Supplementary materials for 'Performing Parentage Analysis in the Presence of Inbreeding and Null Alleles'

Tables

Table S1: The accuracy of the Nei's (1977) estimator and our allele frequency estimator

f	p_y	$\hat{f}$		$\hat{\beta}$		$\hat{p}_y$	
		bias	std	bias	std	bias	std
0	0	0.004	0.007	0.000	0.021	0.008	0.014
0	0.05	0.095	0.018	−0.004	0.021	−0.036	0.021
0	0.15	0.266	0.019	0.003	0.025	−0.129	0.032
0	0.3	0.470	0.020	0.048	0.040	−0.265	0.051
0.05	0	−0.005	0.016	−0.001	0.021	0.012	0.018
0.15	0	−0.005	0.018	−0.003	0.022	0.016	0.024
0.3	0	−0.005	0.020	−0.007	0.023	0.023	0.034
0.05	0.05	0.088	0.018	−0.002	0.022	−0.034	0.024
0.15	0.15	0.212	0.020	0.018	0.030	−0.123	0.039
0.3	0.3	0.299	0.020	0.102	0.057	−0.251	0.072
0	0			0.000	0.021	0.009	0.015
0	0.05			−0.006	0.021	0.001	0.030
0	0.15			−0.015	0.025	0.005	0.042
0	0.3	the true		−0.020	0.034	0.010	0.055
0.05	0	value of f		−0.001	0.021	0.010	0.017
0.15	0	is used in		−0.003	0.022	0.014	0.022
0.3	0	simulation		−0.006	0.023	0.020	0.032
0.05	0.05			−0.006	0.022	0.001	0.033
0.15	0.15			−0.013	0.030	0.005	0.052
0.3	0.3			−0.008	0.049	0.008	0.079

Table S2: Genetic diversity at 40 microsatellite loci with the highest estimated null allele frequency from Nietlisbach et al. (2015) dataset

Locus	k	n	H_O	H_E	PIC	f	p_y
sosp_ng106	2	2277	0.062	0.481	0.365	0.870	0.764
Sosp046	13	1977	0.241	0.844	0.826	0.715	0.544
sosp_ng323	8	1959	0.259	0.739	0.697	0.649	0.469
sosp_ng167	5	2069	0.196	0.539	0.502	0.636	0.449
sosp_ng169	12	2140	0.249	0.612	0.584	0.593	0.411
Sosp039	17	2033	0.382	0.875	0.862	0.564	0.377
sosp_ng023	9	1875	0.361	0.807	0.781	0.554	0.368
sosp_ng136	6	1358	0.345	0.773	0.736	0.553	0.367
sosp_ng005	5	2193	0.252	0.534	0.427	0.529	0.342
sosp_ng274	6	2180	0.364	0.758	0.722	0.520	0.333
sosp_ng068	9	2322	0.334	0.656	0.607	0.491	0.312
sosp_ng074	6	2199	0.342	0.640	0.581	0.467	0.286
sosp_ng042	5	2169	0.298	0.518	0.464	0.425	0.248
sosp_ng386	4	2371	0.318	0.529	0.449	0.400	0.229
sosp_ng079	4	2375	0.352	0.575	0.513	0.388	0.218
sosp_ng116	5	2385	0.364	0.582	0.527	0.374	0.208
sosp_ng105	9	2364	0.530	0.824	0.803	0.357	0.197
sosp_ng340	3	1832	0.279	0.434	0.355	0.357	0.197
Sosp028	9	2198	0.533	0.780	0.752	0.317	0.170
Sosp111	10	2249	0.463	0.681	0.626	0.320	0.169
sosp_ng388	8	2343	0.391	0.556	0.498	0.298	0.163
sosp_ng022	5	2367	0.288	0.403	0.371	0.286	0.145
sosp_ng384	9	2355	0.583	0.782	0.750	0.255	0.123
sosp_ng121	13	2202	0.683	0.884	0.873	0.228	0.106
sosp_ng014	12	2339	0.501	0.634	0.590	0.210	0.097
sosp_ng093	13	2235	0.643	0.808	0.789	0.205	0.091
sosp_ng127	11	2329	0.664	0.815	0.792	0.186	0.079
Sosp144	11	2367	0.688	0.803	0.776	0.144	0.053
sosp_ng322	4	2470	0.449	0.522	0.485	0.140	0.052
sosp_ng268	19	2463	0.687	0.795	0.769	0.136	0.049
sosp_ng300	7	2461	0.544	0.627	0.576	0.132	0.049
sosp_ng198	3	2334	0.330	0.384	0.342	0.140	0.048
sosp_ng299	4	2472	0.458	0.518	0.478	0.117	0.039
sosp_ng055	7	2401	0.653	0.739	0.696	0.117	0.038
sosp_ng349	8	2459	0.640	0.727	0.679	0.120	0.038
sosp_ng066	5	2384	0.529	0.598	0.523	0.116	0.035
Sosp064	16	2381	0.738	0.830	0.810	0.111	0.035
sosp_ng256	7	2461	0.577	0.640	0.594	0.098	0.032
Sosp055	10	2352	0.707	0.792	0.760	0.108	0.032
sosp_ng395	8	2458	0.639	0.703	0.654	0.091	0.024
Average	8.175	2254.0	0.448	0.669	0.625	0.333	0.200

