

Haploinsufficient

| Species | Genome | | | |
|-------------------------|-----------------------------|--------------------------------|---|-----------------------|
| | Number of single copy genes | Number of duplicate copy genes | Number of triplicate or more copy genes | Total number of genes |
| Amazon molly | 10313 | 2909 | 712 | 13934 |
| Atlantic herring | 10198 | 2818 | 624 | 13640 |
| Atlantic salmon | 3919 | 6418 | 4147 | 14484 |
| Ballan wrasse | 9759 | 3130 | 1027 | 13916 |
| Barramundi perch | 10123 | 3089 | 836 | 14048 |
| Blue tilapia | 10480 | 2910 | 651 | 14041 |
| Blunt-snouted clingfish | 10139 | 2552 | 549 | 13240 |
| Brown trout | 3744 | 7066 | 3816 | 14626 |
| Burton's mouthbrooder | 10678 | 2836 | 514 | 14028 |
| Channel bull blenny | 10109 | 2678 | 517 | 13304 |
| Channel catfish | 10868 | 2672 | 590 | 14130 |
| Climbing perch | 10638 | 2979 | 540 | 14157 |
| Cod | 10411 | 2323 | 379 | 13113 |
| Common carp | 3530 | 5699 | 4772 | 14001 |
| Denticle herring | 9916 | 3182 | 798 | 13896 |
| Eastern happy | 10464 | 2865 | 713 | 14042 |
| Electric eel | 10526 | 2973 | 513 | 14012 |
| European seabass | 10503 | 2861 | 442 | 13806 |
| Fugu | 10133 | 2549 | 576 | 13258 |
| Gilthead seabream | 10711 | 2870 | 495 | 14076 |
| Greater amberjack | 10750 | 2957 | 552 | 14259 |
| Guppy | 10623 | 2662 | 509 | 13794 |
| Huchen | 3797 | 6234 | 4510 | 14541 |
| Indian glassy fish | 10440 | 2833 | 556 | 13829 |
| Indian medaka | 10589 | 2798 | 531 | 13918 |
| Japanese medaka HdrR | 10699 | 2557 | 474 | 13730 |
| Japanese medaka HNI | 10528 | 2432 | 426 | 13386 |
| Japanese medaka HSOK | 10609 | 2563 | 455 | 13627 |
| Jewelled blenny | 9907 | 2882 | 881 | 13670 |
| Large yellow croaker | 10645 | 2916 | 464 | 14025 |
| Live sharksucker | 10656 | 2761 | 422 | 13839 |
| Lyretail cichlid | 10331 | 2816 | 640 | 13787 |
| Makobe Island cichlid | 10552 | 2881 | 537 | 13970 |
| Mexican tetra | 10464 | 3139 | 621 | 14224 |
| Midas cichlid | 10441 | 2761 | 595 | 13797 |
| Mummichog | 10489 | 2813 | 553 | 13855 |
| Nile tilapia | 10588 | 2803 | 574 | 13965 |
| Northern pike | 10447 | 3354 | 462 | 14263 |
| Orbiculate cardinalfish | 10081 | 2994 | 797 | 13872 |
| Pachon cavefish | 10333 | 2844 | 497 | 13674 |
| Pinecone soldierfish | 10486 | 3042 | 553 | 14081 |
| Rainbow trout | 4274 | 6304 | 3445 | 14023 |
| Red-bellied piranha | 10767 | 3201 | 589 | 14557 |
| Sailfin molly | 10238 | 2843 | 780 | 13861 |
| Sheepshead minnow | 10388 | 2800 | 597 | 13785 |

Haploinsufficient

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|-----------------------|------------|------------|-----------|-------------|
| Shortfin molly | 10174 | 2962 | 780 | 13916 |
| Siamese fighting fish | 10663 | 2637 | 432 | 13732 |
| Stickleback | 10384 | 2474 | 337 | 13195 |
| Swamp eel | 10771 | 2672 | 512 | 13955 |
| Tetraodon | 9699 | 2576 | 643 | 12918 |
| Tiger tail seahorse | 10485 | 2519 | 512 | 13516 |
| Tongue sole | 10473 | 2615 | 555 | 13643 |
| Turbot | 10755 | 2757 | 340 | 13852 |
| Yellowtail amberjack | 10347 | 3084 | 735 | 14166 |
| Zebra mbuna | 10262 | 3037 | 831 | 14130 |
| Zebrafish | 10601 | 2942 | 552 | 14095 |
| Zig-zag eel | 10768 | 2867 | 431 | 14066 |
| | | | | |
| MAXIMAL | 10868 | 7066 | 4772 | 14626 |
| MINIMAL | 3530 | 2323 | 337 | 12918 |
| MEAN | 9853,78947 | 3135,28070 | 892,82456 | 13881,89474 |

