**Supplementary File 1**

Supplementary file 1A: 21 genes are within in the QTL interval. Start and end positions shown are on scaffold 206 in the yellow *A. plantaginis* reference genome. Gene sequences were blasted against *Heliconius melpomene* and searched for in Flybase. Apla gene names from annotations produced by Yen et al. (2020).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Apla gene name (yellow ref)** | **Hmel gene hit** | **% identical** | **Hmel chr** | **Dmel gene hit** | **Blast score** | **E value** |
| jg6722 | HMEL032761g1.t1 | 45.8 | 15 | kis-PF | [29.261](http://flybase.org/blast/checkJobStatus.html?jobHash=6e143a76e760765cbfdf28a82b334ae1#gnl|dmel|FBpp0300575) | 3.32994 |
| jg6723 | unknown |  |  |  |  |  |
| jg6724 | unknown |  |  |  |  |  |
| jg6725 | HMEL032764g1.t1 | 80.9 | 15 | CG9853-PC | [234.958](http://flybase.org/blast/checkJobStatus.html?jobHash=a9ff65e4dab5266fff007104742a99d2#gnl|dmel|FBpp0310621) | 7.86E-62 |
| jg6726 | HMEL004965g1.t1 | 68.7 | 15 | CG8128-PB | [240.736](http://flybase.org/blast/checkJobStatus.html?jobHash=7c030f2178249064278f86d68804bdfa#gnl|dmel|FBpp0309990) | 9.40E-64 |
| jg6727 | HMEL004965g1.t1 | 61.2 | 15 | CG8128-PB | [240.736](http://flybase.org/blast/checkJobStatus.html?jobHash=7c030f2178249064278f86d68804bdfa#gnl|dmel|FBpp0309990) | 9.40E-64 |
| jg6728 | HMEL004964g1.t1 | 43.6 | 15 | CG6262-PA | [29.261](http://flybase.org/blast/checkJobStatus.html?jobHash=297770370a6d936d91a2aaf63bc17606#gnl|dmel|FBpp0086296) | 0.764596 |
| jg6729 | unknown |  |  |  |  |  |
| jg6730 | unknown |  |  |  |  |  |
| jg6731 | HMEL004962g1.t1 | 81.4 | 15 | dimm-PB | [105.145](http://flybase.org/blast/checkJobStatus.html?jobHash=f89705351f38b6a23de2e107c120dd26#gnl|dmel|FBpp0305546) | 4.56E-23 |
| jg6732 | HMEL016957g1.t1 | 62.4 | 19 | CkIalpha-PG | [512.301](http://flybase.org/blast/checkJobStatus.html?jobHash=d8d29048cfcfa473948815130098f679#gnl|dmel|FBpp0311373) | 2.35E-145 |
| jg6733 | unknown |  |  |  |  |  |
| jg6734 | HMEL004960g1.t1 | 69.7 | 15 | CG7322-PC | [184.882](http://flybase.org/blast/checkJobStatus.html?jobHash=aa75bbe8d98381994144cc9e71586fa8#gnl|dmel|FBpp0311891) | 5.40E-47 |
| jg6735 | HMEL032767g1.t1 | 85.2 | 15 | CG7322-PC | [209.92](http://flybase.org/blast/checkJobStatus.html?jobHash=c465ef5abc34dbbbc05a669c2516ffee#gnl|dmel|FBpp0311891) | 1.57E-54 |
| jg6736 | HMEL010407g1.t1 | 75 | 15 | CG10311-PB | [142.51](http://flybase.org/blast/checkJobStatus.html?jobHash=58f088ab99dcbb94f5c447461033df94#gnl|dmel|FBpp0311397) | 1.76E-34 |
| jg6737 | HMEL032770g1.t1 | 59.7 | 15 | CG34307-PB | [39.2762](http://flybase.org/blast/checkJobStatus.html?jobHash=3e2f188daef4070c8410f478aecee7b1#gnl|dmel|FBpp0290301) | 0.00975671 |
| jg6738 | HMEL010409g1.t1 | 72.1 | 15 | yellow h |  |  |
| jg6739 | HMEL010409g1.t1 | 46 | 15 | yellow h | [112.464](http://flybase.org/blast/checkJobStatus.html?jobHash=46399e568c8870693705ddd2e06234c3#gnl|dmel|FBpp0088184) | 1.74E-25 |
| jg6740 | HMEL032771g1.t1 | 76 | 15 | CG8401-PB | [35.8094](http://flybase.org/blast/checkJobStatus.html?jobHash=a96cc187afd39a50184f3c9c5e34d281#gnl|dmel|FBpp0290414) | 0.0810412 |
| jg6741 | HMEL002092g1.t1 | 68.4 | 15 | yellow d2 | [290.426](http://flybase.org/blast/checkJobStatus.html?jobHash=e94fe84f418e393c4f308641f176adeb#gnl|dmel|FBpp0071921) | 2.27E-78 |
| jg6742 | HMEL032773g1.t1 | 86.7 | 15 | yellow e | [387.882](http://flybase.org/blast/checkJobStatus.html?jobHash=48e62e2987412b3d161e5b97bf1e273b#gnl|dmel|FBpp0082225) | 8.79E-108 |

Supplementary file 1B: Primers used for genotyping. Tested using GoTaq Flexi buffer and GoTaq DNA polymerase, with annealing temperature of 57oC for 35 cycles. ‘Ye12’ primers surround a small deletion in white alleles, producing a 163bp product from Y alleles and 128bp product from W alleles. ‘Dup5’ primers amplify a 449bp sequence within the duplicated sequence only in moths with at least one W allele. See Appendix figure 1 for gel images.

|  |  |  |  |
| --- | --- | --- | --- |
| **Primer name** | **Primer sequence** | **Position in YY genome** | **Position in WW genome** |
| ye12\_F | ATGGCCGATTACGTCTTACGAC | YY\_tarseq\_206\_arrow:9846212 | WW\_tarseq\_419\_arrow:7150189 |
| ye12\_R | CAACTAAATACAAAGTAGCTTCCCT | YY\_tarseq\_206\_arrow:9846375 | WW\_tarseq\_419\_arrow:7150353 |
| dup5C\_f | ACTGACGTTTGTTTTGTCCCAA | NA | WW\_tarseq\_419\_arrow:7052355 |
| dup5D\_R | GGTGTGCATATTCCTGCTGT | NA | WW\_tarseq\_419\_arrow:7052785 |

Supplementary file 1C: List of differentially expressed genes found in the linkage group containing scaffold 419 (WW reference).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ***A. pla. genes*** | ***Scaffold*** | ***Orthogroup*** | ***D. mel. gene id*** | ***D. mel. gene name*** | ***logFC*** | ***adj.P.Val*** | ***Stage*** |
| *jg14802* | WW\_tarseq\_540\_arrow | OG0000503 | NP\_651812.1, NP\_001263113.1, NP\_001189282.1 | epidermal stripes and patches, isoform B [Drosophila melanogaster] | 3.04 | 0.04 | premel |
| *jg15101* | WW\_tarseq\_540\_arrow | OG0000975 | NP\_001260005.1 | uncharacterized protein Dmel\_CG43707, isoform E [Drosophila melanogaster] | -3.88 | 0 | mel |
