

**Supplementary Table 1.** Genome-wide significant SNPs. *P* values are corrected using genomic controls.

SNP	Chr <sup>a</sup>	Build 35 position	<i>P</i> value	OR	Test
rs12821256 C	12	87,830,803	5.5x10 <sup>-14</sup>	2.32	blond vs. brown hair
rs4904864 A	14	91,834,272	5.9x10 <sup>-11</sup>	0.51	blond vs. brown hair
			1.9x10 <sup>-8</sup>	0.63	blue vs. green eyes
rs4904868 T	14	91,850,754	2.2x10 <sup>-13</sup>	0.50	blond vs. brown hair
			7.5x10 <sup>-14</sup>	0.56	blue vs. green eyes
rs2402130 G	14	91,870,956	3.7x10 <sup>-9</sup>	0.47	blond vs. brown hair
rs1584407 A	15	25,830,854	1.1x10 <sup>-7</sup>	0.55	blue vs. brown eyes
rs2703952 C	15	25,855,576	3.7x10 <sup>-12</sup>	0.39	blue vs. brown eyes
rs728405 G	15	25,873,448	1.1x10 <sup>-9</sup>	0.5	blue vs. brown eyes
rs4778220 G	15	25,894,733	1.2x10 <sup>-7</sup>	0.51	blue vs. brown eyes
rs11855019 G	15	26,009,415	9.3x10 <sup>-36</sup>	0.17	blue vs. brown eyes
			5.3x10 <sup>-9</sup>	0.32	blond vs. brown hair
rs6497268 A	15	26,012,308	4.1x10 <sup>-56</sup>	0.13	blue vs. brown eyes
			7.7x10 <sup>-10</sup>	0.37	blond vs. brown hair
			1.5x10 <sup>-13</sup>	0.37	blue vs. green eyes
rs7495174 G	15	26,017,833	3.2x10 <sup>-36</sup>	0.07	blue vs. brown eyes
rs7183877 A	15	26,039,328	1.2x10 <sup>-10</sup>	0.16	blond vs. brown hair
			8.0x10 <sup>-22</sup>	0.10	blue vs. green eyes
			2.2x10 <sup>-72</sup>	0.03	blue vs. brown eyes
rs8028689 C	15	26,162,483	7.3x10 <sup>-38</sup>	0.02	blue vs. brown eyes
rs2240204 T	15	26,167,627	7.3x10 <sup>-38</sup>	0.02	blue vs. brown eyes
rs8039195 C	15	26,189,679	1.5x10 <sup>-12</sup>	0.21	blond vs. brown hair
			9.1x10 <sup>-22</sup>	0.15	blue vs. green eyes
			8.8x10 <sup>-99</sup>	0.03	blue vs. brown eyes
rs16950979 G	15	26,194,101	7.3x10 <sup>-38</sup>	0.02	blue vs. brown eyes
rs16950987 A	15	26,199,823	7.3x10 <sup>-38</sup>	0.02	blue vs. brown eyes
rs1667394 G	15	26,203,777	4.4x10 <sup>-16</sup>	0.18	blond vs. brown hair
			5.1x10 <sup>-25</sup>	0.14	blue vs. green eyes
			1.4x10 <sup>-124</sup>	0.03	blue vs. brown eyes
rs1635168 T	15	26,208,861	5.9x10 <sup>-28</sup>	0.06	blue vs. brown eyes
rs17137796 C	15	26,798,209	2.4x10 <sup>-10</sup>	0.55	blue vs. brown eyes
rs11076747 G	16	87,584,526	2.7x10 <sup>-8</sup>	0.55	red vs. not red hair
rs9921361 G	16	87,821,940	4.4x10 <sup>-9</sup>	0.17	red vs. not red hair
rs1466540 C	16	87,871,978	1.2x10 <sup>-7</sup>	0.52	red vs. not red hair
rs2353028 G	16	87,880,179	4.4x10 <sup>-10</sup>	0.39	red vs. not red hair
rs2306633 A	16	87,882,779	5.3x10 <sup>-12</sup>	0.33	red vs. not red hair
rs2353033 T	16	87,913,062	1.9x10 <sup>-17</sup>	0.40	red vs. not red hair
			4.3x10 <sup>-17</sup>	0.62	freckles present vs. absent
rs889574 C	16	87,914,309	4.4x10 <sup>-8</sup>	0.72	freckles present vs. absent
rs4347628 C	16	88,098,136	2.1x10 <sup>-12</sup>	2.15	red vs. not red hair
rs382745 C	16	88,131,087	4.5x10 <sup>-13</sup>	0.66	freckles present vs. absent
rs352935 A	16	88,176,081	2.2x10 <sup>-10</sup>	0.70	freckles present vs. absent
			6.3x10 <sup>-10</sup>	0.51	red vs. not red hair
rs464349 T	16	88,183,752	1.2x10 <sup>-13</sup>	0.66	freckles present vs. absent
rs164741 C	16	88,219,799	3.6x10 <sup>-15</sup>	0.61	burns vs. tans
			9.0x10 <sup>-39</sup>	0.25	red vs. not red hair
			1.4x10 <sup>-27</sup>	0.52	freckles present vs. absent
rs460879 T	16	88,240,390	6.7x10 <sup>-19</sup>	0.61	freckles present vs. absent
			2.0x10 <sup>-22</sup>	0.34	red vs. not red hair
rs7188458 G	16	88,253,985	7.6x10 <sup>-12</sup>	0.67	burns vs. tans
			1.6x10 <sup>-37</sup>	0.24	red vs. not red hair
			4.7x10 <sup>-23</sup>	0.57	freckles present vs. absent
rs459920 C	16	88,258,328	9.5x10 <sup>-20</sup>	0.36	red vs. not red hair
			6.2x10 <sup>-16</sup>	0.63	freckles present vs. absent