Haploinsufficient

Haploinsufficient genes

| Number of haploinsufficient teleost orthologs returned in singleton | Number of haploinsufficient teleost orthologs remained in duplicate | Number of haploinsufficient teleost orthologs remained in triplicate or more | Total number of haploinsufficient genes |
|---|---|--|---|
| 181 | 84 | 11 | 276 |
| 175 | 76 | 9 | 260 |
| 50 | 112 | 119 | 281 |
| 179 | 79 | 18 | 276 |
| 170 | 94 | 11 | 275 |
| 193 | 78 | 6 | 277 |
| 185 | 71 | 7 | 263 |
| 48 | 120 | 111 | 279 |
| 187 | 82 | 11 | 280 |
| 189 | 71 | 11 | 271 |
| 183 | 94 | 4 | 281 |
| 190 | 83 | 7 | 280 |
| 191 | 75 | 5 | 271 |
| 47 | 103 | 124 | 274 |
| 169 | 90 | 15 | 274 |
| 186 | 78 | 13 | 277 |
| 168 | 100 | 7 | 275 |
| 186 | 82 | 5 | 273 |
| 183 | 68 | 7 | 258 |
| 188 | 86 | 3 | 277 |
| 184 | 87 | 9 | 280 |
| 190 | 73 | 14 | 277 |
| 49 | 99 | 140 | 288 |
| 181 | 82 | 10 | 273 |
| 182 | 87 | 8 | 277 |
| 194 | 82 | 6 | 282 |
| 193 | 76 | 7 | 276 |
| 189 | 75 | 6 | 270 |
| 180 | 78 | 12 | 270 |
| 190 | 82 | 3 | 275 |
| 188 | 82 | 3 | 273 |
| 177 | 84 | 12 | 273 |
| 186 | 81 | 10 | 277 |
| 169 | 101 | 8 | 278 |
| 182 | 83 | 13 | 278 |
| 190 | 78 | 8 | 276 |
| 187 | 82 | 6 | 275 |
| 168 | 102 | 6 | 276 |
| 180 | 79 | 15 | 274 |
| 173 | 90 | 5 | 268 |
| 182 | 88 | 11 | 281 |
| 56 | 122 | 98 | 276 |
| 176 | 98 | 9 | 283 |
| 179 | 83 | 15 | 277 |
| 193 | 73 | 13 | 279 |

Haploinsufficient

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|-----------|----------|----------|-----------|
| 176 | 86 | 18 | 280 |
| 199 | 76 | 4 | 279 |
| 194 | 74 | 5 | 273 |
| 192 | 77 | 7 | 276 |
| 168 | 83 | 16 | 267 |
| 185 | 74 | 12 | 271 |
| 190 | 74 | 13 | 277 |
| 190 | 82 | 6 | 278 |
| 180 | 89 | 11 | 280 |
| 182 | 85 | 14 | 281 |
| 177 | 95 | 7 | 279 |
| 192 | 83 | 4 | 279 |
| | | | |
| 199 | 122 | 140 | 288 |
| 47 | 68 | 3 | 258 |
| 171,77193 | 85,10526 | 18,73684 | 275,61404 |