| *jg1308* | WW\_tarseq\_419\_arrow | OG0001450 | NP\_524344.1 | yellow-e | 10.31 | 0.01 | premel |
| *jg1310* | WW\_tarseq\_419\_arrow | OG0001450 | NP\_524344.1 | yellow-e | 3.86 | 0.02 | premel |
| *jg2035* | WW\_tarseq\_531\_arrow | OG0007293 | NP\_732407.1 | cryptochrome [Drosophila melanogaster] | 2.95 | 0.05 | premel |
| *jg15103* | WW\_tarseq\_540\_arrow | OG0007341 | NP\_609535.1 | WD repeat domain 81 [Drosophila melanogaster] | 1.64 | 0.02 | 72h |
| *jg15168* | WW\_tarseq\_540\_arrow | OG0007353 | NP\_572341.1 | uncharacterized protein Dmel\_CG3184 [Drosophila melanogaster] | 2.21 | 0.03 | 5days |
| *jg1153* | WW\_tarseq\_419\_arrow |  |  |  | -6.95 | 0 | mel |
| *jg14032* | WW\_tarseq\_487\_arrow |  |  |  | -1.7 | 0.04 | premel |
| *jg2034* | WW\_tarseq\_531\_arrow |  |  |  | 2.49 | 0.04 | premel |
| *jg8680* | WW\_tarseq\_472\_arrow |  |  |  | 3.42 | 0 | 5days |
| *jg9028* | WW\_tarseq\_472\_arrow |  |  |  | 3.24 | 0.04 | mel |

Supplementary file 1D: Details of the number of eggs injected with each sgRNA and those which produced adult moths.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **sgRNAs** | **Number\_eggs\_injected** | **Number\_larvae** | **Percentage\_hatched** | **Number\_pupae** | **Number\_adults** | **Hatched\_to\_adult**  **percentage** | **Percentage of emerged adults with phenotype** |
| Val1A | 109 | 29 | 26.61 | 3 | 2 | 6.9 | 100% inc. pupa |
| Val2A | 58 | 21 | 36.21 | 0 | 0 | 0.0 |  |
| Val2B | 112 | 8 | 7.14 | 1 | 1 | 12.5 | 100% (mosaic female) |
| Val3A | 216 | 11 | 5.09 | 2 | 2 | 18.2 | 50% |
| Val3B | 309 | 20 | 6.47 | 2 | 1 | 5.0 | 100% inc. pupa |
| Val1A + Val2A | 65 | 4 | 6.15 | 0 | 0 | 0.0 |  |
| Val1A + Val2B | 21 | 6 | 28.57 | 0 | 0 | 0.0 |  |
| Val1A + Val3A | 61 | 5 | 8.20 | 0 | 0 | 0.0 |  |
| Val2A + Val2B | 55 | 9 | 16.36 | 0 | 0 | 0.0 |  |
| Val2B + Val3A | 49 | 6 | 12.24 | 0 | 0 | 0.0 |  |
| Val3A + Val2B | 53 | 17 | 32.08 | 0 | 0 | 0.0 |  |
| Val3A + Val3B | 115 | 6 | 5.22 | 0 | 0 | 0.0 |  |

Supplementary file 1E: Sample list of all lab cross individuals used in linkage mapping.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID** | **Sex** | **Genotype** | **Family number** | **Generation** | **Total sequenced reads** | **YY mapped reads** | **YY % mapped reads** | **YY duplication** | **YY reads retained after deduplication** | **WW mapped reads** | **WW % mapped** | **WW duplication** | **WW reads retained after deduplication** |
| FI17\_3\_34\_1 | m | WY | 29 | Parent | 2955970 | 2715026 | 91.849 | 0.855 | 393347 | 2748494 | 92.98 | 0.80 | 544140 |
| FI17\_3\_83\_11 | f | YY | 29 | Parent | 3197702 | 3136607 | 98.089 | 0.841 | 499345 | 3147370 | 98.43 | 0.76 | 823864 |
| FI18\_1\_29\_1 | m | YY | 29 | F1 | 1999390 | 1946873 | 97.373 | 0.824 | 342770 | 1971086 | 98.58 | 0.83 | 342138 |
| FI18\_1\_29\_101 | m | YY | 29 | F1 | 2361064 | 2248858 | 95.248 | 0.820 | 404408 | 2277871 | 96.48 | 0.82 | 404261 |
| FI18\_1\_29\_11 | m | YY | 29 | F1 | 2068918 | 2015804 | 97.433 | 0.827 | 348902 | 2042671 | 98.73 | 0.83 | 348176 |
| FI18\_1\_29\_19 | m | WY | 29 | F1 | 1146544 | 1115347 | 97.279 | 0.744 | 285992 | 1130950 | 98.64 | 0.75 | 285547 |
| FI18\_1\_29\_2 | m | YY | 29 | F1 | 3529048 | 3407536 | 96.557 | 0.827 | 590114 | 3454443 | 97.89 | 0.83 | 591096 |
| FI18\_1\_29\_23 | m | YY | 29 | F1 | 1283616 | 1242794 | 96.820 | 0.740 | 323494 | 1259702 | 98.14 | 0.74 | 323404 |
| FI18\_1\_29\_27 | m | YY | 29 | F1 | 2399278 | 2331282 | 97.166 | 0.788 | 493892 | 2364010 | 98.53 | 0.79 | 494821 |
| FI18\_1\_29\_32 | m | YY | 29 | F1 | 1816056 | 1767863 | 97.346 | 0.816 | 325860 | 1789547 | 98.54 | 0.82 | 324933 |
| FI18\_1\_29\_33 | m | YY | 29 | F1 | 2164252 | 2100526 | 97.056 | 0.768 | 487796 | 2130653 | 98.45 | 0.77 | 488153 |
| FI18\_1\_29\_38 | m | WY | 29 | F1 | 3748912 | 3647923 | 97.306 | 0.870 | 473781 | 3697017 | 98.62 | 0.87 | 471901 |
| FI18\_1\_29\_39 | m | YY | 29 | F1 | 1695450 | 1237858 | 73.011 | 0.740 | 321648 | 1254382 | 73.99 | 0.74 | 321608 |
| FI18\_1\_29\_4 | m | WY | 29 | F1 | 1659596 | 1617162 | 97.443 | 0.810 | 307254 | 1637651 | 98.68 | 0.81 | 306746 |
| FI18\_1\_29\_41 | m | WY | 29 | F1 | 1067638 | 1035473 | 96.987 | 0.703 | 307780 | 1050028 | 98.35 | 0.71 | 307601 |
| FI18\_1\_29\_43 | m | WY | 29 | F1 | 1180652 | 1130239 | 95.730 | 0.756 | 276252 | 1145620 | 97.03 | 0.76 | 275715 |
| FI18\_1\_29\_44 | m | WY | 29 | F1 | 2891056 | 2818722 | 97.498 | 0.820 | 506972 | 2854834 | 98.75 | 0.82 | 507386 |
| FI18\_1\_29\_46 | m | YY | 29 | F1 | 3147978 | 3067342 | 97.438 | 0.820 | 551441 | 3107076 | 98.70 | 0.82 | 552171 |
| FI18\_1\_29\_49 | m | WY | 29 | F1 | 794124 | 770168 | 96.983 | 0.686 | 241694 | 780562 | 98.29 | 0.69 | 241493 |
| FI18\_1\_29\_58 | m | YY | 29 | F1 | 2893010 | 1473576 | 50.936 | 0.706 | 432618 | 1496051 | 51.71 | 0.71 | 433794 |
| FI18\_1\_29\_6 | m | YY | 29 | F1 | 3159060 | 3034452 | 96.056 | 0.814 | 564750 | 3077094 | 97.41 | 0.82 | 565680 |
| FI18\_1\_29\_60 | m | WY | 29 | F1 | 1415616 | 1369725 | 96.758 | 0.762 | 326207 | 1388092 | 98.06 | 0.77 | 326034 |
| FI18\_1\_29\_65 | m | YY | 29 | F1 | 3140294 | 3051117 | 97.160 | 0.841 | 484739 | 3093059 | 98.50 | 0.84 | 484175 |
