

## **Mammalian *NPC1* genes may undergo positive selection and human polymorphisms associate with type 2 diabetes**

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## Supplemental Tables and Figures

**Supplemental Table 1. Likelihood ratio test statistics for models of variable selective pressure among sites ( F3X4 codon frequency model)**

| Region/selection model | d.f. | 2ΔLnL | P value | % of sites (average dN/dS) | Selected sites (position, BEB p value, REL p value) |
|------------------------|------|-------|---------|----------------------------|-----------------------------------------------------|
| <b>Loop 1</b>          |      |       |         |                            |                                                     |
| M7 vs M8               | 2    | 8.25  | 0.016   | 0.7% (1.5)                 | 182 (0.99, n.s)                                     |
| M8a vs M8              | 1    | 4     | 0.045   | -                          | -                                                   |
| <b>Loop 2 N-term</b>   |      |       |         |                            |                                                     |
| M7 vs M8               | 2    | 34.3  | <0.0001 | 3.3% (1.325)               | 416 (0.98, 0.99), 417 (0.99, 1), 421 (0.91, 0.99)   |
| M8a vs M8              | 1    | 11.08 | 0.0009  | -                          | -                                                   |
| <b>Loop 2 C-term</b>   |      |       |         |                            |                                                     |
| M7 vs M8               | 2    | 0.04  | 0.98    |                            |                                                     |
| M8a vs M8              | 1    | 2.84  | 0.092   |                            |                                                     |
| <b>SSD</b>             |      |       |         |                            |                                                     |
| M7 vs M8               | 2    | 5.16  | 0.075   | -                          | -                                                   |
| M8a vs M8              | 1    | 2     | 0.16    | -                          | -                                                   |
| <b>Loop 3</b>          |      |       |         |                            |                                                     |
| M7 vs M8               | 2    | 7.36  | 0.025   | -                          | -                                                   |
| M8a vs M8              | 1    | 3.62  | 0.057   | -                          | -                                                   |

Note: M7 is a null model that assumes that  $0 < \omega < 1$  is beta distributed among sites; M8a assumes  $0 < \omega \leq 1$ ; these two models are compared to M8, which includes an extra category of sites with  $\omega > 1$  (positive selection). The F3X4 codon frequency model was used. D.f.: degree of freedom; 2ΔLnL: twice the difference of the natural logs of the maximum likelihood of the models being compared; p value: p value of rejecting the neutral models (M7 or M8a) in favor of the positive selection model (M8); % of sites (average dN/dS): estimated percentage of sites evolving under positive selection by M8 (dN/dS for these codons); selected sites: the position refers to the entire NPC1 human sequence, p values obtained from BEB and REL analyses are shown.

**Supplemental Figure 1. Multiple protein alignment of *NPC1* mammalian genes.** Sites subject to positive selection are highlighted in yellow; the position of human nonsynonymous polymorphisms is shown in green.