Haploinsufficient

Comparison between singleton, duplicate, triplicate and more copies

| Chi2 test | Chi2 test p-value | Chi2 test FDR (Benjamini-Hochberg procedure) | Hypergeometric test p-value | Hypergeometric test FDR (Benjamini-Hochberg procedure) |
|---------------|-------------------|--|-----------------------------|--|
| 10,2061590470 | 0,0013997239 | 0,0022845641 | 0,0010470035 | 0,0017051200 |
| 7,6645462790 | 0,0056316421 | 0,0069783391 | 0,0039069775 | 0,0048412548 |
| 12,2186004916 | 0,0004731541 | 0,0009988809 | 0,0001607143 | 0,0005348866 |
| 3,6630379059 | 0,0556321099 | 0,0566255404 | 0,0323212520 | 0,0328984172 |
| 14,3276075756 | 0,0001535957 | 0,0006734582 | 0,0001301982 | 0,0005300925 |
| 3,6050649087 | 0,0576038201 | 0,0576038201 | 0,0340654876 | 0,0340654876 |
| 5,7028904467 | 0,0169369985 | 0,0182152625 | 0,0110201051 | 0,0118518112 |
| 10,3215136816 | 0,0013148840 | 0,0022845641 | 0,0004935431 | 0,0010047127 |
| 13,4184281030 | 0,0002491644 | 0,0007101185 | 0,0002242059 | 0,0005877859 |
| 5,7881135182 | 0,0161348946 | 0,0180331175 | 0,0104126534 | 0,0115932359 |
| 21,9973707902 | 0,0000027302 | 0,0000485706 | 0,0000040418 | 0,0000592545 |
| 7,9576927880 | 0,0047883414 | 0,0061704021 | 0,0033217325 | 0,0042501311 |
| 13,1649065383 | 0,0002852410 | 0,0007742256 | 0,0002798500 | 0,0006935414 |
| 9,4382112212 | 0,0021251066 | 0,0031059251 | 0,0008364602 | 0,0015380074 |
| 12,5616371816 | 0,0003937466 | 0,0009816221 | 0,0003068178 | 0,0007286922 |
| 7,9265831915 | 0,0048713701 | 0,0061704021 | 0,0033553666 | 0,0042501311 |
| 28,9656492186 | 0,0000000737 | 0,0000041994 | 0,0000001499 | 0,0000085421 |
| 9,4651545368 | 0,0020941179 | 0,0031059251 | 0,0015778364 | 0,0023667546 |
| 4,3308168797 | 0,0374282791 | 0,0387893075 | 0,0231318459 | 0,0239730039 |
| 10,2989277339 | 0,0013310753 | 0,0022845641 | 0,0010384652 | 0,0017051200 |
| 14,1318324627 | 0,0001704351 | 0,0006939143 | 0,0001559338 | 0,0005348866 |
| 11,0919685290 | 0,0008670240 | 0,0017650131 | 0,0007137438 | 0,0013757149 |
| 12,3569821168 | 0,0004393403 | 0,0009988809 | 0,0001443312 | 0,0005348866 |
| 12,4710189651 | 0,0004133146 | 0,0009816221 | 0,0003529652 | 0,0007941895 |
| 16,3922533403 | 0,0000514953 | 0,0003261366 | 0,0000540109 | 0,0003420691 |
| 13,6645611921 | 0,0002185400 | 0,0007101185 | 0,0002082674 | 0,0005877859 |
| 12,5030152191 | 0,0004062958 | 0,0009816221 | 0,0003736318 | 0,0007941895 |
| 9,6564791569 | 0,0018868490 | 0,0029875110 | 0,0014851626 | 0,0022879531 |
| 4,5620880621 | 0,0326871982 | 0,0345031536 | 0,0197480219 | 0,0208451343 |
| 6,9707108930 | 0,0082854574 | 0,0098389807 | 0,0055990507 | 0,0066488727 |
| 10,2021074580 | 0,0014028025 | 0,0022845641 | 0,0011125740 | 0,0017615755 |
| 14,8195401325 | 0,0001183033 | 0,0005619409 | 0,0001111366 | 0,0004872912 |
| 10,5390135780 | 0,0011688078 | 0,0022207349 | 0,0009110236 | 0,0016227608 |
| 23,3284707233 | 0,0000013656 | 0,0000389206 | 0,0000018364 | 0,0000523387 |
| 15,7381000785 | 0,0000727441 | 0,0004146414 | 0,0000725153 | 0,0004133371 |
| 7,0720880617 | 0,0078293959 | 0,0094952248 | 0,0052907387 | 0,0064164277 |
| 9,1679847138 | 0,0024628563 | 0,0034239709 | 0,0018215800 | 0,0025324405 |
| 21,5716876066 | 0,0000034085 | 0,0000485706 | 0,0000041582 | 0,0000592545 |
| 6,7181613163 | 0,0095435968 | 0,0111017350 | 0,0061758149 | 0,0071841112 |
| 17,6098233614 | 0,0000271184 | 0,0001932186 | 0,0000302155 | 0,0002152855 |
| 13,9075037655 | 0,0001920303 | 0,0007084321 | 0,0001689116 | 0,0005348866 |
| 13,5216342157 | 0,0002358290 | 0,0007101185 | 0,0000799658 | 0,0004143685 |
| 20,3711268612 | 0,0000063785 | 0,0000519392 | 0,0000074933 | 0,0000610167 |
| 12,2523989834 | 0,0004646604 | 0,0009988809 | 0,0003761950 | 0,0007941895 |
| 5,7411434700 | 0,0165720004 | 0,0181654619 | 0,0105762853 | 0,0115932359 |