Where we denote k for the number of visible alleles, n for the number of individuals genotyped at the located locus, H_O and H_E for the observed and expected heterozygosities, PIC for the polymorphic information content, f for the inbreeding coefficient, and p_y for the frequency of null allele.

Table S3: Genetic diversity of the top 40 highest arbitrarily chosen alphabetically ranked microsatellite loci taken from Nietlisbach et al. (2015) dataset

Locus	k	n	H_O	H_E	PIC	f	p_y
Escu01	10	3234	0.776	0.771	0.737	−0.007	0.000
Gf005	15	2072	0.863	0.862	0.848	−0.002	0.000
Mme001	9	1825	0.678	0.694	0.656	0.023	0.000
Mme02	17	3289	0.798	0.802	0.779	0.005	0.000
Mme08	9	3279	0.842	0.839	0.818	−0.004	0.000
Mme12	10	3271	0.536	0.535	0.507	−0.001	0.000
sosp_ng001	5	2378	0.745	0.753	0.712	0.010	0.000
sosp_ng002	3	2378	0.496	0.489	0.372	−0.015	0.000
sosp_ng004	10	2237	0.488	0.482	0.461	−0.012	0.000
sosp_ng005	5	2193	0.252	0.534	0.427	0.529	0.342
sosp_ng006	9	2262	0.472	0.467	0.414	−0.010	0.000
sosp_ng007	3	2423	0.544	0.525	0.412	−0.036	0.000
sosp_ng008	11	2437	0.807	0.863	0.847	0.065	0.007
sosp_ng012	7	2387	0.629	0.621	0.550	−0.012	0.000
sosp_ng014	12	2339	0.501	0.634	0.590	0.210	0.097
sosp_ng022	5	2367	0.288	0.403	0.371	0.286	0.145
sosp_ng023	9	1875	0.361	0.807	0.781	0.554	0.368
sosp_ng024	9	2283	0.745	0.784	0.754	0.050	0.000
sosp_ng033	5	2379	0.699	0.708	0.658	0.012	0.000
sosp_ng034	12	2446	0.672	0.686	0.664	0.020	0.000
sosp_ng037	7	2417	0.714	0.724	0.684	0.013	0.000
sosp_ng040	16	2381	0.859	0.854	0.837	−0.006	0.000
sosp_ng042	5	2169	0.298	0.518	0.464	0.425	0.248
sosp_ng045	4	2432	0.386	0.374	0.333	−0.033	0.000
sosp_ng048	8	2128	0.761	0.753	0.711	−0.011	0.000
sosp_ng053	4	2358	0.377	0.402	0.349	0.061	0.009
sosp_ng054	16	2352	0.795	0.807	0.784	0.015	0.000
sosp_ng055	7	2401	0.653	0.739	0.696	0.117	0.038
sosp_ng058	7	2424	0.771	0.780	0.747	0.011	0.000
sosp_ng066	5	2384	0.529	0.598	0.523	0.116	0.035
sosp_ng068	9	2322	0.334	0.656	0.607	0.491	0.312
sosp_ng071	12	2465	0.886	0.879	0.867	−0.007	0.000
sosp_ng072	6	2217	0.596	0.631	0.565	0.055	0.006
sosp_ng074	6	2199	0.342	0.640	0.581	0.467	0.286
sosp_ng079	4	2375	0.352	0.575	0.513	0.388	0.218
sosp_ng081	10	2356	0.732	0.746	0.713	0.018	0.000
sosp_ng082	15	2404	0.761	0.822	0.801	0.074	0.013
sosp_ng083	9	2431	0.270	0.270	0.258	0.000	0.000
sosp_ng086	12	2343	0.765	0.738	0.711	−0.036	0.000
sosp_ng088	12	2448	0.747	0.784	0.755	0.047	0.000
Average	8.725	2409.0	0.603	0.664	0.621	0.097	0.053

