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A study of Y-chromosomal microsatellites and biallelic markers in Norway

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Abstract. Y-chromosomal polymorphisms at nine microsatellite and five biallelic markers in a Norwegian population sample are presented. In 1766 samples, 726 different lineages were encountered. Six known haplogroups were observed (Hg1, 2, 3, 4, 9 and 16). Locus diversity and combined haplotype diversity is given. Signs of regional substructuring of haplogroups are demonstrated. © 2003 Elsevier B.V. All rights reserved.

Keywords: Norway; Y-STR; Microsatellite; Population genetics

1. Introduction, materials and methods

Y-chromosomal polymorphisms at nine microsatellites (DYS19, DYS385, DYS388, DYS389 I, DYS389 II, DYS390, DYS391, DYS392 and DYS393) and five biallelic markers (Tat, YAP, 1–2, SRY1532 and 9–7) were studied in 1766 unrelated Y-chromosomes of Norwegian origin. The males were a pan-Norwegian collection. Methods were as previously described [1,2]. Arlequin was used for calculation of Fst [3]. The repeat number nomenclature follows the ISFH guidelines [4].

2. Results and conclusion

The allele frequencies of the Y-STRs designed by number of repeats are given in Table 1. In 1766 samples, 721 different haplotypes and 726 different lineages were encountered, respectively. Five haplotypes were thus identical by state but not by descent. Six known haplogroups were observed (Hg1, 2, 3, 4, 9 and 16) together with one "new" haplogroup. Three haplogroups (Hg1, 2 and 3) represent about 95% of the population sample. We observed 500 unique lineages as well as 97 pairs and 40 triplets. Locus diversity in regions and total ranged from 0.22 (DYS393, Bergen) to 0.84 (South, Oslo). Signs of regional substructuring of haplogroups are demonstrated particularly in South and West.

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Table 1
Allele frequencies at in regions, cities and in the total population

STR: repeat	South *N*=76	West *N*=301	East *N*=493	Middle *N*=317	North *N*=377	Oslo *N*=109	Bergen *N*=93	Norway *N*=1766
DYS19: 13	0.013	0.023	0.026	0.038	0.029	0.018	0.022	0.027
14	0.592	0.571	0.527	0.426	0.544	0.541	0.527	0.524
15	0.289	0.286	0.300	0.366	0.300	0.294	0.258	0.306
16	0.105	0.086	0.118	0.155	0.114	0.101	0.140	0.118
17		0.033	0.028	0.016	0.013	0.046	0.054	0.025
DYS389 I: 8	0.013	0.003			0.005			0.002
9	0.368	0.296	0.373	0.375	0.316	0.339	0.258	0.340
10	0.500	0.538	0.432	0.461	0.456	0.486	0.591	0.475
11	0.118	0.156	0.191	0.164	0.218	0.174	0.151	0.180
12		0.007	0.004		0.005			0.003
DYS389 II: 23	0.013							0.001
24	0.013	0.010	0.012	0.003	0.013			0.009
25	0.329	0.256	0.337	0.297	0.271	0.303	0.247	0.294
26	0.421	0.375	0.282	0.334	0.342	0.321	0.441	0.337
27	0.118	0.216	0.205	0.224	0.236	0.257	0.183	0.215
28	0.105	0.100	0.130	0.120	0.106	0.110	0.108	0.114
29		0.037	0.032	0.016	0.027	0.009	0.022	0.025
30		0.007	0.002	0.003	0.005			0.003
31				0.003				0.001
DYS390: 20					0.003			0.001
21			0.002	0.003	0.003			0.002
22	0.171	0.126	0.178	0.205	0.199	0.211	0.151	0.179
23	0.342	0.302	0.339	0.271	0.292	0.330	0.301	0.308
24	0.355	0.322	0.227	0.237	0.249	0.239	0.290	0.259
25	0.132	0.233	0.229	0.274	0.241	0.193	0.247	0.235
26		0.017	0.024	0.009	0.013	0.028	0.011	0.016
DYD391: 6			0.002		0.003			0.001
8					0.003			0.001
9	0.013	0.003	0.004	0.013	0.003	0.009		0.006
10	0.434	0.498	0.611	0.640	0.546	0.550	0.634	0.573
11	0.539	0.485	0.371	0.334	0.416	0.413	0.344	0.402
12	0.013	0.010	0.012	0.013	0.029	0.028	0.022	0.017
13		0.003						0.001
DYS392: 9					0.003			0.001
11	0.513	0.545	0.669	0.656	0.594	0.541	0.591	0.611
12	0.092	0.060	0.047	0.095	0.040	0.073	0.054	0.060
13	0.395	0.365	0.233	0.211	0.220	0.312	0.301	0.264
14		0.030	0.047	0.038	0.143	0.073	0.054	0.063
15			0.004					0.001
DYS393: 9							0.011	0.001
10				0.006				0.001
11					0.003			0.001
12	0.092	0.020	0.039	0.013	0.016	0.037	0.022	0.027
13	0.829	0.867	0.848	0.874	0.833	0.807	0.882	0.851
14	0.053	0.100	0.091	0.079	0.143	0.128	0.065	0.101
15	0.026	0.013	0.020	0.028	0.005	0.028	0.022	0.018
16			0.002					0.001
DYS382: 8–14			0.002					0.001
9–13							0.011	0.001
10–13			0.002		0.003			0.001
DYS382: 8–14			0.002					0.001
10–14			0.014	0.006	0.019	0.009	0.011	0.010
10–15			0.002		0.005		0.011	0.002
10–19	0.013							0.001
11–11		0.003	0.012	0.006	0.005	0.018	0.022	0.008