|                 |                                                                    |
|-----------------|--------------------------------------------------------------------|
| Tenrec          | MRARSLALG-LLLLLCPAQVFSQSCVWYGECGIATGDKRYNCEYSGPAKPLPKDGYDLVQ       |
| Macrobat        | MGARGPALGLLLLLLCPAQVFSHSCVWYGECGIASGDKRYNCKYSGPPKLLPKDGYDLVQ       |
| Hyrax           | ----MSALCILLLLCLGQVFSQSCVWYGECGIAAGDKRYNCRYSGPPKPLPKDGYDLVQ        |
| Tree shrew      | -----VFSQSCVWYGECGIATGDKRYNCKYSGPPKPLPKDGYDLVQ                     |
| Armadillo       | --MRGRDLAPLLLLLCPAQVFSQSCVWYGECGIATGDKRYNCKYSGPPVPLPDAGYDLVQ       |
| Kangaroo rat    | MKARGPALGLLLLLLCPAQXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX    |
| Shrew           | MSARGRTVG-LLLLLSVAQVCAQSCVWYGECGIASGDKRYNCEYSGPPKPLPKDGYDLVQ       |
| Dolphin         | MSACGPALGLLLLLLCPAQVFSQSCVWYGECGIASGDKRYNCRYSGLPKPLPEDGYDLVQ       |
| Cow             | MSVRGPAFGLLLLLFCPAQVFSQSCIWYGECGIASGDKRYNCRYSGPPEPLPDGYDLVQ        |
| Pig             | MSARGPAFGLLLLLLCPVQVFSQSCVWYGECGIAYGDKRYNCRYSGPPKPLPEDGYDLVQ       |
| Weasel          | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX |
| Panda           | MTARGPALGLLLLLLCPAQVFAQACVWYGECGIASGDKRYNCQYSGPPKPLPKDGYDLMQ       |
| Dog             | -----FAQSCVWYGECGIASGDKRYNCQYSGPPKPLPKDGYDLMQ                      |
| Cat             | MTARGPALGLLLLLLCPAQVLAQSCIWYGECGIASGDKRYNCKYSGPPKPLPKDGYDLVQ       |
| Microbat        | MSARGLALG-LLLLLCPAQVFPQSCVWYGECGIASGDKRYNCEYSGPPKALPKDGYDLVQ       |
| Horse           | MSAPGPALDLLLLLCAAQVFSQSCVWYGECGIAFGDKRYNCEYSGPPKPLPKDGYDLLQ        |
| Mouse lemur     | MGARGPALG-LLLLLCPAQVFLQSCVWYGECGIASGDKRYNCKYSGPPKPLPKDGYDLVQ       |
| Pika            | -----VIPQSCVWYG-----VR                                             |
| Rabbit          | VSARGRLGLLLLLLCPAQVLPQSCVWYGECGIASGDKRYNCQYSGPPKPLPKDGYDLIQ        |
| Orangutan       | MTARGLALGLLLLLLCPAQVFSQSCVWYGECGIAYGDKRYNCEYSGPPKPLPKDGYDLVQ       |
| Human           | MTARGLALGLLLLLLCPAQVFSQSCVWYGECGIAYGDKRYNCEYSGPPKPLPKDGYDLVQ       |
| Chimpanzee      | MIARGLALGLLLLLLCPAQVFSQSCVWYGECGIAYGDKRYNCEYSGPPKPLPKDGYDLVQ       |
| Gorilla         | MTARGLALGLLLLLLCPAQVFSQSCVWYGECGIAYGDKRYNCEYSGPPKPLPKDGYDLVQ       |
| Marmoset        | -----VFSQSCVWYGECGMAYGDKRYNCEYSGPPKPLPKDGYDLVQ                     |
| Macaque         | MSARGLALGLLLLLLCLAQVFSQSCVWYGECGIAYGDKRYNCEYFGPPKPLPKDGYDLVQ       |