rs12443954 G	16	88,268,997	$8.0 \times 10^{-14}$	0.25	red vs. not red hair
rs258324 A	16	88,281,756	$1.7 \times 10^{-9}$	0.11	red vs. not red hair
rs258322 T	16	88,283,404	$2.0 \times 10^{-11}$	1.77	burns vs. tans
			$5.6 \times 10^{-27}$	3.84	red vs. not red hair
			$1.6 \times 10^{-18}$	2.12	freckles present vs. absent
rs3751695 C	16	88,292,050	$6.0 \times 10^{-14}$	0.4	red vs. not red hair
			$1.1 \times 10^{-7}$	0.66	burns vs. tans
			$4.9 \times 10^{-8}$	0.66	freckles present vs. absent
rs7204478 C	16	88,322,986	$5.1 \times 10^{-8}$	0.73	burns vs. tans
			$1.1 \times 10^{-14}$	0.65	freckles present vs. absent
			$1.4 \times 10^{-39}$	0.23	red vs. not red hair
rs1800359 T	16	88,332,762	$3.5 \times 10^{-22}$	0.31	red vs. not red hair
			$1.6 \times 10^{-13}$	0.65	freckles present vs. absent
rs8058895 C	16	88,342,308	$2.4 \times 10^{-10}$	1.55	freckles present vs. absent
			$1.5 \times 10^{-19}$	2.79	red vs. not red hair
rs7195066 C	16	88,363,824	$4.3 \times 10^{-26}$	5.00	red vs. not red hair
rs16966142 T	16	88,378,534	$1.1 \times 10^{-9}$	0.09	red vs. not red hair
rs1800286 A	16	88,397,262	$9.2 \times 10^{-14}$	0.65	freckles present vs. absent
			$2.5 \times 10^{-23}$	0.30	red vs. not red hair
rs11861084 A	16	88,403,211	$2.2 \times 10^{-24}$	0.29	red vs. not red hair
			$4.1 \times 10^{-15}$	0.64	freckles present vs. absent
rs8060934 C	16	88,447,526	$1.7 \times 10^{-30}$	0.27	red vs. not red hair
			$5.2 \times 10^{-8}$	0.74	freckles present vs. absent
rs4785755 A	16	88,565,329	$1.4 \times 10^{-8}$	0.54	red vs. not red hair
rs4408545 T	16	88,571,529	$2.2 \times 10^{-44}$	0.17	red vs. not red hair
			$2.8 \times 10^{-13}$	0.65	burns vs. tans
			$2.0 \times 10^{-22}$	0.57	freckles present vs. absent
rs4238833 T	16	88,578,190	$3.9 \times 10^{-55}$	0.18	red vs. not red hair
			$1.9 \times 10^{-32}$	0.50	freckles present vs. absent
			$3.0 \times 10^{-19}$	0.59	burns vs. tans
rs7201721 G	16	88,586,247	$4.4 \times 10^{-10}$	1.98	red vs. not red hair
rs4785763 C	16	88,594,437	$2.4 \times 10^{-33}$	0.49	freckles present vs. absent
			$1.1 \times 10^{-19}$	0.58	burns vs. tans
			$3.2 \times 10^{-56}$	0.18	red vs. not red hair
rs9936896 T	16	88,596,560	$1.0 \times 10^{-11}$	0.63	freckles present vs. absent
			$1.5 \times 10^{-12}$	0.45	red vs. not red hair
			$3.4 \times 10^{-8}$	0.69	burns vs. tans
rs11648785 T	16	88,612,062	$2.6 \times 10^{-16}$	0.34	red vs. not red hair
			$4.1 \times 10^{-10}$	0.67	burns vs. tans
			$1.4 \times 10^{-19}$	0.57	freckles present vs. absent
rs2241039 T	16	88,615,938	$7.7 \times 10^{-10}$	0.69	burns vs. tans
			$6.4 \times 10^{-24}$	0.28	red vs. not red hair
			$7.0 \times 10^{-21}$	0.58	freckles present vs. absent
rs1048149 C	16	88,638,451	$5.7 \times 10^{-10}$	0.49	red vs. not red hair
rs2078478 C	16	88,657,637	$7.4 \times 10^{-8}$	3.31	red vs. not red hair
rs7196459 G	16	88,668,978	$2.2 \times 10^{-20}$	0.31	red vs. not red hair
			$7.3 \times 10^{-15}$	0.53	freckles present vs. absent
			$1.1 \times 10^{-13}$	0.54	burns vs. tans
rs4959270 C	6	402,748	$2.2 \times 10^{-8}$	0.73	freckles present vs. absent
rs1540771 G	6	411,033	$1.9 \times 10^{-9}$	0.71	freckles present vs. absent

**Supplementary Table 2.** Frequencies in percentages of key SNPs in all phenotypes and all samples. The first line corresponds to the Icelandic Discovery sample, the second line the Icelandic replication sample, and the third the Dutch replication sample.

