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| **Table S11.** Gene ontology enrichment of lost genes under genome of other species. |
| Reference | Category | Group\_ID | Group\_Names | Genes\_Bg | Genes\_Tg | P (Fisher) | Odds Ratio |
| Human | Stimulus | GO:0007606 | sensory perception ofchemical stimulus | 522 | 172 | 2.91E-05 | 1.47 |
| GO:0004984 | olfactory receptor activity | 440 | 147 | 6.36E-05 | 1.49 |
| GO:0050912 | detection of chemical stimulus involved in sensory perception of taste | 46 | 29 | 3.34E-05 | 2.82 |
| GO:0001580 | detection of chemical stimulus involved in sensory perception of bitter taste | 40 | 28 | 1.10E-05 | 3.13 |
| GO:0050909 | sensory perception of taste | 53 | 24 | 7.09E-03 | 2.02 |
| GO:0033038 | bitter taste receptor activity | 25 | 20 | 4.87E-05 | 3.58 |
| Reproduction | GO:0007267 | gamete generation | 513 | 142 | 2.79E-02 | 1.24 |
| GO:0048232 | male gamete generation | 466 | 131 | 2.46E-02 | 1.26 |
| GO:0007283 | spermatogenesis | 462 | 130 | 2.41E-02 | 1.26 |
| GO:0009566 | fertilization | 117 | 42 | 1.31E-02 | 1.60 |
| GO:0048240 | sperm capacitation | 23 | 12 | 2.54E-02 | 2.33 |
| GO:0007342 | fusion of sperm to egg plasma membrane involved in sigle fertilization | 14 | 8 | 4.67E-02 | 2.55 |
| Nucleotide | GO:0070383 | DNA cytosine deamination | 10 | 9 | 3.57E-03 | 4.02 |
| GO:0047844 | deoxycytidine deaminase activity | 8 | 8 | 3.95E-03 | 4.47 |
| Metal Ions | GO:0006882 | cellular zinc ion homeostasis | 30 | 14 | 2.97E-02 | 2.09 |
| GO:0061687 | detoxification of inorganic compound | 18 | 13 | 1.93E-03 | 3.23 |
| GO:0071280 | cellular response to copper ion | 29 | 13 | 4.40E-02 | 2.00 |
| GO:0010273 | detoxification of copper ion | 16 | 12 | 2.29E-03 | 3.35 |
| GO:0071294 | cellular response to zinc ion | 25 | 12 | 3.31E-02 | 2.15 |
| GO:0090281 | negative regulation of caclcium ion import | 8 | 6 | 2.93E-02 | 3.35 |
| Salmon | Chemotaxis | GO:0008009 | chemokine activity | 62 | 13 | 7.86E-06 | 5.08 |
| GO:0042379 | chemokine receptor binding | 62 | 13 | 7.86E-06 | 5.08 |
| GO:0060326 | ceel chemotaxis | 74 | 13 | 4.07E-05 | 4.25 |
| GO:0006935 | chemotaxis | 136 | 13 | 9.11E-03 | 2.31 |
| Immune System | GO:0006955 | immune response | 289 | 27 | 2.35E-04 | 2.26 |
| GO:0005125 | cytokine activity | 156 | 21 | 9.28E-06 | 3.26 |
| GO:0042288 | MHC class I protein binding | 2 | 2 | 8.97E-03 | 24.20 |
| GO:0019763 | immunoglobulin receptor activity | 3 | 2 | 1.46E-02 | 16.13 |
| GO:0019767 | IgE receptor activity | 3 | 2 | 1.46E-02 | 16.13 |
| GO:0032997 | Fc receptor complex | 3 | 2 | 1.46E-02 | 16.13 |
| Lipid | GO:0042157 | lipoprotein metabolic process | 36 | 6 | 6.04E-03 | 4.03 |
| Mitochondria | GO:0008053 | mitochondrial fusion | 14 | 3 | 2.81E-02 | 5.19 |
| Neuron | GO:0038179 | neurotrophin signaling pathway | 5 | 2 | 2.90E-02 | 9.68 |
| Nucleotide | GO:0004519 | endonuclease activity | 122 | 12 | 1.17E-02 | 2.38 |
| Reproduction | GO:0048240 | sperm capacitation | 6 | 3 | 4.39E-03 | 12.10 |