The definitions for symbols in the header row are as for Table S1.

Figures

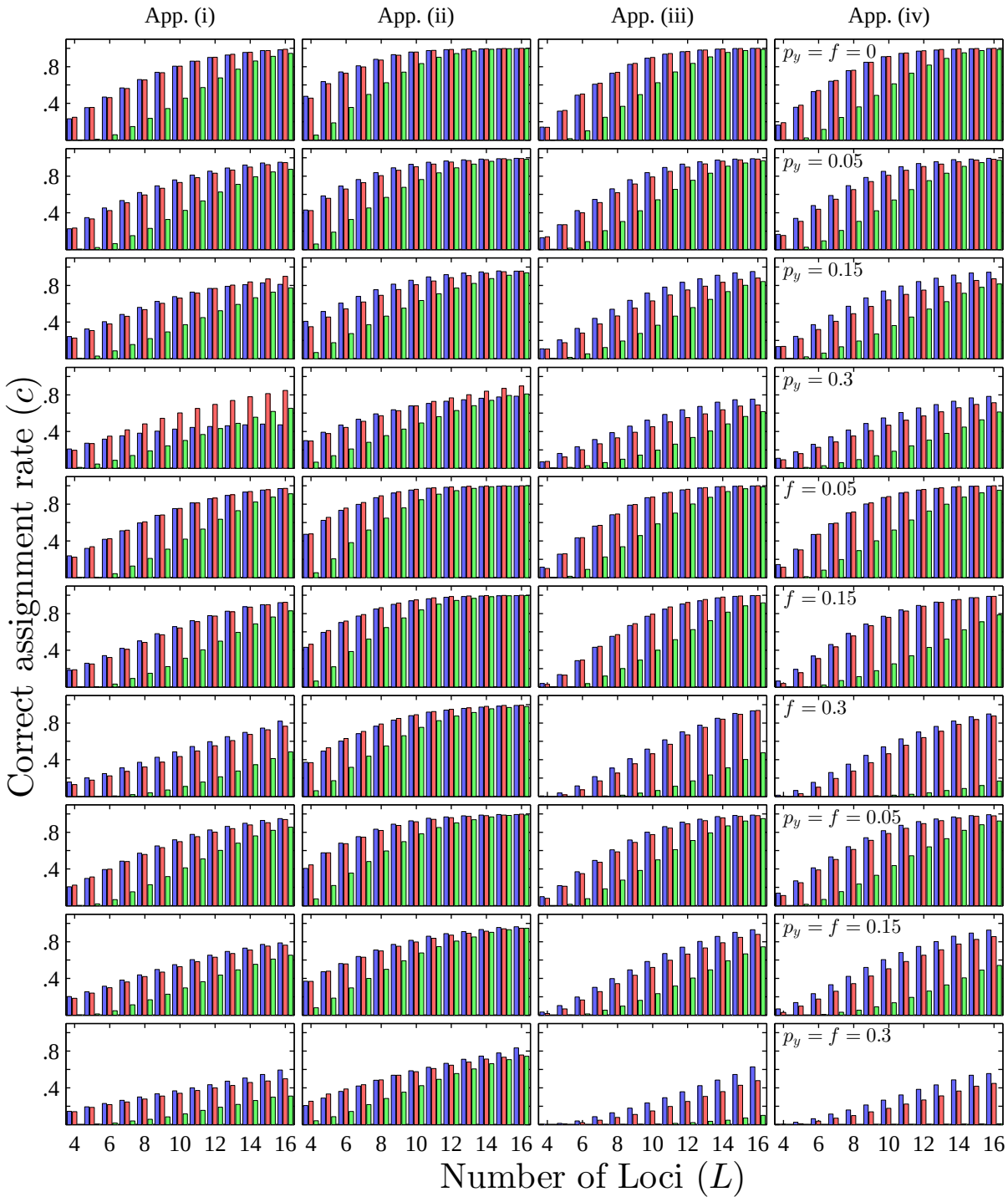

Figure S1: Results of simulated data with the threshold $\Delta_{0.80}$. The definitions of bars together with their colors are as for Figure 3.