Variant Locus	Eye color				Hair Color				Skin sensitive		Freckles	
	All	Blue	Green	Brown	Red	Blond	Dark blond	Brown	Yes	No	Yes	No
rs12896399 T SLC24A4	54.7	57.7	39.5	54.0	56.5	67.8	56.0	44.3	57.5	52.6	54.2	54.9
	56.0	58.3	48.5	52.0	57.2	67.8	55.9	47.5	56.5	55.5	56.4	55.5
	47.8	50.8	33.2	48.1	44.8	57.9	46.6	42.5	47.7	48.0	48.4	47.6
rs12821256 C KITLG	19.6	19.6	20.9	17.8	19.9	27.8	20.2	14.2	20.2	19.2	18.8	20.6
	20.9	21.5	20.0	18.6	19.1	26.7	21.8	16.1	23.2	19.8	20.9	20.8
	12.2	12.3	10.6	12.7	8.3	15.8	13.4	7.2	11.1	12.9	11.9	12.3
rs1540771 A 6P25.3	46.8	46.9	47.1	44.2	46.9	42.5	45.2	51.7	50.0	45.2	50.8	42.4
	44.2	44.9	41.6	40.8	48.1	42.7	43.2	46.6	46.1	43.3	46.7	41.3
	45.4	45.3	48.4	43.8	46.7	43.4	46.2	45.4	47.0	44.3	49.1	43.4
rs1393350 A TYR	29.3	31.1	22.9	27.3	30.0	32.7	29.2	27.4	32.2	27.4	30.4	27.9
	30.5	32.3	25.0	27.3	31.5	34.1	30.9	27.5	36.0	27.4	31.7	29.0
	25.8	27.5	21.5	24.3	21.7	28.1	25.9	24.3	27.0	25.0	27.1	25.3
rs1042602 C TYR	70.2	70.5	68.9	70.2	67.0	67.6	70.7	71.2	69.6	70.4	73.0	67.2
	72.2	71.9	74.3	72.1	71.9	69.6	72.2	73.8	73.0	72.0	75.2	68.6
	62.4	62.5	59.1	63.4	66.7	63.1	60.8	64.6	60.4	63.8	65.5	60.7
rs1667394 A OCA2	97.6	99.0	97.5	87.5	98.2	98.8	98.1	95.5	98.1	97.2	97.4	97.6
	97.4	99.1	95.7	85.2	97.6	98.8	98.2	94.7	97.6	97.3	97.2	97.6
	95.0	99.2	96.5	82.4	96.7	96.9	96.0	91.4	96.9	93.7	95.8	94.5
rs7495174 A OCA2	94.1	98.6	91.1	67.0	94.0	97.8	95.8	88.8	95.1	93.6	94.4	93.8
	93.8	98.1	88.6	67.0	93.0	97.8	96.1	87.3	94.6	93.5	93.9	93.7
	88.0	97.5	85.9	62.7	91.7	94.9	89.8	78.4	90.7	86.0	90.1	86.7
rs1805008 T MC1R	13.5	13.5	13.0	12.8	34.3	13.9	12.3	8.7	18.8	10.4	18.4	9.1
	12.5	12.1	13.7	11.9	35.4	13.8	11.4	8.3	18.0	9.9	17.1	7.4
	8.3	8.6	9.8	6.8	24.1	10.8	7.7	5.9	10.6	6.7	12.0	6.2
rs1805007 T MC1R	9.6	9.7	10.4	7.8	35.7	11.8	7.0	6.1	15.1	6.4	15.1	4.5
	10.3	9.8	12.8	11.2	36.4	13.1	7.5	6.9	16.8	6.8	14.0	6.0
	6.1	6.1	5.5	6.7	41.7	6.7	5.0	4.3	8.5	4.4	11.4	3.1

**Supplementary Table 3.** Results from tests of positive selection based on population differentiation and extended haplotype homozygosity

SNP	Allele	Gene/ Region	Chrom.	Allele frequency				FST (perc. rank) <sup>a</sup>			irEHH value (perc. rank) <sup>a</sup> CEU
				CEU	YRI	ASN	CEU-YRI-ASN	CEU-YRI	CEU-ASN	YRI-ASN	
rs12896399	T	SLC24A4	14	0.600	0.008	0.393	0.405 (9.1)	0.827 (2.1)	0.086 (45)	0.462 (14)	1.02 (6.4)
rs12821256	C	KITLG	12	0.142	0.000	0.000	0.149 (40)	0.153 (40)	0.153 (5.1)	0 (N/A)	6.96 (1.7)
rs1540771	T	6p25.3	6	0.575	0.042	0.300	0.334 (14)	0.665 (6.3)	0.154 (30)	0.234 (35)	1.29 (4.1)
rs1042602	A	TYR	11	0.417	0.000	0.000	0.484 (0.81)	0.526 (1.7)	0.526 (0.37)	0 (N/A)	3.29 (0.55)
rs1393350	A	TYR	11	0.192	0.000	0.000	0.205 (16)	0.212 (12)	0.212 (3.3)	0 (N/A)	0.94 (46)
rs7495174	A	OCA2	15	0.949	0.848	0.292	0.591 (2.7)	0.057 (66)	0.917 (0.79)	0.629 (12)	0.5 (1.3)
rs1667394	T	OCA2	15	0.862	0.052	0.172	0.828 (0.54)	1.323 (0.54)	0.953 (0.66)	0.073 (63)	11.23 (0.32)
rs1805007	T	MC1R	16	0.142	0.000	0.000	0.149 (41)	0.153 (40)	0.153 (5.1)	0 (N/A)	3.91 (6.6)
rs1805008	T	MC1R	16	0.108	0.000	0.000	0.112 (50)	0.115 (31)	0.115 (16)	0 (N/A)	5.37 (6.2)

<sup>a</sup> The percentile rank represents the percent of HapMap alleles of the same frequency in the groups examined that have a value of FST or irEHH that is greater than or equal to that found for the specified allele.