Haploinsufficient

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|---------------|--------------|--------------|--------------|--------------|
| 14,9723067477 | 0,0001091006 | 0,0005619409 | 0,0000967950 | 0,0004597765 |
| 6,4307050341 | 0,0112164047 | 0,0127867014 | 0,0075230389 | 0,0085762644 |
| 9,4903784786 | 0,0020655221 | 0,0031059251 | 0,0016270635 | 0,0023780158 |
| 9,0967994609 | 0,0025605717 | 0,0034750615 | 0,0019291005 | 0,0026180649 |
| 21,1016440984 | 0,0000043555 | 0,0000496532 | 0,0000056708 | 0,0000610167 |
| 13,4996159692 | 0,0002386123 | 0,0007101185 | 0,0002268647 | 0,0005877859 |
| 10,3726061715 | 0,0012789887 | 0,0022845641 | 0,0010109007 | 0,0017051200 |
| 13,8418423699 | 0,0001988581 | 0,0007084321 | 0,0001912887 | 0,0005738661 |
| 10,9002737974 | 0,0009615005 | 0,0018898458 | 0,0007240605 | 0,0013757149 |
| 8,7252644021 | 0,0031383056 | 0,0041600795 | 0,0021639893 | 0,0028685439 |
| 20,7316023375 | 0,0000052837 | 0,0000501949 | 0,0000067116 | 0,0000610167 |
| 9,3027989029 | 0,0022880403 | 0,0032604575 | 0,0017167394 | 0,0024463536 |
| 28,96565 | 0,05760 | 0,05760 | 0,03407 | 0,03407 |
| 3,60506491 | 0,00000007 | 0,00000420 | 0,00000015 | 0,00000854 |
| 11,89211 | 0,00559 | 0,00637 | 0,00352 | 0,00407 |

**Comparison between tripli or more
copies and dupli or less copies**

| Hypergeometric test p-value | Hypergeometric test FDR (Benjamini- Hochberg procedure) |
|--|--|
| 0,8405420446 | 0,9977290843 |
| 0,8465903628 | 0,9977290843 |
| 0,0000004878 | 0,0000092687 |
| 0,7419100984 | 0,9977290843 |
| 0,9416467713 | 0,9977290843 |
| 0,9900214941 | 0,9977290843 |
| 0,9238422923 | 0,9977290843 |
| 0,0000003194 | 0,0000091022 |
| 0,4502664310 | 0,9977290843 |
| 0,4850482528 | 0,9977290843 |
| 0,9977290843 | 0,9977290843 |
| 0,9136706806 | 0,9977290843 |
| 0,8962819500 | 0,9977290843 |
| 0,0000713147 | 0,0008129874 |
| 0,6140214247 | 0,9977290843 |
| 0,6551854774 | 0,9977290843 |
| 0,8811426208 | 0,9977290843 |
| 0,9403476032 | 0,9977290843 |
| 0,9356512805 | 0,9977290843 |
| 0,9971380494 | 0,9977290843 |
| 0,7612433867 | 0,9977290843 |
| 0,1458988969 | 0,9977290843 |
| 0,0000000002 | 0,0000000132 |
| 0,6634619857 | 0,9977290843 |
| 0,8345244581 | 0,9977290843 |
| 0,9278126172 | 0,9977290843 |
| 0,7799939293 | 0,9977290843 |
| 0,8916808704 | 0,9977290843 |
| 0,9368565868 | 0,9977290843 |
| 0,9950670394 | 0,9977290843 |
| 0,9906273482 | 0,9977290843 |
| 0,6188397823 | 0,9977290843 |
| 0,6256966388 | 0,9977290843 |
| 0,9229924282 | 0,9977290843 |
| 0,4226425927 | 0,9977290843 |
| 0,8656110427 | 0,9977290843 |
| 0,9722945232 | 0,9977290843 |
| 0,8869896982 | 0,9977290843 |
| 0,6147665639 | 0,9977290843 |
| 0,9689223674 | 0,9977290843 |
| 0,5480569810 | 0,9977290843 |
| 0,0000267848 | 0,0003816837 |
| 0,8137519881 | 0,9977290843 |
| 0,5992324073 | 0,9977290843 |
| 0,4337543415 | 0,9977290843 |

Haploinsufficient

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| 0,3075823245 | 0,9977290843 |
| 0,9777122354 | 0,9977290843 |
| 0,8308546122 | 0,9977290843 |
| 0,8846251972 | 0,9977290843 |
| 0,2567840545 | 0,9977290843 |
| 0,3312017859 | 0,9977290843 |
| 0,3383605328 | 0,9977290843 |
| 0,6817055866 | 0,9977290843 |
| 0,8659999059 | 0,9977290843 |
| 0,7765715194 | 0,9977290843 |
| 0,9244591043 | 0,9977290843 |
| 0,9736627946 | 0,9977290843 |

| | |
|------------|------------|
| 0,99773 | 0,99773 |
| 0,00000000 | 0,00000001 |
| 0,69160 | 0,91023 |