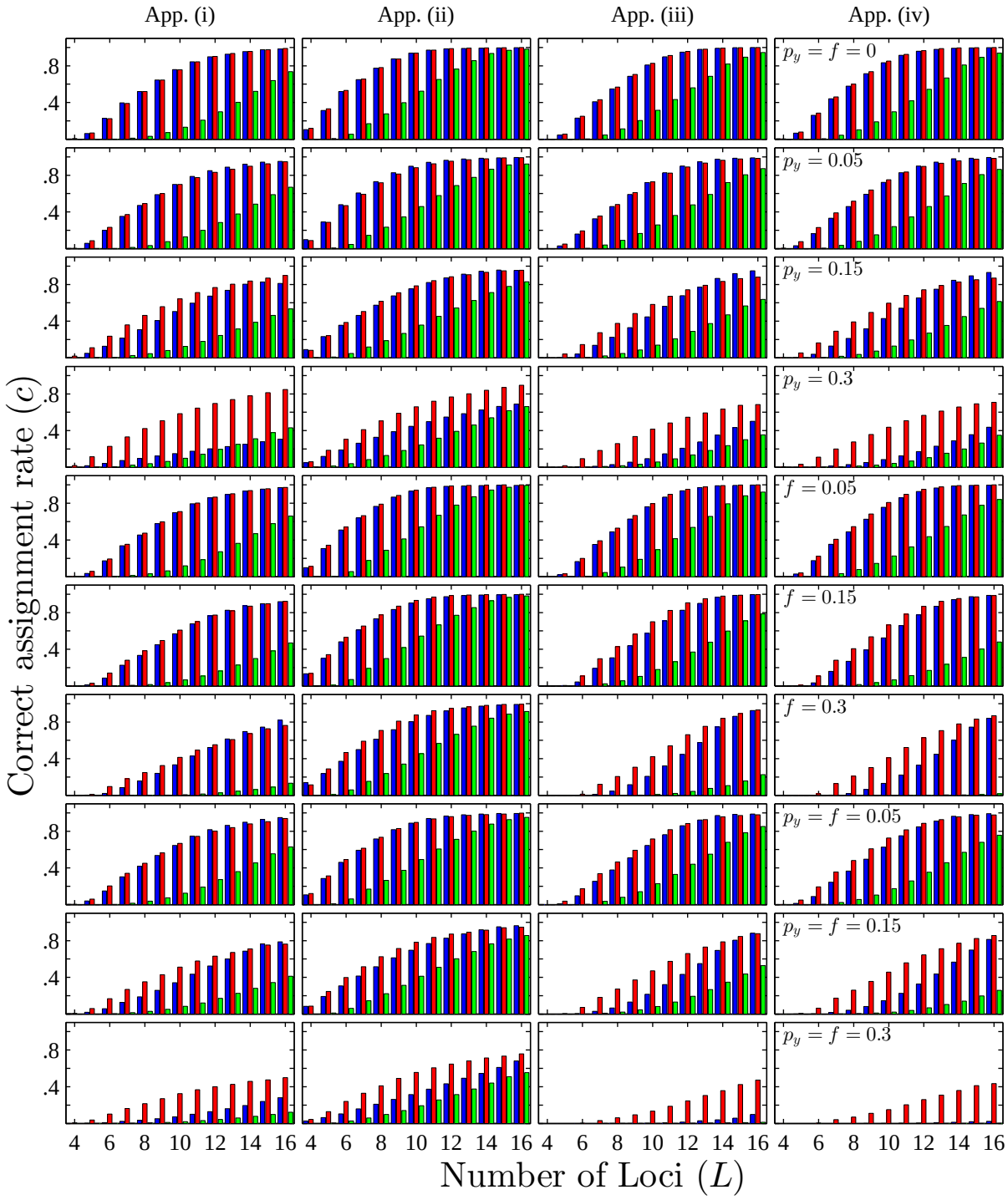

Figure S2: Results of simulated data with the threshold $\Delta_{0.99}$. The definitions of bars together with their colors are as for Figure 3.