| FI18\_1\_29\_68 | m | YY | 29 | F1 | 2696202 | 2626553 | 97.417 | 0.855 | 381758 | 2657543 | 98.57 | 0.86 | 380774 |
| FI18\_1\_29\_74 | m | YY | 29 | F1 | 1449948 | 1413194 | 97.465 | 0.777 | 314744 | 1431318 | 98.72 | 0.78 | 313807 |
| FI18\_1\_29\_76 | m | YY | 29 | F1 | 2531304 | 2418112 | 95.528 | 0.853 | 355571 | 2447038 | 96.67 | 0.85 | 354981 |
| FI18\_1\_29\_78 | m | YY | 29 | F1 | 1678066 | 1625019 | 96.839 | 0.779 | 359452 | 1647238 | 98.16 | 0.78 | 359548 |
| FI18\_1\_29\_82 | m | YY | 29 | F1 | 3198008 | 3097633 | 96.861 | 0.858 | 439408 | 3136758 | 98.08 | 0.86 | 438710 |
| FI18\_1\_29\_83 | m | YY | 29 | F1 | 3006038 | 2866236 | 95.349 | 0.830 | 486751 | 2907742 | 96.73 | 0.83 | 485152 |
| FI18\_1\_29\_84 | m | WY | 29 | F1 | 1520480 | 1481081 | 97.409 | 0.789 | 312609 | 1499436 | 98.62 | 0.79 | 312154 |
| FI18\_1\_29\_88 | m | YY | 29 | F1 | 2657610 | 2587124 | 97.348 | 0.822 | 460265 | 2620810 | 98.62 | 0.82 | 460215 |
| FI18\_1\_29\_9 | m | WY | 29 | F1 | 1554302 | 1504346 | 96.786 | 0.772 | 343716 | 1525473 | 98.15 | 0.77 | 343466 |
| FI18\_1\_29\_93 | m | WY | 29 | F1 | 1737742 | 1691286 | 97.327 | 0.810 | 321434 | 1712318 | 98.54 | 0.81 | 320585 |
| FI18\_1\_29\_95 | m | WY | 29 | F1 | 2188534 | 2058702 | 94.068 | 0.815 | 381273 | 2085456 | 95.29 | 0.82 | 380670 |
| FI18\_1\_29\_98 | m | YY | 29 | F1 | 2821014 | 1951884 | 69.191 | 0.755 | 478442 | 1980282 | 70.20 | 0.76 | 479244 |
| FI17\_3\_71\_3 | m | WY | 30 | Parent | 4317516 | 4162243 | 96.404 | 0.853 | 613865 | 4224077 | 97.84 | 0.80 | 830911 |
| FI17\_3\_81\_4 | f | YY | 30 | Parent | 3107120 | 3026320 | 97.400 | 0.857 | 433556 | 3040627 | 97.86 | 0.75 | 541186 |
| FI18\_1\_30\_106 | m | WY | 30 | F1 | 2715010 | 2053347 | 75.629 | 0.790 | 431541 | 2083411 | 76.74 | 0.79 | 431795 |
| FI18\_1\_30\_11 | m | WY | 30 | F1 | 2869392 | 2778003 | 96.815 | 0.848 | 423555 | 2815377 | 98.12 | 0.85 | 422981 |
| FI18\_1\_30\_12 | m | WY | 30 | F1 | 2973814 | 2844480 | 95.651 | 0.834 | 473217 | 2886012 | 97.05 | 0.84 | 471277 |
| FI18\_1\_30\_14 | m | WY | 30 | F1 | 4478234 | 2564695 | 57.270 | 0.832 | 431954 | 2601818 | 58.10 | 0.83 | 430023 |
| FI18\_1\_30\_18 | m | WY | 30 | F1 | 1599220 | 1555974 | 97.296 | 0.818 | 283223 | 1577278 | 98.63 | 0.82 | 281921 |
| FI18\_1\_30\_2 | m | YY | 30 | F1 | 3022868 | 2785048 | 92.133 | 0.823 | 492599 | 2823454 | 93.40 | 0.83 | 492254 |
| FI18\_1\_30\_24 | m | WY | 30 | F1 | 1825228 | 1516006 | 83.058 | 0.794 | 311592 | 1538155 | 84.27 | 0.80 | 310094 |
| FI18\_1\_30\_3 | m | YY | 30 | F1 | 1734848 | 1022616 | 58.946 | 0.809 | 195239 | 1034509 | 59.63 | 0.81 | 193181 |
| FI18\_1\_30\_30 | m | WY | 30 | F1 | 2787488 | 2698920 | 96.823 | 0.801 | 536756 | 2740534 | 98.32 | 0.80 | 535060 |
| FI18\_1\_30\_32 | m | YY | 30 | F1 | 2379786 | 2315421 | 97.295 | 0.827 | 400142 | 2349891 | 98.74 | 0.83 | 398925 |
| FI18\_1\_30\_36 | m | WY | 30 | F1 | 1527360 | 1339985 | 87.732 | 0.774 | 303226 | 1359367 | 89.00 | 0.78 | 302162 |
| FI18\_1\_30\_4 | m | WY | 30 | F1 | 2383670 | 2321238 | 97.381 | 0.836 | 381226 | 2352819 | 98.71 | 0.84 | 379064 |
| FI18\_1\_30\_40 | m | WY | 30 | F1 | 2346222 | 2284549 | 97.371 | 0.843 | 359175 | 2315827 | 98.70 | 0.85 | 356863 |
| FI18\_1\_30\_42 | m | YY | 30 | F1 | 1070592 | 1038205 | 96.975 | 0.768 | 241165 | 1053339 | 98.39 | 0.77 | 240238 |
| FI18\_1\_30\_43 | m | YY | 30 | F1 | 1972550 | 1918571 | 97.263 | 0.821 | 343546 | 1946119 | 98.66 | 0.82 | 342191 |
| FI18\_1\_30\_5 | m | WY | 30 | F1 | 1426882 | 1367090 | 95.810 | 0.788 | 290415 | 1387392 | 97.23 | 0.79 | 289031 |
| FI18\_1\_30\_52 | m | WY | 30 | F1 | 5053696 | 4514518 | 89.331 | 0.892 | 487534 | 4574384 | 90.52 | 0.89 | 481237 |
| FI18\_1\_30\_53 | m | YY | 30 | F1 | 2230112 | 2171645 | 97.378 | 0.818 | 396180 | 2196873 | 98.51 | 0.82 | 397275 |
| FI18\_1\_30\_54 | m | YY | 30 | F1 | 3919162 | 3799033 | 96.935 | 0.883 | 443179 | 3851217 | 98.27 | 0.89 | 436759 |
| FI18\_1\_30\_55 | m | WY | 30 | F1 | 2322312 | 2192761 | 94.421 | 0.818 | 399266 | 2223184 | 95.73 | 0.82 | 398852 |
| FI18\_1\_30\_56 | m | WY | 30 | F1 | 1114538 | 1082869 | 97.159 | 0.733 | 288835 | 1098673 | 98.58 | 0.74 | 288058 |
| FI18\_1\_30\_57 | m | WY | 30 | F1 | 3931316 | 3777836 | 96.096 | 0.868 | 500346 | 3827592 | 97.36 | 0.87 | 496429 |
| FI18\_1\_30\_62 | m | WY | 30 | F1 | 2868180 | 2791424 | 97.324 | 0.835 | 459977 | 2830970 | 98.70 | 0.84 | 456986 |
| FI18\_1\_30\_63 | m | YY | 30 | F1 | 1461576 | 1423021 | 97.362 | 0.790 | 299500 | 1441196 | 98.61 | 0.79 | 299667 |
| FI18\_1\_30\_65 | m | WY | 30 | F1 | 1866314 | 1812580 | 97.121 | 0.827 | 314087 | 1838963 | 98.53 | 0.83 | 312070 |
| FI18\_1\_30\_66 | m | WY | 30 | F1 | 3043110 | 2936318 | 96.491 | 0.896 | 305921 | 2970116 | 97.60 | 0.90 | 301052 |
| FI18\_1\_30\_75 | m | WY | 30 | F1 | 2295070 | 2216385 | 96.572 | 0.813 | 414891 | 2249790 | 98.03 | 0.82 | 413818 |
| FI18\_1\_30\_8 | m | WY | 30 | F1 | 3093078 | 2659531 | 85.983 | 0.789 | 562165 | 2701905 | 87.35 | 0.79 | 561879 |
| FI18\_1\_30\_80 | m | WY | 30 | F1 | 2270474 | 2167775 | 95.477 | 0.785 | 465533 | 2201415 | 96.96 | 0.79 | 464124 |
| FI18\_1\_30\_84 | m | WY | 30 | F1 | 3155708 | 3061936 | 97.028 | 0.832 | 515203 | 3109723 | 98.54 | 0.84 | 512912 |
