

FOR THE RECORD

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Y-Chromosome STR Haplotypes in a Sample from São Paulo State, Southeastern Brazil

POPULATION: Unrelated males from the São Paulo State, Brazil ($n = 617$).

KEYWORDS: forensic science, DNA typing, Y Chromosome, DYS19, DYS390, DYS391, DYS392, DYS393, population genetics, Brazil

A sample of 617 unrelated individuals was randomly selected from healthy males involved in paternity testing in the Ribeirão Preto area, a city located at the northwestern region of the São Paulo State, southeastern Brazil. Genomic DNA was isolated from buccal swab or blood samples by an adaptation of the Higuchi (1) protocol. PCR reactions were performed according to the conditions described by Kayser et al. (2), and their products were separated by 10% denaturing polyacrylamide gel electrophoresis (PAGE) and visualized by silver staining (3). A negative control

was included in each reaction. The allele nomenclature follows that of Kayser et al. (2), in agreement with the recommendations from the International Society for Forensic Genetics (4). Allele designations were determined by comparison of the sample fragments with those of control DNA samples previously sequenced.

Allele and haplotype frequencies were estimated by the gene-counting method (Tables 1 and 2). Gene and haplotype diversities were calculated using the ARLEQUIN software version 2.000 (5). Discrimination capacity was estimated as the proportion

TABLE 1—Allele frequencies and gene diversities (GD) for five Y-STRs (standard deviation in parentheses) in 617 Brazilian males from São Paulo State.

Allele	DYS19	DYS390	DYS391	DYS392	DYS393
9			0.107 (0.012)		
10			0.514 (0.020)	0.058 (0.009)	
11			0.358 (0.019)	0.405 (0.020)	0.003 (0.002)
12			0.019 (0.006)	0.060 (0.010)	0.152 (0.014)
13	0.136 (0.014)		0.002 (0.002)	0.418 (0.020)	0.650 (0.019)
14	0.493 (0.020)			0.033 (0.007)	0.161 (0.015)
15	0.233 (0.017)			0.024 (0.006)	0.032 (0.007)
16	0.109 (0.013)			0.002 (0.002)	0.002 (0.002)
17	0.027 (0.007)				
18	0.002 (0.002)				
19					
20					
21		0.096 (0.012)			
22		0.123 (0.013)			
23		0.229 (0.017)			
24		0.439 (0.020)			
25		0.024 (0.006)			
26		0.078 (0.011)			
27		0.003 (0.002)			
28		0.008 (0.004)			
GD	0.673 (0.014)	0.725 (0.012)	0.597 (0.011)	0.653 (0.011)	0.528 (0.020)

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TABLE 2—Y-chromosome STR haplotypes in 617 unrelated males from São Paulo State (southeastern Brazil).