**Supplementary Table 4.** Main association results, stratified by sex, for all samples. For each SNP, the first line contains the results for males, and the second for females. A *P* value testing for an overall difference of association between the sexes is given.

		OR (95% c.i.)			
Locus	SNP	Iceland Discovery	Iceland replication	Holland	P
<b>Blue vs. brown eyes</b>					
OCA2	rs1667394	28.51 (16.47,49.34)	16.48 (9.63,28.18)	12.60 (7.92,20.03)	0.12
		30.92 (20.97,45.59)	21.66 (13.37,35.10)	24.97 (13.84,45.04)	
OCA2	rs7495174	4.57 (1.34,15.61)	3.65 (1.44,9.27)	6.82 (2.87,16.22)	0.67
		7.48 (3.86,14.50)	7.15 (3.21,15.91)	2.71 (0.81,9.05)	
<b>Blue vs green eyes</b>					
SLC24A4	rs12896399	2.28 (1.55,3.35)	1.63 (1.21,2.19)	2.17 (1.35,3.50)	0.41
		2.07(1.72,2.47)	1.45 (1.20,1.74)	2.05 (1.45,2.92)	
TYR	rs1393350	2.14 (1.38,3.32)	1.23 (0.89,1.70)	1.25 (0.73,2.16)	0.88
		1.44 (1.19,1.75)	1.53 (1.24,1.89)	1.60 (1.08,2.37)	
OCA2	rs1667394	6.18 (2.71,14.08)	3.59 (1.80,7.20)	7.32 (3.28,16.37)	0.16
		7.24 (4.68,11.20)	7.64 (4.90,11.93)	7.75 (3.43,17.51)	
<b>Red vs. not red hair</b>					
MC1R	rs1805008	8.98 (5.06,15.97)	4.54 (3.05,6.77)	2.80 (0.93,8.45)	0.89
		7.60 (5.54,10.42)	4.51 (3.32,6.12)	4.51 (1.83,11.09)	
MC1R	rs1805007	13.82 (7.94,24.04)	5.32 (3.55,7.97)	11.61 (4.63,29.06)	0.56
		12.12 (8.68,16.90)	6.72 (4.92,9.17)	15.97 (6.83,37.32)	
<b>Blond vs. brown hair</b>					
SLC24A4	rs12896399	2.48 (1.77,3.47)	2.02 (1.50,2.74)	2.11 (1.54,2.87)	0.78
		2.60 (2.07,3.26)	2.56 (2.01,3.25)	1.58 (1.10,2.27)	
KITLG	rs12821256	1.95 (1.30,2.93)	1.52 (1.06,2.17)	2.01 (1.25,3.23)	0.030
		2.49 (1.92,3.24)	2.20 (1.65,2.94)	3.26 (1.76,6.05)	
OCA2	rs1667394	6.02 (2.47,14.64)	6.29 (2.81,14.09)	6.20 (3.35,11.45)	0.51
		4.67 (2.79,7.83)	6.07 (3.39,10.86)	4.73 (2.40,9.34)	
MC1R	rs1805008	1.51 (0.84,2.72)	2.56 (1.67,3.93)	2.26 (1.22,4.16)	0.15
		1.91 (1.37,2.66)	1.36 (0.96,1.93)	1.71 (0.93,3.14)	
MC1R	rs1805007	2.39 (1.37,4.14)	2.17 (1.43,3.31)	2.05 (1.08,3.89)	0.31
		2.22 (1.49,3.30)	1.88 (1.30,2.71)	0.91 (0.37,2.27)	
<b>Skin sensitivity to sun</b>					
TYR	rs1393350	1.26 (1.00,1.59)	1.61 (1.31,1.98)	1.08 (0.84,1.38)	0.66
		1.26 (1.08,1.46)	1.42 (1.19,1.69)	1.15 (0.87,1.52)	
MC1R	rs1805008	2.05 (1.46,2.86)	2.42 (1.89,3.09)	2.03 (1.38,3.01)	0.18
		2.38 (1.95,2.90)	1.85 (1.50,2.28)	1.26 (0.82,1.95)	
MC1R	rs1805007	2.40 (1.69,3.41)	2.30 (1.77,3.00)	1.84 (1.20,2.82)	0.060
		3.33 (2.63,4.23)	2.70 (2.15,3.40)	2.56 (1.47,4.46)	
<b>Freckles</b>					
6P25.3	rs1540771	1.45 (1.18,1.79)	1.18 (0.99,1.41)	1.22 (0.97,1.54)	0.53
		1.41 (1.23,1.61)	1.30 (1.11,1.52)	1.36 (1.06,1.74)	
TYR	rs1042602	1.16 (0.93,1.46)	1.16 (0.95,1.42)	1.44 (1.13,1.84)	0.15
		1.41 (1.22,1.63)	1.61 (1.35,1.91)	1.01 (0.78,1.30)	
MC1R	rs1805008	2.81 (2.02,3.92)	2.66 (2.08,3.40)	2.04 (1.36,3.04)	0.50
		2.53 (2.07,3.09)	2.41 (1.92,3.01)	2.14 (1.37,3.33)	
MC1R	rs1805007	5.18 (3.63,7.41)	2.62 (2.02,3.40)	4.18 (2.71,6.46)	0.69
		4.26 (3.31,5.49)	2.64 (2.05,3.40)	4.64 (2.57,8.37)	