| FI18\_1\_30\_88 | m | WY | 30 | F1 | 2060846 | 1877502 | 91.103 | 0.831 | 318137 | 1904332 | 92.41 | 0.83 | 316669 |
| FI18\_1\_30\_89 | m | WY | 30 | F1 | 4167516 | 3948027 | 94.733 | 0.859 | 557287 | 4006846 | 96.14 | 0.86 | 553226 |
| FI18\_1\_30\_9 | m | WY | 30 | F1 | 145926 | 139007 | 95.259 | 0.468 | 73949 | 141042 | 96.65 | 0.48 | 73822 |
| FI18\_1\_30\_90 | m | YY | 30 | F1 | 1286248 | 1252107 | 97.346 | 0.767 | 291522 | 1270035 | 98.74 | 0.77 | 291225 |
| FI18\_1\_30\_91 | m | WY | 30 | F1 | 2326852 | 2245625 | 96.509 | 0.816 | 412438 | 2279310 | 97.96 | 0.82 | 410759 |
| FI18\_1\_30\_92 | m | YY | 30 | F1 | 1830454 | 1770263 | 96.712 | 0.769 | 408900 | 1796330 | 98.14 | 0.77 | 408877 |
| FI18\_1\_30\_94 | m | YY | 30 | F1 | 3836556 | 3698968 | 96.414 | 0.871 | 478601 | 3743031 | 97.56 | 0.87 | 479708 |
| FI18\_1\_30\_95 | m | WY | 30 | F1 | 4085302 | 3956235 | 96.841 | 0.873 | 501017 | 4013996 | 98.25 | 0.88 | 495944 |
| FI17\_3\_97\_7 | m | WY | 32 | Parent | 5704750 | 3351852 | 58.755 | 0.843 | 525582 | 3400691 | 59.61 | 0.80 | 503529 |
| FI17\_3\_56\_2 | f | YY | 32 | Parent | 12734726 | 2216899 | 17.408 | 0.856 | 318198 | 2224846 | 17.47 | 0.80 | 445434 |
| FI18\_1\_32\_1 | m | WY | 32 | F1 | 2713466 | 2628102 | 96.854 | 0.853 | 386373 | 2661104 | 98.07 | 0.86 | 384355 |
| FI18\_1\_32\_10 | m | WY | 32 | F1 | 3211340 | 3131817 | 97.524 | 0.859 | 440030 | 3169547 | 98.70 | 0.86 | 437076 |
| FI18\_1\_32\_100 | m | WY | 32 | F1 | 2651298 | 2586070 | 97.540 | 0.849 | 390910 | 2619419 | 98.80 | 0.85 | 387892 |
| FI18\_1\_32\_11 | m | WY | 32 | F1 | 2015790 | 1953474 | 96.909 | 0.804 | 382149 | 1979883 | 98.22 | 0.81 | 380754 |
| FI18\_1\_32\_12 | m | YY | 32 | F1 | 2420446 | 2339031 | 96.636 | 0.807 | 452120 | 2371340 | 97.97 | 0.81 | 450573 |
| FI18\_1\_32\_17 | m | WY | 32 | F1 | 2503044 | 2419974 | 96.681 | 0.852 | 358779 | 2450754 | 97.91 | 0.85 | 356650 |
| FI18\_1\_32\_18 | m | YY | 32 | F1 | 1672500 | 1628328 | 97.359 | 0.817 | 297256 | 1648404 | 98.56 | 0.82 | 295997 |
| FI18\_1\_32\_23 | m | YY | 32 | F1 | 2664986 | 2484766 | 93.237 | 0.848 | 377868 | 2516373 | 94.42 | 0.85 | 375861 |
| FI18\_1\_32\_27 | m | YY | 32 | F1 | 2594498 | 2525197 | 97.329 | 0.823 | 447059 | 2559795 | 98.66 | 0.83 | 445908 |
| FI18\_1\_32\_30 | m | YY | 32 | F1 | 1720144 | 1675773 | 97.421 | 0.814 | 311376 | 1697540 | 98.69 | 0.82 | 310141 |
| FI18\_1\_32\_36 | m | WY | 32 | F1 | 2220868 | 2156152 | 97.086 | 0.781 | 473166 | 2186450 | 98.45 | 0.78 | 473939 |
| FI18\_1\_32\_38 | m | WY | 32 | F1 | 2945502 | 2866956 | 97.333 | 0.853 | 421535 | 2906212 | 98.67 | 0.86 | 418895 |
| FI18\_1\_32\_40 | m | WY | 32 | F1 | 1945642 | 1737773 | 89.316 | 0.798 | 350668 | 1761860 | 90.55 | 0.80 | 349957 |
| FI18\_1\_32\_44 | m | YY | 32 | F1 | 2912328 | 2813114 | 96.593 | 0.856 | 406172 | 2849472 | 97.84 | 0.86 | 402462 |
| FI18\_1\_32\_47 | m | WY | 32 | F1 | 1805192 | 1568781 | 86.904 | 0.771 | 360027 | 1591403 | 88.16 | 0.77 | 360198 |
| FI18\_1\_32\_50\_1 | m | WY | 32 | F1 | 2343302 | 2267978 | 96.786 | 0.838 | 367425 | 2296497 | 98.00 | 0.84 | 365773 |
| FI18\_1\_32\_51 | m | WY | 32 | F1 | 2274740 | 2089964 | 91.877 | 0.833 | 348148 | 2115979 | 93.02 | 0.84 | 346551 |
| FI18\_1\_32\_53 | m | YY | 32 | F1 | 1364862 | 1317458 | 96.527 | 0.774 | 297759 | 1334444 | 97.77 | 0.78 | 296711 |
| FI18\_1\_32\_56 | m | YY | 32 | F1 | 2223158 | 2018476 | 90.793 | 0.837 | 328854 | 2044373 | 91.96 | 0.84 | 326572 |
| FI18\_1\_32\_57 | m | YY | 32 | F1 | 2584886 | 2491294 | 96.379 | 0.833 | 416906 | 2523897 | 97.64 | 0.84 | 415749 |
| FI18\_1\_32\_58 | m | YY | 32 | F1 | 2042488 | 1987407 | 97.303 | 0.804 | 389592 | 2015607 | 98.68 | 0.81 | 388087 |
| FI18\_1\_32\_66 | m | WY | 32 | F1 | 2861330 | 2734683 | 95.574 | 0.817 | 500515 | 2772097 | 96.88 | 0.82 | 499501 |
| FI18\_1\_32\_67 | m | YY | 32 | F1 | 2683192 | 2573925 | 95.928 | 0.841 | 408704 | 2607463 | 97.18 | 0.84 | 406990 |
| FI18\_1\_32\_68 | m | YY | 32 | F1 | 2192898 | 2138659 | 97.527 | 0.830 | 363067 | 2165772 | 98.76 | 0.83 | 361189 |
| FI18\_1\_32\_70 | m | YY | 32 | F1 | 2519412 | 2446488 | 97.106 | 0.793 | 507448 | 2482049 | 98.52 | 0.80 | 507378 |
| FI18\_1\_32\_71 | m | YY | 32 | F1 | 3308020 | 3171685 | 95.879 | 0.851 | 472947 | 3212971 | 97.13 | 0.85 | 470874 |
| FI18\_1\_32\_78 | m | WY | 32 | F1 | 2112880 | 2062840 | 97.632 | 0.839 | 332683 | 2088674 | 98.85 | 0.84 | 330912 |
| FI18\_1\_32\_79 | m | YY | 32 | F1 | 2518434 | 1915805 | 76.071 | 0.812 | 360674 | 1942127 | 77.12 | 0.81 | 359605 |
| FI18\_1\_32\_80 | m | WY | 32 | F1 | 1477900 | 1224353 | 82.844 | 0.771 | 280331 | 1241392 | 84.00 | 0.77 | 279709 |
| FI18\_1\_32\_83 | m | WY | 32 | F1 | 1117270 | 1078079 | 96.492 | 0.731 | 289881 | 1093619 | 97.88 | 0.73 | 290086 |
| FI18\_1\_32\_88 | m | YY | 32 | F1 | 2058940 | 2004230 | 97.343 | 0.826 | 347869 | 2029105 | 98.55 | 0.83 | 346436 |
| FI18\_1\_32\_89 | m | WY | 32 | F1 | 2449154 | 2384743 | 97.370 | 0.824 | 420528 | 2414835 | 98.60 | 0.83 | 418755 |
| FI18\_1\_32\_9 | m | YY | 32 | F1 | 2106886 | 2039571 | 96.805 | 0.835 | 336647 | 2064595 | 97.99 | 0.84 | 334520 |
| FI17\_3\_72\_7 | m | WY | 35 | Parent | 6985806 | 6733807 | 96.393 | 0.918 | 555217 | 6820593 | 97.64 | 0.89 | 781200 |