| Gibbon          | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX |
| Baboon          | MSARGLALGLLLLLLCPAQVFSQSCVWYGECGIAYGDKRYNCEYFGPPKPLPKDGYDLVQ       |
| Bushbaby        | MSALGPALRILLLLLLCPAQVFSQSCVWYGECGIASGDKRYNCKYSGPPKPLPKDGYDLVQ      |
| Tarsier         | MSARGPALGLLLLLLWPAQVFSQSCVWYGECGIASGDKRYNCKYSGPPKPLPKDGYDLVQ       |
| Mouse           | MGAAHPALGLLLLLLCPAQVFSQSCVWYGECGIATGDKRYNCKYSGPPKPLPKDGYDLVQ       |
| Rat             | MGAAHPALGLLLLLLCPAQVFSQSCVWYGECGVAFGDKRYNCEYSGPPKPLPKDGYDLVQ       |
| Hamster         | MSARHPALGLLLLLLCPAQVFSQSCVWYGECGIAFGDKRYNCKYSGPPKPLPKDGNLLQ        |
| Guinea pig      | -----FSQSCIWFGECGIASGDKRYNCKYSGPPKPLPKDGYDLVQ                      |
| Opossum         | -----VFSQSCVWYGECGMASEGNRYNCEYSGPPKPLPKDGYDLVQ                     |
| Tasmanian devil | -----                                                              |
| Platypus        | -----FSQSCIWYGECGIASGDKRYNCEYSGPPIPLPEDGYDLIQ                      |
| Elephant        | MRARSPALSILLLLLCLAQVFSQSCVWYGECGIAAGDKRYNCKYSGPPKPLPKDGYDLVQ       |
| Wallaby         | -----VFSQSCVWYGECDIASEGKRYNCEYSGPPKPLPKDGYDLVQ                     |
| Sloth           | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX |
| Hedgehog        | -----VFTQSCIWYGECGIASGDKRYNCKYSGPPKPLPKDGYDLVQ                     |
| Squirrel        | -----VFLQSCVWYGECGIASGDKRYNCRYSGPPKPLPKDGYDLVQ                     |
|                 |                                                                    |
| Tenrec          | ELCPGFFFDVSNLCCDVQQLRTLKDNLQPLQLFLSRCPSCFYNLNMFCELTCSPRQSEF        |
| Macrobat        | ELCPGFFSDNISLCCDVQQLRTLKDNLQPLQLFLSRCPSCFYNLNMFCELTCSPRQSE-        |
| Hyrax           | ELCPGFFFDNVSLCCDVQQLRTLKDNLQPLQLFLSRCPSCFYNLNMFCELTCSPRQSWF        |
| Tree shrew      | ELCPGFFFDNVSLCCDVQQLRTLKDNLQPLQLFLSRCPSCFYNLNMFCELTCSPRQSQF        |
| Armadillo       | ELCPGFFFDNVSLCCDVQQLRTLKDNLQPLQLFLSRCPSCFYNLNMFCELTCSPRQGF         |
| Kangaroo rat    | ELCPGFFFDNVSVCCDVQQLRTLKSNLQPLQLFLSRCPSCFYNLMSLFCELTCSPPQSQF       |
| Shrew           | ELCPGFFFDNVSLCC-VQQLQTLKENLQRPQLFLSRCPSCFYNLNMFCELTCSPRQSQF        |
| Dolphin         | ELCPGFFFGNVSLCCDVQQLRTLKDNLQPLQLFLSRCPSCFYNLNMFCELTCSPRQSQF        |
| Cow             | ELCPGFFFGNVSLCCDVQQLRTLKDNLQPLQLFLSRCPSCFYNLVNLFCELTCSPRQSQF       |
| Pig             | ELCPGFFFGNVSLCCDVQQLRTLKDNLQPLQLFLSRCPSCFYNLNMFCELTCSPRQSQF        |
| Weasel          | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX |