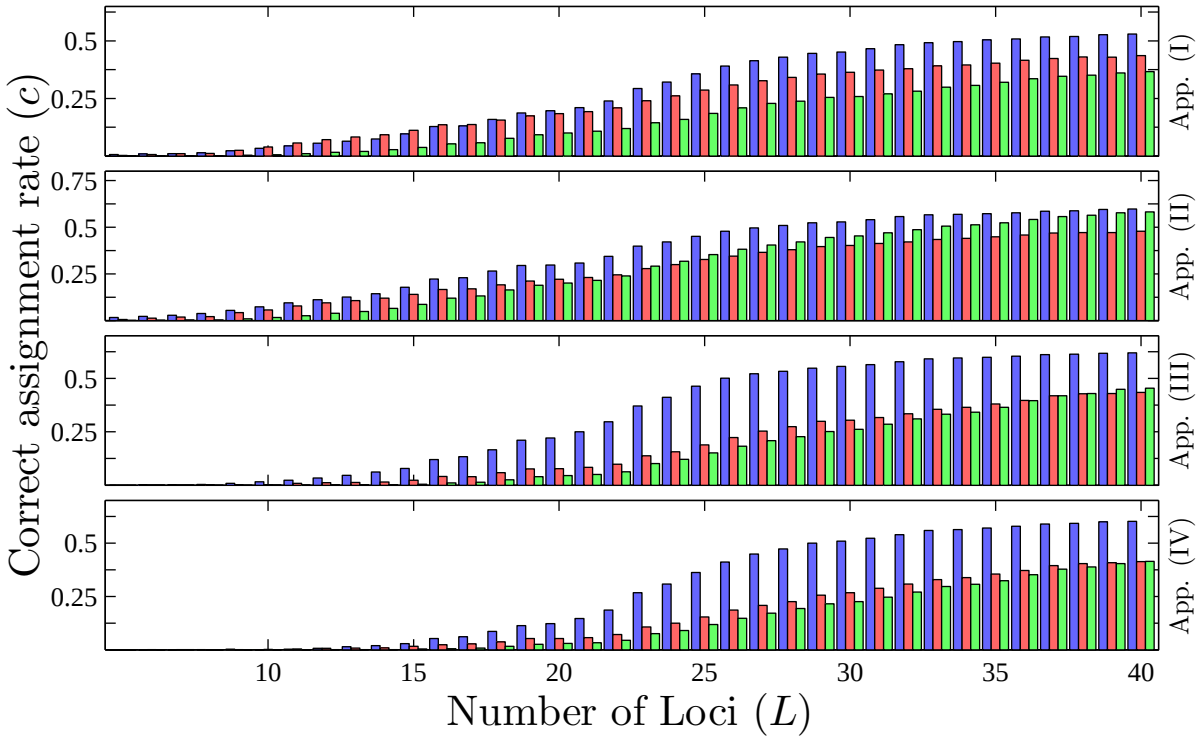

Figure S3: Results of empirical data with the threshold $\Delta_{0.80}$. The definitions of bars together with their colors are as for Figure 4.