| FI17\_3\_49\_2 | f | YY | 35 | Parent | 4170902 | 3996659 | 95.822 | 0.881 | 474906 | 4008431 | 96.10 | 0.84 | 653585 |
| FI18\_1\_35\_105 | m | YY | 35 | F1 | 4022634 | 3834980 | 95.335 | 0.843 | 602628 | 3889267 | 96.68 | 0.85 | 600085 |
| FI18\_1\_35\_106 | m | YY | 35 | F1 | 3614566 | 3030045 | 83.829 | 0.834 | 502926 | 3071448 | 84.97 | 0.84 | 501637 |
| FI18\_1\_35\_107 | m | YY | 35 | F1 | 3346384 | 3254695 | 97.260 | 0.861 | 451300 | 3297645 | 98.54 | 0.86 | 448886 |
| FI18\_1\_35\_108 | m | WY | 35 | F1 | 2368662 | 2285847 | 96.504 | 0.827 | 394503 | 2316049 | 97.78 | 0.83 | 393746 |
| FI18\_1\_35\_109 | m | YY | 35 | F1 | 4079696 | 3966821 | 97.233 | 0.853 | 581428 | 4020088 | 98.54 | 0.86 | 578209 |
| FI18\_1\_35\_11 | m | WY | 35 | F1 | 2111094 | 2000420 | 94.758 | 0.826 | 414635 | 2026564 | 96.00 | 0.83 | 352689 |
| FI18\_1\_35\_110 | m | WY | 35 | F1 | 2458458 | 2389520 | 97.196 | 0.826 | 386197 | 2421034 | 98.48 | 0.83 | 414091 |
| FI18\_1\_35\_111 | m | WY | 35 | F1 | 2303368 | 2222441 | 96.487 | 0.823 | 354631 | 2252832 | 97.81 | 0.83 | 384555 |
| FI18\_1\_35\_112 | m | WY | 35 | F1 | 3711582 | 3584681 | 96.581 | 0.866 | 479803 | 3630766 | 97.82 | 0.87 | 476672 |
| FI18\_1\_35\_113 | m | WY | 35 | F1 | 3159130 | 3069909 | 97.176 | 0.829 | 524186 | 3113018 | 98.54 | 0.83 | 522785 |
| FI18\_1\_35\_114 | m | WY | 35 | F1 | 2286442 | 2219116 | 97.055 | 0.796 | 451671 | 2251683 | 98.48 | 0.80 | 451709 |
| FI18\_1\_35\_115 | m | YY | 35 | F1 | 4042534 | 3556216 | 87.970 | 0.908 | 328073 | 3596944 | 88.98 | 0.91 | 323326 |
| FI18\_1\_35\_117 | m | YY | 35 | F1 | 5095106 | 4910918 | 96.385 | 0.877 | 605879 | 4976003 | 97.66 | 0.88 | 607205 |
| FI18\_1\_35\_118 | m | WY | 35 | F1 | 2803240 | 2713436 | 96.796 | 0.837 | 441079 | 2749086 | 98.07 | 0.84 | 439911 |
| FI18\_1\_35\_12 | m | YY | 35 | F1 | 5122120 | 4318359 | 84.308 | 0.892 | 465882 | 4367086 | 85.26 | 0.89 | 460939 |
| FI18\_1\_35\_124 | m | YY | 35 | F1 | 4084550 | 3981723 | 97.483 | 0.893 | 425219 | 4031405 | 98.70 | 0.90 | 419245 |
| FI18\_1\_35\_129 | m | WY | 35 | F1 | 1868866 | 1812576 | 96.988 | 0.823 | 320517 | 1837315 | 98.31 | 0.83 | 318853 |
| FI18\_1\_35\_130 | m | WY | 35 | F1 | 2278784 | 2220546 | 97.444 | 0.851 | 330748 | 2249967 | 98.74 | 0.85 | 328178 |
| FI18\_1\_35\_131 | m | YY | 35 | F1 | 2508666 | 2438390 | 97.199 | 0.839 | 391789 | 2469826 | 98.45 | 0.84 | 390368 |
| FI18\_1\_35\_14 | m | YY | 35 | F1 | 5116298 | 4944259 | 96.637 | 0.859 | 697050 | 5013442 | 97.99 | 0.86 | 694775 |
| FI18\_1\_35\_15 | m | YY | 35 | F1 | 3019894 | 2890565 | 95.717 | 0.785 | 621455 | 2933036 | 97.12 | 0.79 | 622407 |
| FI18\_1\_35\_16 | m | WY | 35 | F1 | 2456980 | 2387996 | 97.192 | 0.833 | 397605 | 2421394 | 98.55 | 0.84 | 395404 |
| FI18\_1\_35\_18 | m | YY | 35 | F1 | 3912406 | 3805044 | 97.256 | 0.885 | 436710 | 3854079 | 98.51 | 0.89 | 434097 |
| FI18\_1\_35\_201 | m | YY | 35 | F1 | 3533726 | 3429725 | 97.057 | 0.862 | 472487 | 3475867 | 98.36 | 0.86 | 470227 |
| FI18\_1\_35\_202 | m | YY | 35 | F1 | 1548800 | 1497770 | 96.705 | 0.789 | 315985 | 1519757 | 98.12 | 0.79 | 315829 |
| FI18\_1\_35\_203 | m | WY | 35 | F1 | 2529636 | 2361197 | 93.341 | 0.815 | 435746 | 2394939 | 94.68 | 0.82 | 434933 |
| FI18\_1\_35\_204 | m | WY | 35 | F1 | 1843578 | 1688393 | 91.582 | 0.763 | 400723 | 1713748 | 92.96 | 0.77 | 401016 |
| FI18\_1\_35\_205 | m | WY | 35 | F1 | 2985074 | 2906901 | 97.381 | 0.864 | 396332 | 2944441 | 98.64 | 0.87 | 393787 |
| FI18\_1\_35\_23 | m | WY | 35 | F1 | 2660236 | 2517194 | 94.623 | 0.845 | 390549 | 2550049 | 95.86 | 0.85 | 388521 |
| FI18\_1\_35\_26 | m | WY | 35 | F1 | 3518410 | 3419253 | 97.182 | 0.848 | 521155 | 3465568 | 98.50 | 0.85 | 519575 |
| FI18\_1\_35\_27 | m | YY | 35 | F1 | 4180740 | 4018770 | 96.126 | 0.859 | 566600 | 4073081 | 97.42 | 0.86 | 564290 |
| FI18\_1\_35\_30 | m | YY | 35 | F1 | 3154926 | 3052328 | 96.748 | 0.883 | 356336 | 3091011 | 97.97 | 0.89 | 351995 |
| FI18\_1\_35\_34 | m | YY | 35 | F1 | 3944846 | 3793771 | 96.170 | 0.857 | 540650 | 3844661 | 97.46 | 0.86 | 539733 |
| FI18\_1\_35\_38 | m | YY | 35 | F1 | 2862154 | 2762897 | 96.532 | 0.861 | 383162 | 2799925 | 97.83 | 0.86 | 380537 |
| FI18\_1\_35\_4 | m | WY | 35 | F1 | 1577512 | 1536243 | 97.384 | 0.808 | 295506 | 1555941 | 98.63 | 0.87 | 438536 |
| FI18\_1\_35\_41 | m | YY | 35 | F1 | 3559782 | 3367393 | 94.595 | 0.869 | 441184 | 3410928 | 95.82 | 0.81 | 293362 |
| FI18\_1\_35\_42 | m | YY | 35 | F1 | 2472706 | 2299419 | 92.992 | 0.846 | 353007 | 2327801 | 94.14 | 0.85 | 351126 |
| FI18\_1\_35\_44 | m | WY | 35 | F1 | 2710278 | 2619093 | 96.636 | 0.842 | 414429 | 2655136 | 97.97 | 0.84 | 411613 |
| FI18\_1\_35\_46 | m | YY | 35 | F1 | 4262616 | 4140732 | 97.141 | 0.862 | 570989 | 4198044 | 98.49 | 0.86 | 570002 |
| FI18\_1\_35\_48 | m | WY | 35 | F1 | 3216496 | 2916095 | 90.661 | 0.856 | 421370 | 2953800 | 91.83 | 0.86 | 418047 |
| FI18\_1\_35\_50 | m | WY | 35 | F1 | 2489832 | 2423228 | 97.325 | 0.848 | 368727 | 2455548 | 98.62 | 0.85 | 366764 |
| FI18\_1\_35\_55 | m | WY | 35 | F1 | 2359414 | 2275714 | 96.453 | 0.820 | 408809 | 2306363 | 97.75 | 0.82 | 407863 |
