavarian population. Int J Legal Med 1995;107:227–8.
191. Huckenbeck W, Kuntze K, Scheil HG, Alt KW. German population data on the loci low-density lipoprotein receptor, glycophorin A, hemoglobin G, D7S8 and group-specific component. Anthrop Anz 1995;53(3):193–8.
192. Garofano L, Lago G, Vecchio C, Pizzamiglio M, Zanon C, Virgili A, et al. Italian population data on the Polymarker system and on the five short tandem repeat loci CSF1PO, TPOX, TH01, F13B, vWA. J Forensic Sci 1998 Jul;43(4):837–40.
193. Tagliabracci A, Buscemi L, Cerri N, Cucurachi N, Lombardi R, Mignola R, et al. Italian population data on the loci LDLR, GYPA, HBGG, D7S8 and GC. Int J Legal Med 1996;109:161–2.
194. Tagliabracci A, Buscemi L, Cucurachi N, Mencarelli R, Giorgetti R, Ferrara SD. A population study of 5 PCR genetic markers, LDLR, GYPA, HBGG, D7S8 and Gc in Italy. In: Carracedo A, Brinkmann B, Bär W, editors. Advances in forensic haemogenetics. 16th Congress of the International Society for Forensic Haemogenetics; 1995 Sept 12–16; Santiago de Compostela. Berlin: Springer Verlag 1996;6: 635–7.
195. Cerri N, Mignola R, De Ferrari F. Allele distribution of the amplitype PM coamplification system in a population of Northern Italy. In: Carracedo A, Brinkmann B, Bär W, editors. Advances in forensic haemogenetics. 16th Congress of the International Society for Forensic Haemogenetics; 1995 Sept 12–16; Santiago de Compostela. Berlin: Springer Verlag 1996;6:506–9.
196. Gino S, Robino C, Torre C, lorio M, Peruccio D. LDLR, GYPA, HBGG, D7S8 and Gc allele and genotype frequencies in the northwest Italian population. J Forensic Sci 1999 Jan;44(1):171–4.
197. Kloosterman AD, Sjerps M, Wust D. Dutch Caucasian population data on the loci LDLR, GYPA, HBGG, D7S8, and GC. Int J Leg Med 1995;108:36–8.
198. Turowska B, Sanak M. Data on the loci LDLR, GYPA, HBGG, D7S8 and Gc in a South Polish population. Int J Legal Med 1998;111:101–2.
199. Rodriguez-Calvo MS, Bellas S, Souto L, Vide C, Valverde E, Carracedo A. Population data on the loci LDLR, GYPA, HBGG, D7S8, and Gc in three southwest European populations. J Forensic Sci 1996 Mar;41(2):291–6.
200. Prieto V, Andres MI, Flores IC, Sanz P. Southern Spain population frequencies of the loci LDLR, GYPA, HBGG, D7S8 and Gc. A comparison between Andalusian and Canary Islands frequencies. In: Carracedo A, Brinkmann B, Bär W, editors. Advances in forensic haemogenetics. 16th Congress of the International Society for Forensic Haemogenetics; 1995 Sept 12–16; Santiago de Compostela. Berlin: Springer Verlag 1996;6:610–2.
201. Martinez-Jarreta B, Abecia E, Bell B, Casalod Y, Castellano M, Hinojal R. Frequencies of the five PCR-based genetic markers LDLR, GYPA, HBGG, D7S8 and Gc in the population of Asturias (North Spain). Int J Legal Med 1997;110:41–3.
202. Herrera M, Asperilla C, Aumente MA, Prieto L, Arroyo'E, Ruiz de la Cuesta JM. Frequency data on the loci LDLR, GYPA, HBGG, D7S8 and Gc in a population resident in Madrid (Spain). In: Carracedo A, Brinkmann B, Bär W, editors. Advances in forensic haemogenetics. 16th Congress of the International Society for Forensic Haemogenetics; 1995 Sept 12–16; Santiago de Compostela. Berlin: Springer Verlag 1996;6:547–8.
203. Ulkuer MK, Ulkuer U, Kesici T, Menevse A. Data on the PCR Turkish population based loci: LDLR, GYPA, HBGG, D7S8, and Gc. J Forensic Sci 1999 Nov;44(6):1258–1260.

Additional information and reprint requests:
R. E. Gaensslen
Forensic Science (M/C 866)
University of Illinois at Chicago
College of Pharmacy
833 S. Wood Street
Chicago IL 60612-7231 USA