Haplotype	DYS19	DYS390	DYS391	DYS392	DYS393	n	F
H1	13	21	10	11	13	1	0.0016
H2	13	22	09	14	12	1	0.0016
H3	13	22	10	11	14	2	0.0032
H4	13	22	10	13	12	1	0.0016
H5	13	22	10	14	13	1	0.0016
H6	13	22	10	15	13	1	0.0016
H7	13	22	11	14	13	1	0.0016
H8	13	23	09	11	13	6	0.0097
H9	13	23	09	12	13	1	0.0016
H10	13	23	10	11	12	3	0.0049
H11	13	23	10	11	13	2	0.0032
H12	13	23	10	11	14	1	0.0016
H13	13	23	10	13	14	1	0.0016
H14	13	23	11	11	13	1	0.0016
H15	13	23	11	13	13	2	0.0032
H16	13	24	09	10	13	1	0.0016
H17	13	24	09	11	12	2	0.0032
H18	13	24	09	11	13	13	0.0211
H19	13	24	09	11	14	2	0.0032
H20	13	24	09	14	13	1	0.0016
H21	13	24	09	14	14	1	0.0016
H22	13	24	10	10	12	1	0.0016
H23	13	24	10	10	13	1	0.0016
H24	13	24	10	11	12	3	0.0049
H25	13	24	10	11	13	13	0.0211
H26	13	24	10	11	14	1	0.0016
H27	13	24	10	13	13	4	0.0065
H28	13	24	10	13	14	1	0.0016
H29	13	24	10	15	13	1	0.0016
H30	13	24	11	11	13	2	0.0032
H31	13	24	11	13	13	3	0.0049
H32	13	24	11	13	14	1	0.0016
H33	13	24	11	15	13	1	0.0016
H34	13	24	12	13	13	1	0.0016
H35	13	25	10	11	13	1	0.0016
H36	13	25	11	12	13	1	0.0016
H37	13	26	10	11	13	2	0.0032
H38	13	26	10	14	13	1	0.0016
H39	13	26	10	15	13	1	0.0016
H40	14	21	09	11	13	1	0.0016
H41	14	21	10	11	12	1	0.0016
H42	14	21	11	11	13	3	0.0049
H43	14	22	09	10	13	1	0.0016
H44	14	22	09	11	13	2	0.0032
H45	14	22	10	10	12	1	0.0016
H46	14	22	10	10	13	1	0.0016
H47	14	22	10	10	14	1	0.0016
H48	14	22	10	11	12	4	0.0065
H49	14	22	10	11	13	10	0.0162
H50	14	22	10	11	14	2	0.0032
H51	14	22	10	13	12	1	0.0016
H52	14	22	11	11	13	2	0.0032
H53	14	22	11	13	13	1	0.0016
H54	14	23	09	11	12	1	0.0016
H55	14	23	09	11	13	1	0.0016
H56	14	23	10	10	12	1	0.0016
H57	14	23	10	10	13	2	0.0032
H58	14	23	10	10	14	1	0.0016
H59	14	23	10	11	12	6	0.0097
H60	14	23	10	11	13	6	0.0097
H61	14	23	10	11	15	1	0.0016
H62	14	23	10	12	13	2	0.0032
H63	14	23	10	13	12	1	0.0016
H64	14	23	10	13	13	12	0.0194
H65	14	23	10	14	13	1	0.0016
H66	14	23	11	11	12	1	0.0016
H67	14	23	11	12	13	3	0.0049
H68	14	23	11	12	14	1	0.0016
H69	14	23	11	13	13	20	0.0324
H70	14	23	11	13	14	2	0.0032
H71	14	23	11	14	13	1	0.0016
H72	14	23	11	15	13	1	0.0016
H73	14	23	12	13	13	2	0.0032
H74	14	24	09	11	12	1	0.0016

TABLE 2—Continued.