| Panda           | ELCPGFFFDNVSVCCDVQQLRTLKDSLQPLQLFLSRCPSCFYNLNMFCELTCSPRQSQF        |
| Dog             | ELCPGLFFFDNVSVCCDVQQLRTLKDSLQPLQLFLSRCPSCFYNLNMFCELTCSPPQSQF       |
| Cat             | ELCPGFFFDNVSLCCDVQQLRTLKDNLALPLQXXXXCPSCFYNLVNLFCELTCSPRQSQF       |
| Microbat        | ELCPGLFFFGNVSLCCDVQQLRTLKDNLQPLQLFLSRCPSCFYNLNMFCELTCSPRQSQF       |
| Horse           | ELCPGLFFFGNVSLCCDVQQLRTLKDNLQPLQLFLSRCPSCFYNLNMFCELTCSPPQSQF       |
| Mouse lemur     | EHCPCGFFFDNVSLCCDVQQLRTLKDNLQPLQLFLSRCPSCFYNLTLFCELTCSPRQSQF       |

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| Pika            | ELCPGFFFFDNVSLCCDVQQLRTLKGNLQPLQFLSRCPSCFYNNLMNLFCELTCSPRQSQF        |
| Rabbit          | ELCPGFFFFDNVSLCCDVQQLQTLKDNLQPLQFLSRCPSCFYNNLMNLFCELTCSPRQSQF        |
| Orangutan       | ELCPGFFFFGNVSLCCDVQQLQTLKDNLQPLQFLSRCPSCFYNNLMNLFCELTCSPRQSQF        |
| Human           | ELCPGFFFFGNVSLCCDVQQLQTLKDNLQPLQFLSRCPSCFYNNLMNLFCELTCSPRQSQF        |
| Chimpanzee      | ELCPGFFFFGNVSLCCDVQQLQTLKDNLQPLQFLSRCPSCFYNNLMNLFCELTCSPRQSQF        |
| Gorilla         | ELCPGFFFFGNVSLCCDVQQLQTLKDNLQPLQFLSRCPSCFYNNLMNLFCELTCSPRQSQF        |
| Marmoset        | ELCPGFFFFDNVSLCCDVQQLQTLKDSLQPLQFLSRCPSCFYNNLMNLFCELTCSPRQSQF        |
| Macaque         | ELCPGFFFFGNVSLCCDVQQLQTLKDNLQPLQFLSRCPSCFYNNLMNLFCELTCSPRQSQF        |
| Gibbon          | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX |
| Baboon          | ELCPGFFFFGNVSLCCDIQQLQTLKDNLQPLQFLSRCPSCFYNNLMNLFCELTCSPRQSQF        |
| Bushbaby        | ELCPGFFFFDNVSLCCDVQQLQTLKDNLQPLQFLSRCPSCFYNNLMNLFCELTCSPRQSQF        |
| Tarsier         | ELCPGFLYDNVSLCCDVQQLQTLKDNLQPLQFLSRCPSCFYNNLMNLFCELTCSPPQGRF         |
| Mouse           | ELCPGLFFDNVSLCCDIQQLQTLKSNLQPLQFLSRCPSCFYNNMTLFCELTCSPHQSQF          |
| Rat             | ELCPGLFFGNVSLCCDVQQLQTLKSNLQPLQFLSRCPSCFYNNMTLFCELTCSPHQSQF          |
| Hamster         | ELCPGFFFFGNVSLCCDVQQLQTLKSNLQPLQFLSRCPSCFYNNMTLFCELTCSPHQSQF         |
| Guinea pig      | ELCPGFFFFDNVSLCCDVQQLQTLKDNLQPLQFLSRCPSCFYNNLMNLFCELTCSPHQSQF        |
| Opossum         | ELCPGYFFDDVRLCCDVQQLQTLKSNLQPLQFLSRCPSCFYNNLMNLFCELTCSPRQSQF         |
| Tasmanian devil | XXXXXXXXXXXXXXXXXXXXXXXXXXXXLPLGFSFRCPSCFYNNLMNLFCELTCSPRQSQF        |
| Platypus        | ELCPGLFFGNVSLCCDVQQLHTLKDKLQPLQFLSRCPSCFYNNLMNLFCELTCSPPYQGQF        |
| Elephant        | ELCPGFFFFDNVSLCCDVQQLRTLKDNLQPLQFLSRCPSCFYNNLMNLFCELTCSPPQSQF        |