| FI18\_1\_35\_63 | m | WY | 35 | F1 | 2052154 | 1974678 | 96.225 | 0.825 | 344993 | 2000431 | 97.48 | 0.83 | 343929 |
| FI18\_1\_35\_64 | m | WY | 35 | F1 | 1527192 | 1485772 | 97.288 | 0.782 | 323976 | 1505656 | 98.59 | 0.79 | 323437 |
| FI18\_1\_35\_7 | m | YY | 35 | F1 | 5425568 | 5283782 | 97.387 | 0.888 | 593717 | 5352263 | 98.65 | 0.89 | 588934 |
| FI18\_1\_35\_71 | m | WY | 35 | F1 | 2400100 | 2329217 | 97.047 | 0.819 | 421606 | 2360482 | 98.35 | 0.82 | 420247 |
| FI18\_1\_35\_75 | m | WY | 35 | F1 | 964512 | 751542 | 77.919 | 0.778 | 166550 | 758586 | 78.65 | 0.78 | 165028 |
| FI18\_1\_35\_77 | m | YY | 35 | F1 | 3730104 | 3620632 | 97.065 | 0.865 | 488724 | 3666177 | 98.29 | 0.87 | 488414 |
| FI18\_1\_35\_8 | m | YY | 35 | F1 | 3452032 | 3358858 | 97.301 | 0.846 | 518108 | 3403069 | 98.58 | 0.85 | 515878 |
| FI18\_1\_35\_80 | m | WY | 35 | F1 | 2593944 | 2496331 | 96.237 | 0.818 | 454804 | 2533709 | 97.68 | 0.82 | 453525 |
| FI18\_1\_35\_87 | m | YY | 35 | F1 | 1765316 | 1719243 | 97.390 | 0.820 | 308853 | 1741749 | 98.66 | 0.82 | 307339 |
| FI18\_1\_35\_88 | m | YY | 35 | F1 | 4767910 | 4573602 | 95.925 | 0.866 | 611810 | 4636650 | 97.25 | 0.87 | 607947 |
| FI18\_1\_35\_90 | m | YY | 35 | F1 | 3354264 | 3252455 | 96.965 | 0.878 | 395524 | 3293166 | 98.18 | 0.88 | 392171 |
| FI18\_1\_35\_95 | m | YY | 35 | F1 | 4430800 | 4302387 | 97.102 | 0.842 | 678160 | 4362196 | 98.45 | 0.84 | 678885 |
| FI18\_1\_35\_96 | m | WY | 35 | F1 | 2715398 | 2640153 | 97.229 | 0.835 | 436057 | 2676128 | 98.55 | 0.84 | 435103 |
| FI18\_1\_35\_97 | m | WY | 35 | F1 | 4886316 | 4653904 | 95.244 | 0.899 | 471477 | 4712210 | 96.44 | 0.90 | 467161 |
| FI18\_1\_29\_14\_1 | excluded due to low mapping | | 29 | F1 | 5754900 | 274244 | 4.765 |  |  | 278459 | 4.84 |  |  |
| FI18\_1\_29\_20\_1 | excluded due to low mapping | | 29 | F1 | 691934 | 153766 | 22.223 |  |  | 155963 | 22.54 |  |  |
| FI18\_1\_29\_3\_1 | excluded due to low mapping | | 29 | F1 | 6673428 | 349921 | 5.243 |  |  | 352906 | 5.29 |  |  |
| FI18\_1\_29\_59\_1 | excluded due to low mapping | | 29 | F1 | 2940246 | 206153 | 7.011 |  |  | 208804 | 7.10 |  |  |
| FI18\_1\_29\_97\_1 | excluded due to low mapping | | 29 | F1 | 7207076 | 1488963 | 20.660 |  |  | 1508887 | 20.94 |  |  |
| FI18\_1\_30\_96\_1 | excluded due to low mapping | | 30 | F1 | 1115724 |  |  |  |  |  |  |  |  |
| FI18\_1\_32\_50\_2\_1 | excluded due to low mapping | | 32 | F1 | 9689116 | 368989 | 3.808 |  |  | 373251 | 3.85 |  |  |
| FI18\_1\_32\_74\_1 | excluded due to low mapping | | 32 | F1 | 6430210 | 1215692 | 18.906 |  |  | 1229932 | 19.13 |  |  |
| FI18\_1\_32\_94\_1 | excluded due to low mapping | | 32 | F1 | 6933950 | 5839 | 0.084 |  |  | 5963 | 0.09 |  |  |
| FI18\_1\_35\_53\_1 | excluded due to low mapping | | 35 | F1 | 11105008 | 10313 | 0.093 |  |  | 10423 | 0.09 |  |  |
| FI18\_1\_35\_91\_1 | excluded due to low mapping | | 35 | F1 | 9853700 | 62965 | 0.639 |  |  | 63712 | 0.65 |  |  |
| FI18\_1\_35\_94\_1 | excluded due to low mapping | | 35 | F1 | 6052848 | 1562498 | 25.814 |  |  | 1582649 | 26.15 |  |  |

Supplementary file 1F: Sample list of all wild samples used.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Locality | Latitude | Longitude | Region | Collection year | Sex | Colour | Used in GWAS | Total sequenced reads | YY Mapped reads | YY % mapped reads | YY duplication | YY Reads retained after deduplication | YY average read depth | WW mapped read | WW % mapped | WW duplication | WW Reads retained after deduplication | WW average read depth |
| CAM015132 | Huosiaisnotko, Laukaa | 62.38634 | 25.81796 | Central Finland | 2018 | Male | Y | x | 99337203 | 95728163 | 96.37 | 0.13 | 83260117 | 17.382 | 99278718 | 99.02 | 0.14 | 98307916 | 17.6129 |
| CAM015133 | Huosiaisnotko, Laukaa | 62.38634 | 25.81796 | Central Finland | 2018 | Male | Y | x | 91549356 | 88141528 | 96.28 | 0.14 | 75592171 | 15.8571 | 91510105 | 98.94 | 0.15 | 90540109 | 16.0169 |
| CAM015134 | Haralanharju, Kangasala | 61.53456355 | 24.08097897 | Central Finland | 2018 | Male | Y | x | 84051672 | 81125511 | 96.52 | 0.14 | 69937864 | 14.6407 | 84005409 | 99.03 | 0.14 | 83188228 | 14.8749 |
| CAM015135 | Heposuo, Laukaa | 62.34784 | 25.82785 | Central Finland | 2018 | Male | Y | x | 82188518 | 79203877 | 96.37 | 0.14 | 68088328 | 14.2128 | 82119542 | 99 | 0.15 | 81299902 | 14.3792 |
| CAM015136 | Huosiaisnotko, Laukaa | 62.38634 | 25.81796 | Central Finland | 2018 | Male | Y | x | 83831177 | 80915884 | 96.52 | 0.14 | 69802421 | 14.6376 | 83766436 | 99.03 | 0.14 | 82952260 | 14.842 |
| CAM015137 | Mäyrämäki, Jyväskylä | 62.22814 | 25.64794 | Central Finland | 2018 | Male | W | x | 90325260 | 86804526 | 96.10 | 0.14 | 74784341 | 15.8328 | 90270209 | 98.99 | 0.14 | 89355999 | 16.0069 |
| CAM015138 | Heposuo, Laukaa | 62.34784 | 25.82785 | Central Finland | 2018 | Male | W | x | 83258916 | 80277374 | 96.42 | 0.14 | 69295411 | 14.4791 | 83204225 | 98.98 | 0.14 | 82355152 | 14.675 |
| CAM015139 | Lautaperä, Keuruu | 62.18709 | 24.87121 | Central Finland | 2018 | Male | W | x | 91929373 | 88159990 | 95.90 | 0.14 | 75864499 | 15.7166 | 91852724 | 99.04 | 0.15 | 90968838 | 15.9305 |