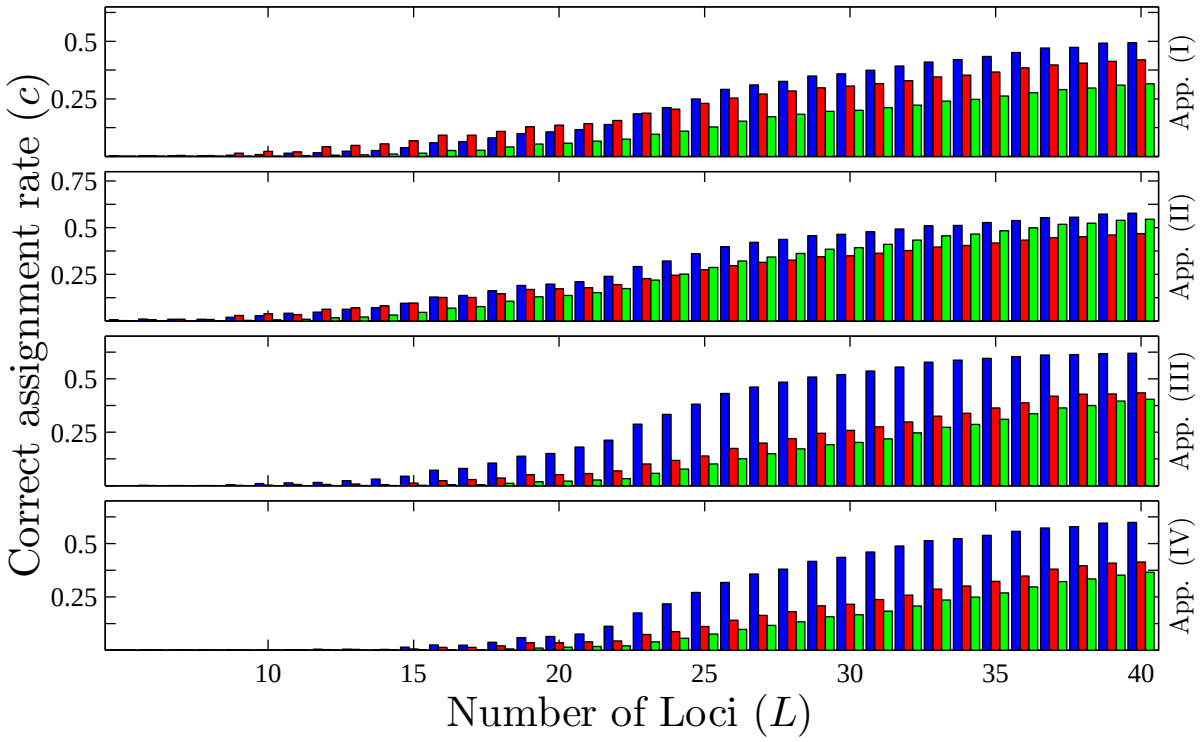

Figure S4: Results of empirical data with the threshold $\Delta_{0.99}$. The definitions of bars together with their colors are as for Figure 4.