| Wallaby         | ELCPGFFFFGNVSLCCDVQQLQTLKNNLQPLQFLSRCPSCFYNNLMNLFCELTCSPRQSWF        |
| Sloth           | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX |
| Hedgehog        | ELCPGFFFFDNVSLCCDVQQLQTLKNSLQPLQFLSRCPSCFYNNLMNLFCELTCSHRQSQF        |
| Squirrel        | ELCPGFFFFDNVSLCCDVQQLQTLKDNLQPLQFLSXXXXXXXXXXXXXXXXXXXXXXXXXXXX      |

|                 |                                                                      |
|-----------------|----------------------------------------------------------------------|
| Tenrec          | LNVTATGDYVDPATNQTKTNVEELQYYIGERFANAMYNACRDVEAPSSNEKALGLLCGKD         |
| Macrobat        | LNVTATEDYFDPVINQTKTNVKELQYYVGESFANAMYNACRDVEAPSSNDKALGLLCGKD         |
| Hyrax           | LNVTATEDYVDPSTNQTKTNVEELQYICIGESFASXXXXXXXXXXXXXXXXXXXXXXXXXXXX      |
| Tree shrew      | LNVTATEDYVDPVTNQTKTNVEELQYYVGQSFANXXXXXXXXXXXXXXXXXXXXXXXXXXXX       |
| Armadillo       | LNVTATEDYVDPVTNQTKTNVKELEYIGESFANAMYNACRDVEAPSSNDKALGLLCGKD          |
| Kangaroo rat    | LNVTETEDI VDPVTNQTKTNVKALEYIGQSFANAMYNACRDVEAPSSNDKALGLLCGKD         |
| Shrew           | LNVTATGEYVDPVTNQTKRNVIELQYFIGESFANAMYNACRDVEAPSSNDKALGLLCGKE         |
| Dolphin         | LNVTAVEDYVDPVTNQTKTNVKELQYYVGESFANAMYNACRDVEAPSSNEKALGLLCGKE         |
| Cow             | LNVTATEDYVDPATNQTKTNVKELQYYVGESFANAMYNACRDVEAPSSNEKALGLLCGRE         |
| Pig             | LNVTATEDYVDPVTNQTKTNVKELEYVGETFANAMYNACRDVEAPSSNEKALGLLCGRE          |
| Weasel          | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX |
| Panda           | LNVTESDYIDPVTNQTKTNVKELQYYVGESFANAMYNACRDVEAPSSNDKALGLLCGKD          |
| Dog             | LNVTETEDYVDPVTNQTKTNVKELQYYVGESFANAMYNACRDVEAPSSNDKALGLLCGKE         |
| Cat             | LNVTATEDYVDPVTNQTKTNVKELQYYIGESFANAMYNACRDVEAPSSNDKALGLLCGKD         |
| Microbat        | LNVTETEEYVDPVTNENKTNVKELQYYVGESFANAMYNACRDVEAPSSNDKALGLLCGKE         |
| Horse           | LNVTATEDYVDPVTNQTKTNVIELQYYVGESFANAMYNACRDVEAPSSNDKALGILCGKE         |
| Mouse lemur     | LNVTATEDYVDPVTNQTKTNVKELEYVGQSFANAMYNACRDVEAPSSNDKALGLLCGKD          |
| Pika            | LNVTATEEYVDPATNQTKTNIKELQYYIGQRFADAMYNACRDVEAPSSNDKALGLLCGKD         |
| Rabbit          | LNVTATEAYVDPATNQTKTNVKELQYYIGQRFADAMYNACRDVEAPSSNDKALGLLCGKD         |
| Orangutan       | LNVTATEDYVDPVTNQTKTNVKELQYYVGQSFANAMYNACRDVEAPSSNDKALGLLCGKD         |
| Human           | LNVTATEDYVDPVTNQTKTNVKELQYYVGQSFANAMYNACRDVEAPSSNDKALGLLCGKD         |