Haplotype	DYS19	DYS390	DYS391	DYS392	DYS393	n	F
H75	14	24	09	12	13	1	0.0016
H76	14	24	09	13	12	1	0.0016
H77	14	24	09	13	13	4	0.0065
H78	14	24	10	10	12	1	0.0016
H79	14	24	10	10	13	2	0.0032
H80	14	24	10	11	12	4	0.0065
H81	14	24	10	11	13	4	0.0065
H82	14	24	10	12	13	4	0.0065
H83	14	24	10	12	14	1	0.0016
H84	14	24	10	13	12	4	0.0065
H85	14	24	10	13	13	28	0.0454
H86	14	24	10	13	14	3	0.0049
H87	14	24	10	14	12	1	0.0016
H88	14	24	10	14	14	1	0.0016
H89	14	24	10	15	12	1	0.0016
H90	14	24	10	15	13	2	0.0032
H91	14	24	11	10	12	1	0.0016
H92	14	24	11	11	12	1	0.0016
H93	14	24	11	11	14	1	0.0016
H94	14	24	11	12	12	1	0.0016
H95	14	24	11	12	13	2	0.0032
H96	14	24	11	13	12	10	0.0162
H97	14	24	11	13	13	59	0.0956
H98	14	24	11	13	14	14	0.0227
H99	14	24	11	13	15	1	0.0016
H100	14	24	11	14	13	2	0.0032
H101	14	24	11	14	14	3	0.0049
H102	14	24	11	15	12	1	0.0016
H103	14	24	11	15	13	3	0.0049
H104	14	24	12	13	12	1	0.0016
H105	14	24	12	13	13	4	0.0065
H106	14	25	10	11	12	1	0.0016
H107	14	25	10	13	12	1	0.0016
H108	14	25	10	13	13	2	0.0032
H109	14	25	10	14	13	2	0.0032
H110	14	25	11	13	12	1	0.0016
H111	14	25	11	13	13	2	0.0032
H112	14	25	11	15	13	1	0.0016
H113	14	26	09	12	13	1	0.0016
H114	14	26	09	12	15	1	0.0016
H115	14	26	09	13	13	1	0.0016
H116	14	26	10	10	12	1	0.0016
H117	14	26	10	10	13	1	0.0016
H118	14	26	10	11	12	1	0.0016
H119	14	26	10	11	14	2	0.0032
H120	14	26	10	13	12	2	0.0032
H121	14	26	10	13	13	4	0.0065
H122	14	26	10	13	14	2	0.0032
H123	14	26	10	14	13	1	0.0016
H124	14	26	11	11	13	1	0.0016
H125	14	26	11	11	14	1	0.0016
H126	14	26	11	12	13	1	0.0016
H127	14	26	11	13	11	1	0.0016
H128	14	26	11	13	13	4	0.0065
H129	14	26	12	13	13	2	0.0032
H130	14	27	10	14	13	1	0.0016
H131	14	28	11	13	13	2	0.0032
H132	15	21	09	11	13	1	0.0016
H133	15	21	09	11	14	1	0.0016
H134	15	21	09	11	15	1	0.0016
H135	15	21	10	10	13	2	0.0032
H136	15	21	10	11	12	1	0.0016
H137	15	21	10	11	13	4	0.0065
H138	15	21	10	11	14	7	0.0113
H139	15	21	11	11	13	11	0.0178
H140	15	21	11	11	14	1	0.0016
H141	15	22	09	10	12	1	0.0016
H142	15	22	09	10	14	1	0.0016
H143	15	22	09	11	12	1	0.0016
H144	15	22	09	11	14	1	0.0016
H145	15	22	10	10	14	2	0.0032
H146	15	22	10	11	12	1	0.0016
H147	15	22	10	11	13	7	0.0113
H148	15	22	10	11	14	8	0.0130
H149	15	22	10	11	16	1	0.0016

TABLE 2—Continued.