Table 1 (*continued*)

STR: repeat	South *N*=76	West *N*=301	East *N*=493	Middle *N*=317	North *N*=377	Oslo *N*=109	Bergen *N*=93	Norway *N*=1766
11–12	0.013	0.017	0.004	0.003	0.003		0.043	0.008
11–13	0.105	0.130	0.063	0.038	0.098	0.073	0.086	0.081
11–14	0.355	0.415	0.361	0.413	0.358	0.358	0.376	0.379
11–15	0.079	0.056	0.049	0.063	0.050	0.083	0.032	0.055
11–16		0.023	0.004	0.003	0.016	0.009	0.032	0.011
11–17					0.011			0.002
11–19			0.002					0.001
12–12			0.002					0.001
12–13		0.007	0.004		0.013	0.009	0.011	0.006
12–14	0.013	0.027	0.034	0.025	0.042	0.037	0.011	0.031
12–15			0.004	0.009	0.005			0.004
12–16					0.003		0.011	0.001
12–17			0.002					0.001
13–13	0.013	0.003	0.008	0.009	0.021	0.009	0.011	0.011
13–14	0.053	0.070	0.089	0.120	0.114	0.073	0.054	0.092
13–15	0.039	0.017	0.018	0.019	0.029	0.009	0.011	0.020
13–16		0.007	0.008	0.009	0.003		0.011	0.006
13–17	0.026	0.010	0.006	0.013	0.008	0.009		0.009
13–18			0.002	0.013	0.003	0.009		0.004
13–19					0.003			0.001
13–20			0.002		0.008			0.002
13–21			0.002	0.003	0.005			0.002
14–14	0.118	0.110	0.083	0.091	0.077	0.119	0.065	0.091
14–15	0.105	0.070	0.128	0.082	0.066	0.092	0.140	0.094
14–16	0.013		0.020	0.013	0.013	0.009		0.012
14–17		0.003	0.008	0.003				0.003
14–20			0.002					0.001
15–15	0.026	0.017	0.043	0.041	0.013	0.046	0.022	0.030
15–16	0.026	0.007		0.003	0.003	0.018	0.022	0.006
15–17			0.002	0.003		0.009		0.002
15–18		0.003						0.001
15–20			0.002					0.001
16–16		0.003	0.002	0.006				0.002
16–17				0.003				0.001
16–18			0.004				0.011	0.002
16–19			0.002		0.003			0.001
17–17			0.004					0.001
17–18		0.003	0.002					0.001
DYS388: 10		0.037	0.020	0.019	0.024	0.018	0.054	0.024
11			0.002					0.001
12	0.605	0.651	0.554	0.562	0.594	0.569	0.602	0.586
13	0.079	0.050	0.059	0.088	0.040	0.083	0.054	0.061
14	0.289	0.236	0.341	0.309	0.332	0.294	0.290	0.307
15	0.013	0.017	0.016	0.013	0.011	0.028		0.014
16	0.013	0.010	0.008	0.006				0.006
17				0.003		0.009		0.001

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