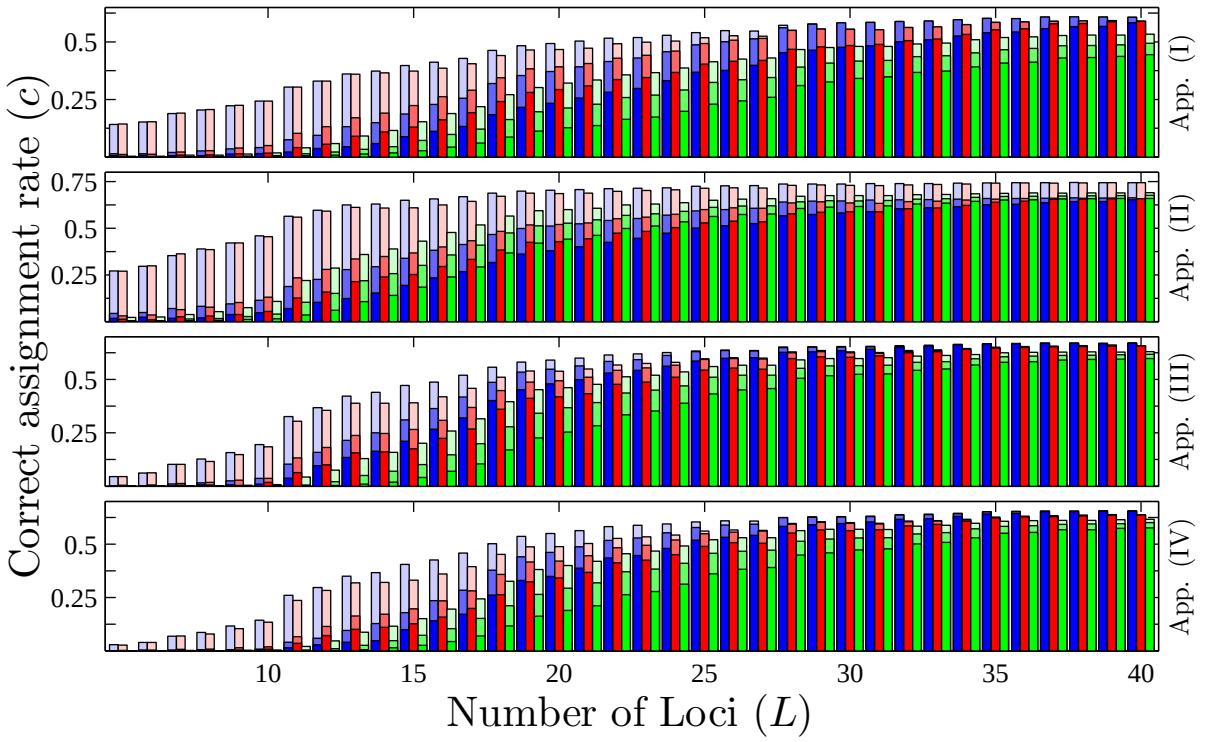

Figure S5: Results of the parentage analysis using the dataset of Nietlisbach et al. (2015), in which the loci chosen are with the highest rank of alphabetical order. Each row denotes an application. The definitions of bars together with their colors are as for Figure 3.