| Chimpanzee      | LNVTATEDYVDPVTNQTKTNVKELQYYVGQSFANAMYNACRDVEAPSSNDKALGLLCGKD         |
| Gorilla         | LNVTATEDYVDPVTNQTKTNVKELQYYVGQSFANAMYNACRDVEAPSSNDKALGLLCGKD         |
| Marmoset        | LNVTATEDYVDPVTNQTKTNVKELQYYVGQSFANAMYNACRDVEAPSSXXXXXXXXXXXXXX       |
| Macaque         | LNVTATEDYVDPVTNQTKTNVKELQYFVGQSFANAMYNACRDVEAPSSNDKALGLLCGKD         |
| Gibbon          | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX |
| Baboon          | LNVTATEDYVDPVTNQTKTNVKELQYFVGQSFANVMYNACRDVEAPSSNDKALELLCGKD         |
| Bushbaby        | LNVTATEDYVDPVTNQTRTNVKELQYYIGQTFANAMYNACRDVQAPSSNEKALGLLCGKD         |
| Tarsier         | LNVTATKDYVDPVTNQTKTNVVELQYYVGQSFANAMYDACRDVEAPSSNDKALGLLCGKD         |
| Mouse           | LNVTATEDYFDPKTQENKTNVKELEYFVGQSFANAMYNACRDVEAPSSNEKALGLLCGRD         |
| Rat             | LNVTATEDYFDPETRENKTNVKELEYVGRSFANAMYNACRDVEAPSSNEKALGLLCGRD          |
| Hamster         | LNVTATEDYVDPKTQENKTNVKELEYIGQSFANEMYNACRDVEAPASNEKALGILCGKD          |
| Guinea pig      | LNVTATEDYIDPDTNQTRTNVKELQYYIGQSFANAMYNACRDVEAPSSNDKALGLLCGRD         |
| Opossum         | LNVTSTQSFIDPTTNETKTNI DGLQYYIGQSFADAMYNACHDVEAPSSNDKALGLMCGKD        |
| Tasmanian devil | LNVTATKSYIDPTTNETKTNVEELQYYIGQSFADAMYNACRDVES PSSNDKALGLLCGKD        |
| Platypus        | LNVTTTGDFVDPVSNITKKNVETL--YYIGKSFADAMYGACRDVEAPSSNDKALGLLCGRD        |
| Elephant        | LNVTATNDYVDPVTNETKTNVEELQYYIGDSFANAMYNACRDVEAPSSNDKALGLLCGKD         |
| Wallaby         | LNVTDTESHVDPTTNETRINVKGLQYYIGQSFADAMYNACQDVEAPSSNDKALGLLCGKD         |
| Sloth           | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX |
| Hedgehog        | LNITATEDYVDPVTNQTKTNVKELQYYIGETFANAMYNACQDVEAPSSNDRALGLMCGRD         |

Squirrel XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXMYNACRDVEAPSSNDKALGLLCGRD

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Tenrec AEACNATNWIEYMFNKDNGQAPFTITPVFSDVPLLGMEPMNNATKGCDEAVDEVMGPCSC  
Macrobat AKDCNATNWIEYMFNKDNGQAPFTITPIFSDLPAHGMKPMNNATKGCDESVDVETGPCSC  
Hyrax XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXLPVLGMEPMNNATKDCNEAVDEVETGPCSC  
Tree shrew XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXLPVHGMEPMNNATKACSESVDEVETGPCSC  
Armadillo ASACNATNWIEYMFNKDNGQAPFTITPIFSDLPAHGMMEPMNNATKGCNESVDVETGPCSC  
Kangaroo rat ASACNATNWIEYMFNKDNGQAPFTITPIFSXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  
Shrew AEACNATNWIEYMFNKDNGQAPFTITPIFSXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  