| CAM015140 | Heposuo, Laukaa | 62.34784 | 25.82785 | Central Finland | 2018 | Male | W | x | 85888608 | 82609774 | 96.18 | 0.14 | 71419687 | 14.8998 | 85825617 | 98.96 | 0.14 | 84937070 | 15.1099 |
| CAM015141 | Huosiaisnotko, Laukaa | 62.38634 | 25.81796 | Central Finland | 2018 | Male | W | x | 76588254 | 73780022 | 96.33 | 0.14 | 63477797 | 13.3699 | 76558659 | 99.01 | 0.15 | 75803292 | 13.5154 |
| CAM015192 | Heposuo, Laukaa | 62.34784 | 25.82785 | Central Finland | 2018 | Male | Y | x | 80404515 | 77653009 | 96.58 | 0.15 | 65662866 | 13.7736 | 80351585 | 98.85 | 0.16 | 79428391 | 14.0112 |
| CAM015193 | Heposuo, Laukaa | 62.34784 | 25.82785 | Central Finland | 2018 | Male | Y | x | 58498076 | 56522266 | 96.62 | 0.13 | 49442117 | 10.4086 | 58462162 | 99.04 | 0.13 | 57903161 | 10.5802 |
| CAM015194 | Heposuo, Laukaa | 62.34784 | 25.82785 | Central Finland | 2018 | Male | Y | x | 65622607 | 63282509 | 96.43 | 0.14 | 54683278 | 11.5851 | 65581436 | 98.98 | 0.14 | 64914704 | 11.7449 |
| CAM015195 | Mäyrämäki, Jyväskylä | 62.22814 | 25.64794 | Central Finland | 2018 | Male | Y | x | 58154455 | 56272290 | 96.76 | 0.12 | 49706191 | 10.5543 | 58119500 | 99.02 | 0.12 | 57547059 | 10.6945 |
| CAM015196 | Mäyrämäki, Jyväskylä | 62.22814 | 25.64794 | Central Finland | 2018 | Male | Y | x | 83371214 | 80690761 | 96.78 | 0.14 | 69714679 | 14.7052 | 83320131 | 99.05 | 0.14 | 82530724 | 14.8955 |
| CAM015197 | Mäyrämäki, Jyväskylä | 62.22814 | 25.64794 | Central Finland | 2018 | Male | W | x | 68675694 | 66496196 | 96.83 | 0.13 | 58102548 | 12.2659 | 68633799 | 99.08 | 0.13 | 68004964 | 12.4399 |
| CAM015198 | Mäyrämäki, Jyväskylä | 62.22814 | 25.64794 | Central Finland | 2018 | Male | W | x | 75453002 | 72010183 | 95.44 | 0.24 | 55086736 | 11.385 | 75405484 | 98.87 | 0.25 | 74551498 | 11.5827 |
| CAM015199 | Mäyrämäki, Jyväskylä | 62.22814 | 25.64794 | Central Finland | 2018 | Male | W | x | 69939593 | 67389470 | 96.35 | 0.14 | 58195017 | 12.5471 | 69889281 | 99.04 | 0.14 | 69214869 | 12.7278 |
| CAM015200 | Mäyrämäki, Jyväskylä | 62.22814 | 25.64794 | Central Finland | 2018 | Male | W | x | 55198189 | 53350748 | 96.65 | 0.12 | 47208830 | 10.2012 | 56405976 | 99.08 | 0.12 | 54666270 | 10.3219 |
| CAM015201 | Mäyrämäki, Jyväskylä | 62.22814 | 25.64794 | Central Finland | 2018 | Male | W | x | 92938532 | 88633493 | 95.37 | 0.24 | 67242769 | 13.8414 | 92892355 | 98.88 | 0.25 | 91856037 | 14.0357 |
| CAM015142 | Voiaskintie, Ulrikasund | 60.43466 | 25.32835 | Southern Finland | 2018 | Male | Y | x | 84316506 | 80894323 | 95.94 | 0.13 | 70140012 | 14.8534 | 84287184 | 99.04 | 0.14 | 83480957 | 15.0015 |
| CAM015143 | Tvärminne, Hanko | 59.846 | 23.185 | Southern Finland | 2018 | Male | Y | x | 81341932 | 78370587 | 96.35 | 0.14 | 67261188 | 14.2685 | 81283183 | 99 | 0.15 | 80472992 | 14.4447 |
| CAM015144 | Tvärminne, Hanko | 59.846 | 23.185 | Southern Finland | 2018 | Male | Y | x | 88405065 | 85421712 | 96.63 | 0.14 | 73193505 | 15.1229 | 88352550 | 98.97 | 0.15 | 87440926 | 15.3091 |
| CAM015145 | Tvärminne, Hanko | 59.846 | 23.185 | Southern Finland | 2018 | Male | Y | x | 80894075 | 77989309 | 96.41 | 0.13 | 67679132 | 14.0029 | 80841879 | 98.97 | 0.14 | 80008747 | 14.195 |
| CAM015146 | Tvärminne, Hanko | 59.846 | 23.185 | Southern Finland | 2018 | Male | Y | x | 81136931 | 78241764 | 96.43 | 0.13 | 67854265 | 14.2953 | 81086172 | 98.89 | 0.14 | 80187814 | 14.451 |
| CAM015147 | Voiaskintie, Ulrikasund | 60.43466 | 25.32835 | Southern Finland | 2018 | Male | W | x | 75094177 | 72333859 | 96.32 | 0.13 | 62642058 | 13.4071 | 75042444 | 99 | 0.14 | 74295482 | 13.5672 |
| CAM015148 | Voiaskintie, Ulrikasund | 60.43466 | 25.32835 | Southern Finland | 2018 | Male | W | x | 89834991 | 86506811 | 96.30 | 0.14 | 74333381 | 15.7749 | 89777636 | 99 | 0.15 | 88882799 | 15.9597 |
| CAM015149 | Mosabackantie, Sipoo | 60.36973 | 24.54084 | Southern Finland | 2018 | Male | W | x | 73648890 | 71065467 | 96.49 | 0.13 | 61618406 | 13.0722 | 73604268 | 99.03 | 0.14 | 72886794 | 13.2296 |
| CAM015150 | Voiaskintie, Ulrikasund | 60.43466 | 25.32835 | Southern Finland | 2018 | Male | W | x | 72378681 | 69440673 | 95.94 | 0.13 | 60321260 | 12.834 | 72332606 | 98.98 | 0.14 | 71594111 | 13.0016 |
| CAM015151 | Voiaskintie, Ulrikasund | 60.43466 | 25.32835 | Southern Finland | 2018 | Male | W | x | 80232467 | 76779318 | 95.70 | 0.14 | 66143339 | 13.6987 | 80159712 | 99.06 | 0.15 | 79405646 | 13.9165 |
| CAM015154 | Kanaküla 2 | 58.26328 | 25.11927 | Estonia | 2018 | Male | W | x | 71789797 | 69217313 | 96.42 | 0.13 | 60293429 | 12.7039 | 71746939 | 98.93 | 0.13 | 70982660 | 12.8702 |
| CAM015155 | Kanaküla 1.2 | 58.15794 | 25.8694 | Estonia | 2018 | Male | W | x | 90309170 | 87203546 | 96.56 | 0.14 | 75335592 | 15.3226 | 90247219 | 98.99 | 0.14 | 89333141 | 15.5947 |
| CAM015158 | Kanaküla 4 | 58.274533 | 25.117817 | Estonia | 2018 | Male | W | x | 77232567 | 74330844 | 96.24 | 0.14 | 64205532 | 13.123 | 82512306 | 98.99 | 0.14 | 76392613 | 13.3823 |
| CAM015159 | Kanaküla 2 | 58.26328 | 25.11927 | Estonia | 2018 | Male | W | x | 79351392 | 76638691 | 96.58 | 0.13 | 66913224 | 13.7015 | 77179045 | 98.98 | 0.13 | 78483602 | 13.8975 |