Haplotype	DYS19	DYS390	DYS391	DYS392	DYS393	<i>n</i>	<i>F</i>
H150	15	22	10	13	14	1	0.0016
H151	15	22	10	13	15	2	0.0032
H152	15	22	11	10	13	2	0.0032
H153	15	22	11	11	13	2	0.0032
H154	15	22	11	13	13	1	0.0016
H155	15	22	12	10	14	1	0.0016
H156	15	23	09	11	12	1	0.0016
H157	15	23	09	11	13	2	0.0032
H158	15	23	10	11	12	7	0.0113
H159	15	23	10	11	13	4	0.0065
H160	15	23	10	11	14	1	0.0016
H161	15	23	10	11	15	2	0.0032
H162	15	23	10	12	12	1	0.0016
H163	15	23	10	12	13	1	0.0016
H164	15	23	10	12	14	1	0.0016
H165	15	23	10	12	15	1	0.0016
H166	15	23	10	13	12	1	0.0016
H167	15	23	10	13	13	5	0.0081
H168	15	23	11	12	14	2	0.0032
H169	15	23	11	13	13	4	0.0065
H170	15	23	11	13	14	1	0.0016
H171	15	23	11	14	14	1	0.0016
H172	15	24	09	10	12	1	0.0016
H173	15	24	09	11	12	1	0.0016
H174	15	24	09	11	13	1	0.0016
H175	15	24	09	13	13	1	0.0016
H176	15	24	09	13	14	1	0.0016
H177	15	24	10	10	12	1	0.0016
H178	15	24	10	11	12	1	0.0016
H179	15	24	10	11	13	4	0.0065
H180	15	24	10	12	12	1	0.0016
H181	15	24	10	12	15	1	0.0016
H182	15	24	10	13	13	5	0.0081
H183	15	24	10	13	14	2	0.0032
H184	15	24	10	15	13	1	0.0016
H185	15	24	10	15	14	1	0.0016
H186	15	24	10	16	14	1	0.0016
H187	15	24	11	12	13	2	0.0032
H188	15	24	11	13	13	15	0.0243
H189	15	24	11	13	14	1	0.0016
H190	15	25	09	11	12	1	0.0016
H191	15	26	10	11	13	2	0.0032
H192	15	26	10	13	13	1	0.0016
H193	15	26	11	13	13	2	0.0032
H194	15	27	10	11	13	1	0.0016
H195	16	21	10	11	13	3	0.0049
H196	16	21	10	11	14	6	0.0097
H197	16	21	10	11	15	3	0.0049
H198	16	21	10	12	14	2	0.0032
H199	16	21	11	10	14	1	0.0016
H200	16	21	11	11	13	1	0.0016
H201	16	22	09	11	14	1	0.0016
H202	16	22	10	11	12	1	0.0016
H203	16	22	10	11	13	3	0.0049
H204	16	22	10	11	14	2	0.0032
H205	16	22	10	11	15	2	0.0032
H206	16	22	11	13	13	1	0.0016
H207	16	23	09	10	13	1	0.0016
H208	16	23	09	11	12	1	0.0016
H209	16	23	10	11	12	3	0.0049
H210	16	23	10	11	13	6	0.0097
H211	16	23	10	11	14	1	0.0016
H212	16	23	10	12	14	1	0.0016
H213	16	23	11	11	12	1	0.0016
H214	16	23	11	11	13	2	0.0032
H215	16	23	12	12	11	1	0.0016
H216	16	24	10	11	13	3	0.0049
H217	16	24	10	13	13	4	0.0065
H218	16	24	11	10	13	1	0.0016
H219	16	24	11	11	13	1	0.0016
H220	16	24	11	13	13	1	0.0016
H221	16	25	10	10	13	1	0.0016
H222	16	26	09	11	12	1	0.0016
H223	16	26	10	10	13	1	0.0016
H224	16	26	10	11	13	3	0.0049

TABLE 2—Continued.

Haplotype	DYS19	DYS390	DYS391	DYS392	DYS393	<i>n</i>	<i>F</i>
H225	16	26	10	13	13	1	0.0016
H226	16	26	11	11	12	1	0.0016
H227	16	26	11	11	13	3	0.0049
H228	16	26	13	12	13	1	0.0016
H229	16	28	10	11	13	1	0.0016
H230	16	28	10	11	14	1	0.0016
H231	17	21	10	11	12	1	0.0016
H232	17	21	10	11	14	3	0.0049
H233	17	21	10	11	15	3	0.0049
H234	17	21	10	13	15	1	0.0016
H235	17	22	10	11	12	1	0.0016
H236	17	23	09	12	13	1	0.0016
H237	17	23	10	10	13	1	0.0016
H238	17	23	10	11	12	1	0.0016
H239	17	23	10	11	13	1	0.0016
H240	17	23	11	12	15	1	0.0016
H241	17	23	11	13	14	1	0.0016
H242	17	26	11	11	13	1	0.0016
H243	17	28	09	10	13	1	0.0016
H244	18	25	10	10	13	1	0.0016

n, number of individuals observed for each haplotype; *F*, frequency for each haplotype in 617 individuals.

of different haplotypes in the sample. The haplotype diversity in the analyzed sample was 0.9831 ± 0.0022 , and the discrimination capacity was 0.3955.

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