**Supplementary Table 5.** The fraction of the variance of various phenotypes explained by the previously reported variants, by the new variants (after accounting for the previously reported ones), and by all the variants combined. All traits were treated as two class categorical variables, except hair shade which was treated as a quantitative variable (scoring blond hair as 1, dark blond or light brown hair as 2, and brown or black hair as 3).

Phenotypes	MC1R and OCA2		SLC24A4, TYR, KITLG and 6p25.3		All loci	
	Iceland	Holland	Iceland	Holland	Iceland	Holland
Blue vs. brown eyes	47.2	47.7	1.0	0.9	47.7	48.2
Blue vs. green eyes	7.7	10.0	4.4	5.9	11.8	15.3
Brown vs. green eyes	26.7	17.8	0	2.7	26.7	20.0
Red hair	29.0	26.0	0	0	29.0	26.0
Hair shade (minus red)	7.2	7.3	5.9	3.2	12.7	10.2
Skin sensitivity to sun	7.9	2.6	1.6	0.8	9.4	3.4
Freckles	9.7	8.9	1.9	1.0	11.4	9.8

**Supplementary Table 6.** Inflation factors on  $\chi^2$  scale for each genome-wide association scan performed. The mean genomic inflation factor was used to correct  $P$  values.

Test	Mean genomic $\chi^2$	Median genomic $\chi^2$	Genealogy simulated $\chi^2$
Blue vs. brown eyes	1.15	1.12	1.12
Blue vs. green eyes	1.11	1.11	1.09
Red hair	1.14	1.13	1.10
Blond vs. brown hair	1.18	1.17	1.14
Skin sensitivity to sun	1.11	1.11	1.08
Freckles	1.14	1.13	1.11

**Supplementary table 7.** - Primers sequences for SNPs in Tables 2, 3 and 4.

<b>SNP</b>	<b>Forward_primer</b>	<b>Reverse_primer</b>	<b>VIC-Probe</b>	<b>FAM-Probe</b>	<b>Enhancer</b>
rs12896399	AGCCCTGGGTCTTGATGTTGTA	ATCTGGCGA*TCCA*ATTCTTTGT	GACAAAGAGAAC	GACAAAGAGACC	CAAAATATACTGACCTAAA
rs12821256	CAGGTGTGAAGTTGTGTGGCAGAA	GTCATAAAGTTCCCTGGAGCCAAG	TTTCCT*T*TAGTG	TTTCCT*TTAGCG	GCCGTAGTAACATG
rs1540771	ACA*CACGTGA*TAGACTG	ACA*GTA*ACCTGTGGAC	AGCT*CAGCC	AGCT*CA*ACC	ACTCGTGCAGTTC
rs1393350	GGTGAATGATA*ACA*CGAACAGATT	GA*TGCGTGCATATCCACCAACT	ACACAGATTTTCG	CACACAGATTTTG	TGCAGAGAAGG*GA
rs1042602	GCATTATTATGTGTCAATGGATGCACTGCT	CGCAACAAGAAGAGTCTATGCCAAG	GG*GGATCTGA	TGG*GG*GATATGA	ATCTGGAGAGACATT
rs1667394	TCCACCATTAAAGACGCAGCAATTCAA	GAGACTTTGAGGTCTCCAAC	GCA*TA*CAC	A*CGTGCATATAC	AAACAAACAAAGAAACAA
rs7495174	GGCTTAGGAAGCAAGGCAAGTT	TGGGTCGCCTGGCAGAGAG	CCTAAA*GGTCA	CCCTA*AAGGTTA	TGTGCACAGACG



**Supplementary Table 8.** Correction factors for on  $\chi^2$  scale based on the first 10 principal components calculated using the EIGENSTRAT software package.

<b>Test</b>	<b><math>0.05 \geq P &gt; 10^{-5}</math></b>	<b><math>10^{-5} \geq P &gt; 10^{-7}</math></b>	<b><math>10^{-7} &gt; P</math></b>
Blue vs. brown eyes	1.049	1.044	1.027
Blue vs. green eyes	1.030	0.972	1.048
Red hair	1.048	1.063	1.005
Blond vs. brown hair	1.074	1.059	1.028
Skin sensitivity to sun	1.027	1.007	1.002
Freckles	1.053	1.000	0.999