| CAM015162 | Thieves Hill, Aultmore, Keith | 57.575222 | -3.048778 | Scotland | 2015 | Male | Y | x | 82938651 | 79794024 | 96.21 | 0.15 | 67813099 | 14.2972 | 79287964 | 98.99 | 0.16 | 82016446 | 14.5358 |
| CAM015163 | Portknockie, Buckie | 57.702785 | -2.879435 | Scotland | 2015 | Male | Y | x | 83269393 | 80197317 | 96.31 | 0.14 | 68632488 | 14.4383 | 82886426 | 98.95 | 0.15 | 82338256 | 14.6507 |
| CAM015165 | Portknockie, Buckie | 57.702785 | -2.879435 | Scotland | 2015 | Male | Y | x | 71071794 | 47490 | 0.07 | 0.14 | 40949 | 0.00243509 | removed due to low mapping % | | |  |  |
| CAM015170 | Findlater Castle, Portsoy | 57.69157 | -2.77265 | Scotland | 2015 | Male | Y | x | 59557227 | 57359570 | 96.31 | 0.13 | 50112976 | 10.4116 | 71072090 | 0.79 | 0.13 | 58867297 | 10.5789 |
| CAM015202 | F1 offspring of wild parents | NA | NA | Scotland | 2015 | Male | Y | x | 59937755 | 58011585 | 96.79 | 0.13 | 50720420 | 10.7925 | 59903009 | 99 | 0.13 | 59301604 | 10.9623 |
| CAM015203 | F1 offspring of wild parents | NA | NA | Scotland | 2015 | Male | Y | x | 55068668 | 53331495 | 96.85 | 0.12 | 46913748 | 9.92293 | 57251863 | 99.03 | 0.13 | 54495189 | 10.0522 |
| CAM015204 | F1 offspring of wild parents | NA | NA | Scotland | 2015 | Male | Y | x | 64822930 | 62348914 | 96.18 | 0.13 | 54148683 | 11.475 | 64780636 | 98.08 | 0.14 | 63535554 | 11.6182 |
| CAM015206 | F1 offspring of wild parents | NA | NA | Scotland | 2015 | Male | Y | x | 87767164 | 84630216 | 96.43 | 0.16 | 70781662 | 14.6903 | 87719259 | 98.9 | 0.17 | 86758116 | 14.9508 |
| CAM015207 | F1 offspring of wild parents | NA | NA | Scotland | 2015 | Male | Y | x | 62230737 | 58239265 | 93.59 | 0.12 | 51177246 | 10.9483 | 62197559 | 96.13 | 0.13 | 59791385 | 11.1071 |
| CAM015208 | F1 offspring of wild parents | NA | NA | Scotland | 2015 | Male | Y | x | 47567413 | 46042450 | 96.79 | 0.12 | 40522208 | 8.60095 | 64848486 | 98.96 | 0.12 | 64176574 | 11.8856 |
| CAM015209 | F1 offspring of wild parents | NA | NA | Scotland | 2015 | Male | Y | x | 119873564 | 114836831 | 95.80 | 0.17 | 95610964 | 19.8179 | 119796501 | 98.93 | 0.18 | 118513971 | 20.175 |
| CAM015211 | F1 offspring of wild parents | NA | NA | Scotland | 2015 | Male | Y | x | 47171055 | 45865834 | 97.23 | 0.11 | 40747916 | 8.70432 | 63799250 | 99.04 | 0.11 | 63185074 | 11.9608 |
| CAM15072 | Tvärminne, Hanko | 59.846 | 23.185 | Southern Finland |  | Male | Y |  | These samples were added to later analyses using the WW genome | | | | |  |  |  | 0.08 | 71280369 | 14.1515 |
| CAM015073 | Tvärminne, Hanko | 59.846 | 23.185 | Southern Finland |  | Male | Y |  |  |  |  |  |  |  | 68638162 | 99.02 | 0.08 | 67967326 | 13.4971 |
| CAM015078 | Tvärminne, Hanko | 59.846 | 23.185 | Southern Finland |  | Male | W |  |  |  |  |  |  |  | 70063666 | 99.04 | 0.08 | 69389996 | 13.7484 |
| CAM15084 | Tvärminne, Hanko | 59.846 | 23.185 | Southern Finland |  | Male | W |  |  |  |  |  |  |  |  |  | 0.08 | 70835562 | 13.9317 |
| CAM015085 | Tvärminne, Hanko | 59.846 | 23.185 | Southern Finland |  | Male | W |  |  |  |  |  |  |  | 49250064 | 99.05 | 0.09 | 48782086 | 9.66459 |
| CAM015086 | Tvärminne, Hanko | 59.846 | 23.185 | Southern Finland |  | Male | Y |  |  |  |  |  |  |  | 57402371 | 98.98 | 0.08 | 56815328 | 11.2504 |
| CAM015088 | Tvärminne, Hanko | 59.846 | 23.185 | Southern Finland |  | Male | Y |  |  |  |  |  |  |  | 65556920 | 99.02 | 0.09 | 64913551 | 12.7004 |
| CAM015089 | Tvärminne, Hanko | 59.846 | 23.185 | Southern Finland |  | Male | W |  |  |  |  |  |  |  | 67913274 | 99.02 | 0.09 | 67245909 | 13.2502 |
| CAM015091 | Tvärminne, Hanko | 59.846 | 23.185 | Southern Finland |  | Male | W |  |  |  |  |  |  |  | 66279795 | 99.04 | 0.09 | 65642031 | 12.9068 |
| CAM015094 | Tvärminne, Hanko | 59.846 | 23.185 | Southern Finland |  | Male | Y |  |  |  |  |  |  |  | 71591177 | 98.88 | 0.10 | 70791957 | 13.6097 |

Supplementary file 1G: CRISPR sgRNAs sequences.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **sgRNA name** | **Target sequence** | **Starting location in *valkea*** | **PAM** | **Specificity score %** | **Activity score** |
| Val1A | CTGAGAACACGGTACCTACG | WW\_tarseq\_419\_arrow:7,014,923 | GGG | 62.5 | 0.68 |
| Val2A | ACACCCACAGTCTATTGCAG | WW\_tarseq\_419\_arrow:7,021,659 | TGG | 62.5 | 0.505 |
| Val2B | TCGTGGCATTCTGCCGGCCG | WW\_tarseq\_419\_arrow:7,021,588 | CGG | 62.5 | 0.698 |
| Val3A | CTCGGGGGAAGTATACACTT | WW\_tarseq\_419\_arrow:7,031,836 | CGG | 83.3 | 0.722 |
| Val3B | CTTCGCTTACATCAGTGACA | WW\_tarseq\_419\_arrow:7,031,950 | CGG | 83.3 | 0.754 |

Supplementary file 1H: Elution gradient used in pheomelanin HPLC analysis.

|  |  |  |
| --- | --- | --- |
| **Time (s)** | **%A** | **%B** |
| 0 | 96 | 4 |
| 0.2 | 96 | 4 |
| 0.3 | 94 | 6 |
| 20 | 94 | 6 |
| 21 | 60 | 40 |
| 35 | 40 | 60 |
| 39 | 40 | 60 |
| 42 | 96 | 4 |

Supplementary file 1I: Waveform of disposable working electrode in pheomelanin analysis.

|  |  |  |
| --- | --- | --- |
| **Time (s)** | **Potential (V)** | **Integration** |
| 0 | 0.13 |  |
| 0.04 | 0.13 |  |
| 0.05 | 0.45 |  |
| 0.21 | 0.45 | Begin |
| 0.56 | 0.45 | End |
| 0.57 | -1.67 |  |
| 0.58 | -1.67 |  |
| 0.59 | 0.93 |  |
| 0.6 | 0.13 |  |