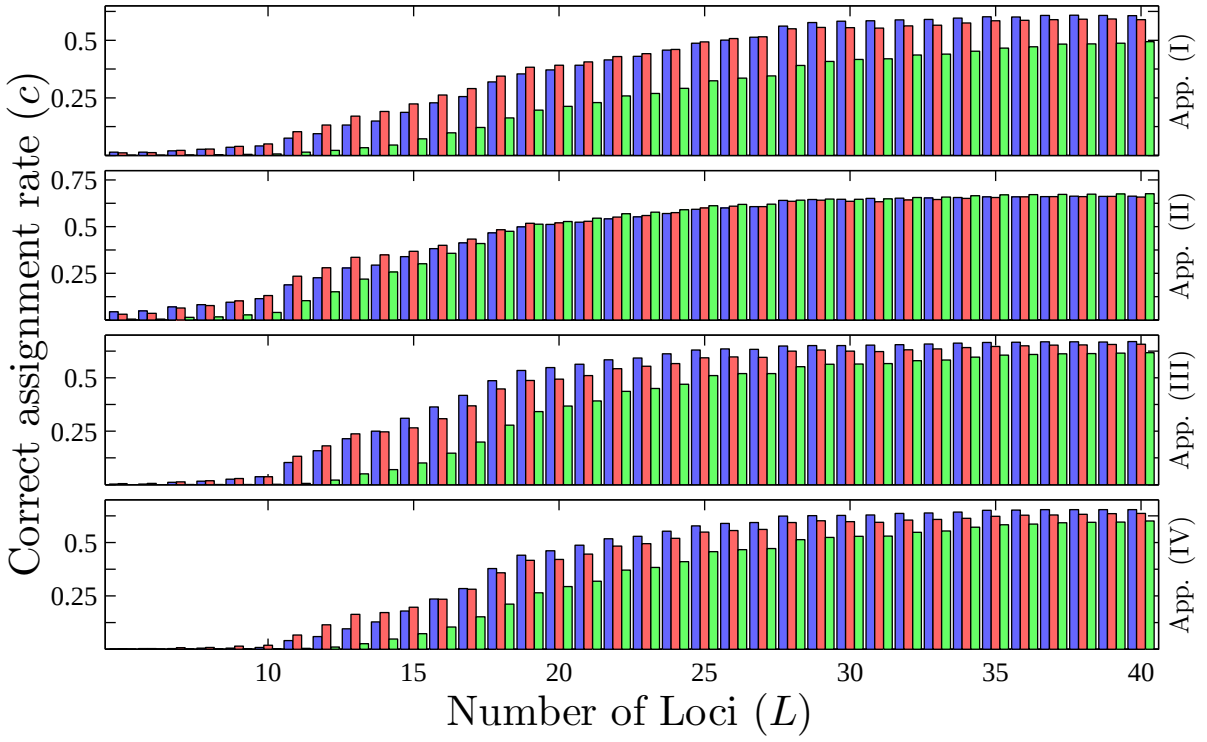

Figure S6: Results of empirical data with the threshold $\Delta_{0.80}$. The definitions of bars together with their colors are as for Figure S5.

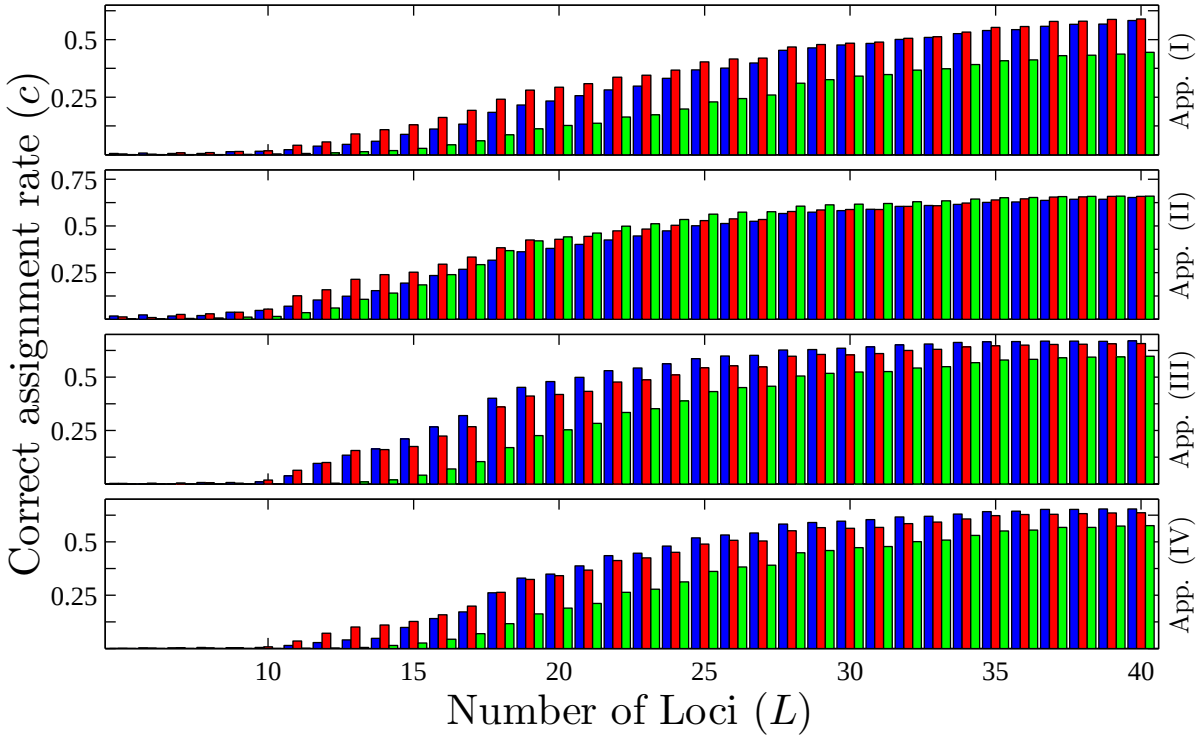

Figure S7: Results of empirical data with the threshold $\Delta_{0.99}$. The definitions of bars together with their colors are as for Figure S5.