**Supplementary Table 9.** Allele frequency of variants among different populations.

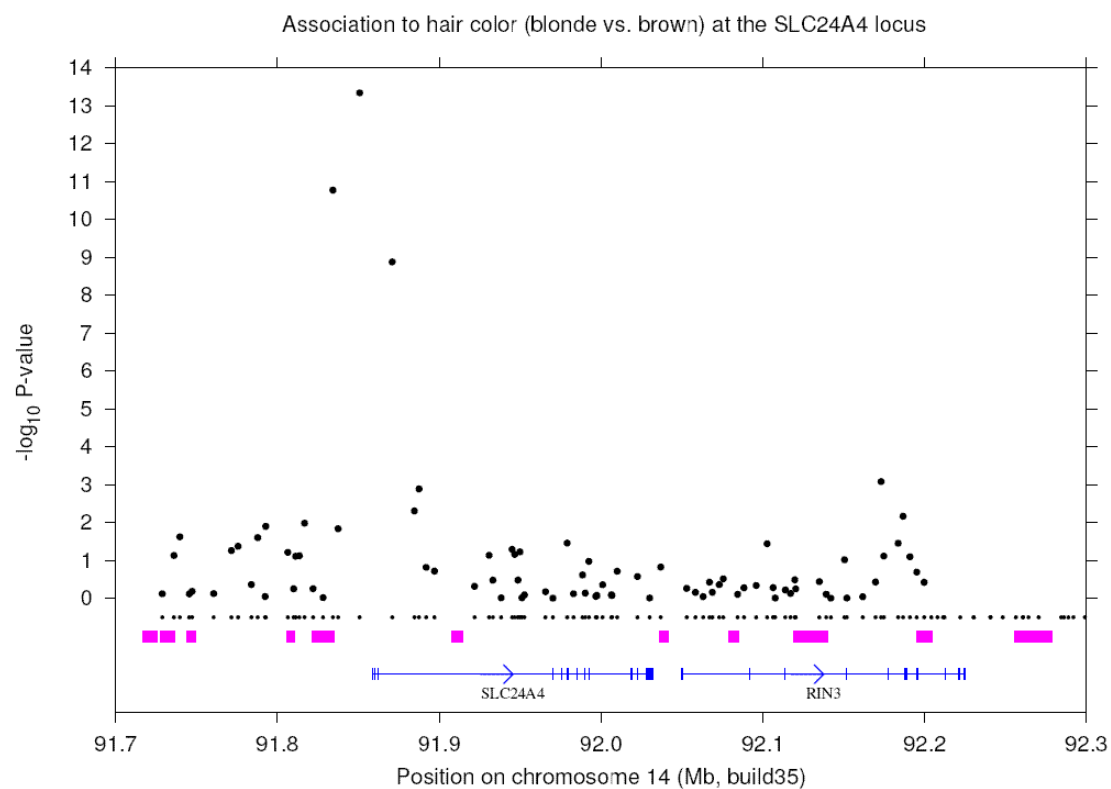
<b>Locus</b>	<b>SLC24A4</b>	<b>KITLG</b>	<b>SEC5L1</b>	<b>TYR</b>	<b>TYR</b>	<b>OCA2</b>	<b>MC1R</b>	<b>MC1R</b>
<b>SNP</b>	<b>rs12896399</b>	<b>rs12821256</b>	<b>rs1540771</b>	<b>rs1393350</b>	<b>rs1042602</b>	<b>rs1667394</b>	<b>rs1805008</b>	<b>rs1805007</b>
<b>Allele</b>	<b>T</b>	<b>C</b>	<b>A</b>	<b>A</b>	<b>C</b>	<b>A</b>	<b>T</b>	<b>T</b>
Population								
N								
Iceland	54	19	46	29	70	94	14	10
13,264								
Holland	48	12	45	25	63	88	8	6
1,214								
US <sup>a</sup>	-	10	48	26	64	85	-	-
2,276								
CEU <sup>b</sup>	60	14	58	19	58	87	8	14
60								
CHB <sup>b</sup>	21	0	25	0	100	20	0	0
45								
JPT <sup>b</sup>	58	0	36	0	100	14	0	0
45								
YRI <sup>b</sup>	1	0	5	0	100	5	0	0
60								
Pigment effect	Blond Blue vs. green eye	Blond	Freckle	Blue vs. green eye	Freckle	Blond Blue eye	Red hair Fair skin Freckles	Red hair Fair skin Freckles

<sup>a</sup>Cancer Genetic Markers of Susceptibility (CGEMS)

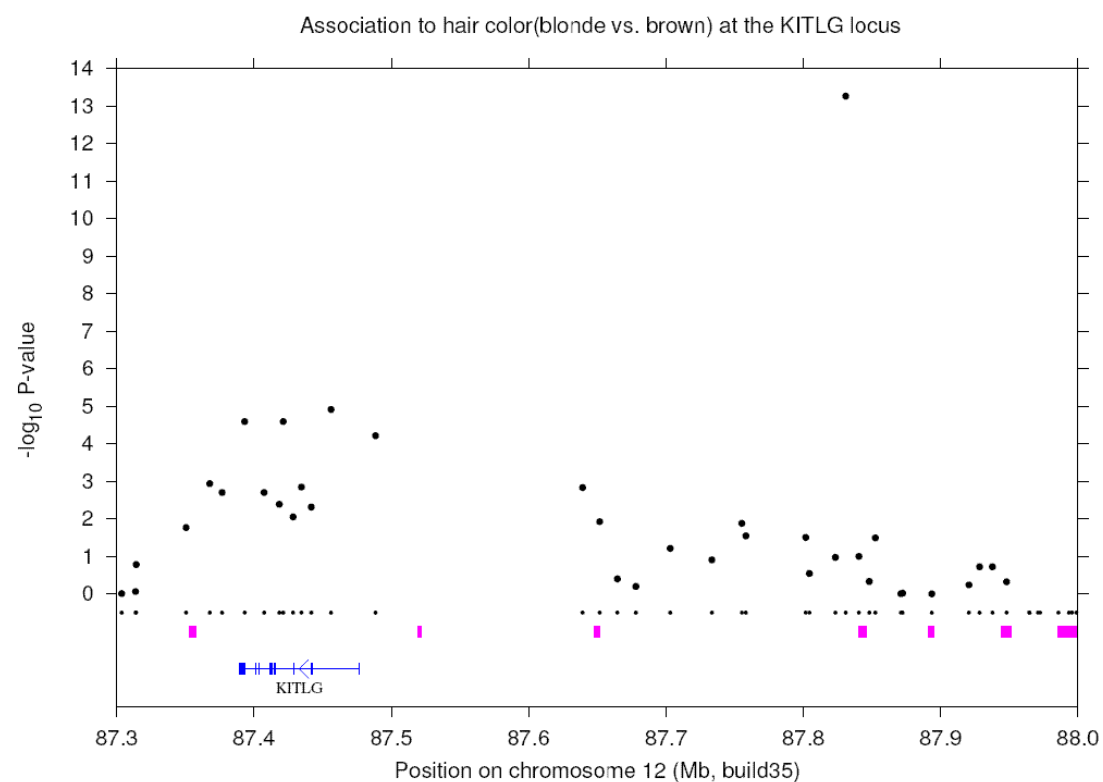
<sup>b</sup>Hapmap populations

**Supplementary Figure 1-6.** Allelic association of Illumina SNP's with main skin and eye pigmentation characteristics. The small horizontal dots show all the genotyped SNP's indicating the coverage of each genomic region. The large dots correspond to the SNP's tested for association. The recombination hot spots are shown by the red strips. Genes are represented by the blue lines, with the exons as thin vertical bars and with an arrow in the direction of transcription. The graphical description of the genes was simplified in Figure 5.

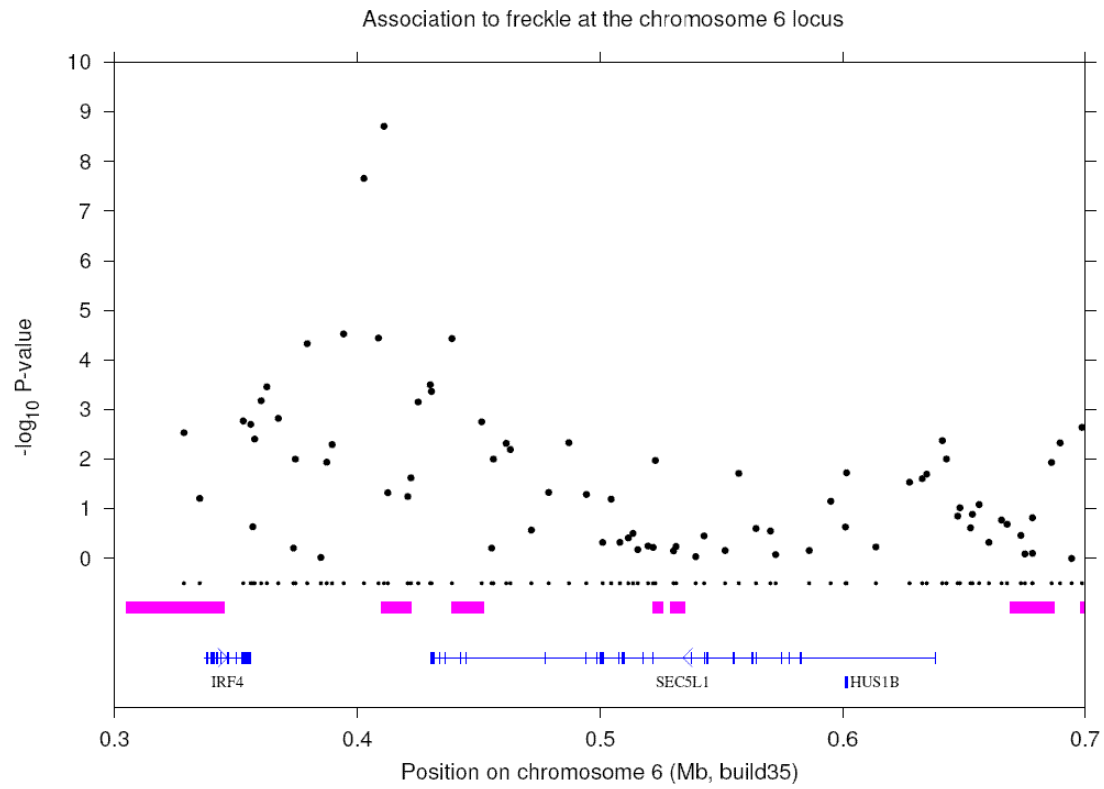
**Supplementary Figure 1.**



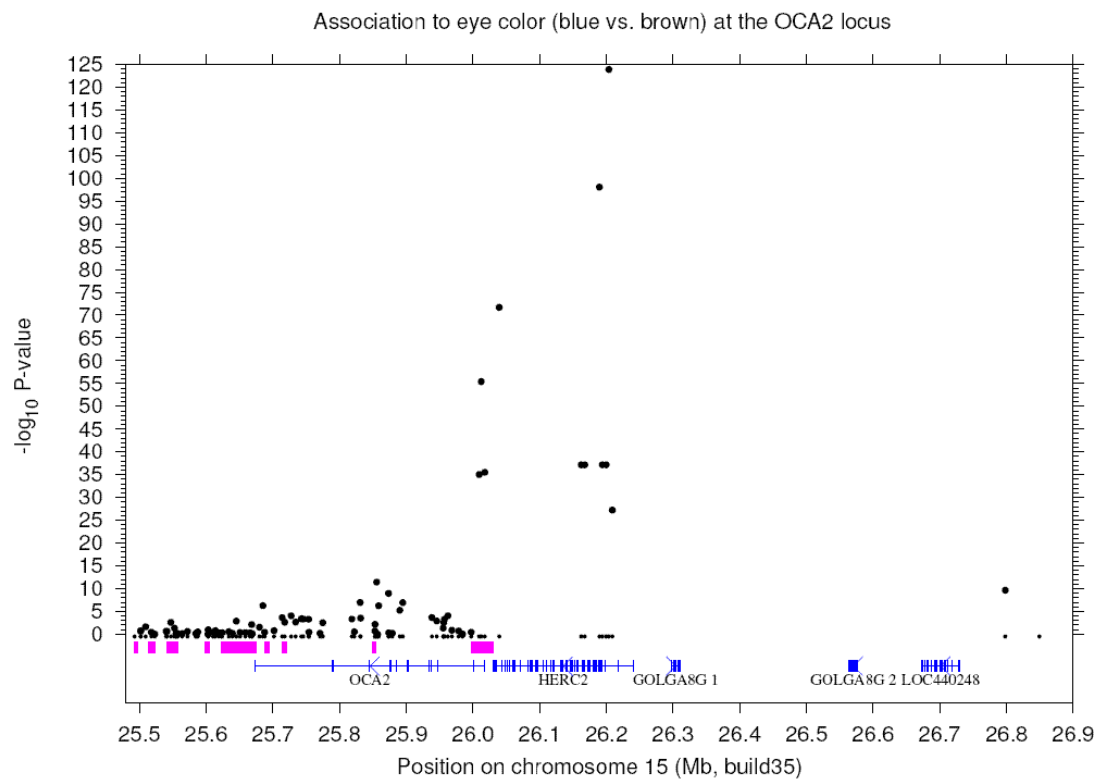
**Supplementary Figure 2.**



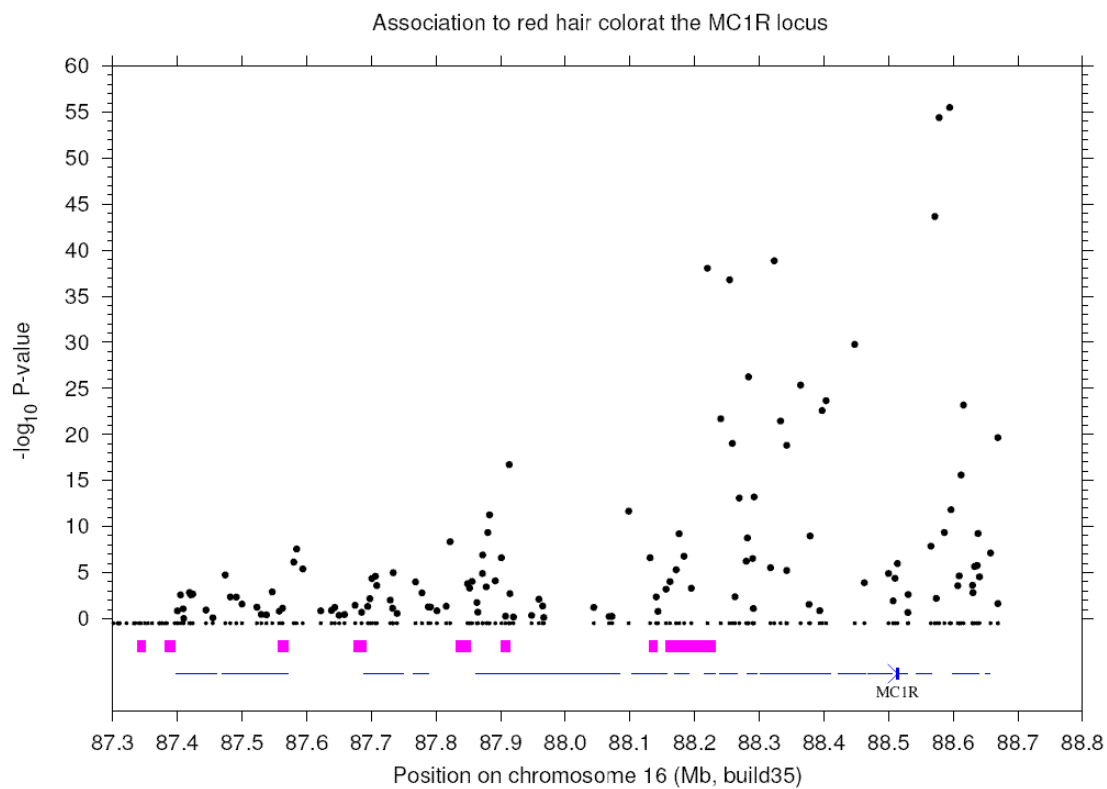
**Supplementary Figure 3.**



**Supplementary Figure 4.**



**Supplementary Figure 5.**



**Supplementary Figure 6.**