Dolphin AEACNATNWIEYMFNKDNGQAPFTITPIFSDLPAHEMEPMNNATKGCNESVDVETGPCSC  
Cow ASACNATNWIEYMFNKDNGQAPFTITPVFSDLPTHGMEPMNNATKGCDESVDVETGPCSC  
Pig AQACNATNWIEYMFNKDNGQAPFTITPIFSDLPTHGMEPMNNATKGCDESVDVETGPCSC  
Weasel XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  
Panda AEACNATNWIEYMFNKDNGQAPFTITPIFSDLPAHAMEPMNNATKGCDESVDVETGPCSC  
Dog AEACNATNWIEYMFNKDNGQAPFTITPIFSDLPAHGMKPMNNATKGCDEPVDEVETGPCSC  
Cat AEACNATNWIEYMFNKDNGQAPFTITPIFSDLPTHGMEPMNNATKGCDESVDVETGPCSC  
Microbat AAACNATNWIEYMFNKDNGQAPFTITPVFSDLPAGMEPMNNATKGCAPVDEVETGPCSC  
Horse AEACNATNWIEYMFNKDNGQAPFTITPIFSDFPAGMEPMNNATKGCNESVDVETGPCSC  
Mouse lemur AAACNATNWIEYMFNKDNGQAPFTITPIFSDLPLQGMEPMNNATKGCNESVDEGTGPCSC  
Pika ASACNATNWIEYMFNKDNGQAPFTITPIFSDLPVSGMEPMNNATKGCNEAVDEVETGPCSC  
Rabbit ANACNATNWIEYMFNKDNGQAPFTITPIFSDLPVHGMEPMNNATKGCNEAVDEVETGPCSC  
Orangutan ADACNATNWIEYMFNKDNGQAPFTITPVFSDFPVHGMEPMNNATKGCDESVDVETGPCSC  
Human ADACNATNWIEYMFNKDNGQAPFTITPVFSDFPVHGMEPMNNATKGCDESVDVETGPCSC  
Chimpanzee ADACNATNWIEYMFNKDNGQAPFTITPVFSDFPVHGMEPMNNATKGCDESVDVETGPCSC  
Gorilla ADACNATNWIEYMFNKDNGQAPFTITPVFSDFPVHGMEPMNNATKGCDESVDVETGPCSC  
Marmoset XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXDFVHGMEPMNNATKGCDESVDVETGPCSC  
Macaque XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXDFVHGMEPMNNATKGCDESVDVETGPCSC  
Gibbon XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXDFVHGMEPMNNATKGCDESVDVETGPCSC  
Baboon ADACNATNWIEYMFNKDNGQAPFTITPVFSDFPVHGMEPMNNATKGCDESVDVETGPCSC  
Bushbaby AAACNATNWIEYMFNKDNGQAPFTITPVFSDLPAGMEPMNNATKGCNESVDVETGPCSC  
Tarsier ADACNATNWIEYMFNKDNGQAPFTITPIFSDLPVHGMEPMNNATKGCNESVDVETGPCSC  
Mouse ARACNATNWIEYMFNKDNGQAPFTITPVFSDLSILGMEPMNNATKGCNESVDVETGPCSC  
Rat ARACNATNWIEYMFNKDNGQAPFTITPVFSDLSVLGMEPMNNATKGCNESVDVETGPCSC  
Hamster ARACNATNWIEYMFNKDNGQAPFTITPIFSDLPILGMEPMNNATKGCNESVDVETGPCSC  
Guinea pig ADTCNATNWIEYMFNKDNGQAPFTITPIFSDLPILHGMEPMNNATKGCNESVDVETGPCSC  
Opossum AKDCNATNWIEYMFNKDNGQAPFTITPIFSDIPLYGMQPMNNATKGCNESVDVETGPCSC  
Tasmanian devil AKDCNATNWIEYMFNKDNGQAPFTITPIFSDNSLYKMEPMNNATKGCNESVDVETGPCSC  
Platypus AKDCNATNWIEYMFNKDNGQAPFTITPIFSDVSIKMIKPMNNATKGCNESVDVETGPCSC  
Elephant AKACNATNWIEYMFNKDNGQAPFTITPVFSDLPVLGMEPMNNATKGCDEAVDEVETGPCSC  
Wallaby AKDCNATNWIEYMFNKDNGQAPFTITPIFSDIPVYGMMEPMNNATKGCNESVDVETGPCSC  
Sloth XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  
Hedgehog ASDCNATNWIEYMFNKDNGQAPFTITPIFSDFPTHGMEPMNNATKGCDESVDVETGPCSC  
Squirrel ADACNATNWIEYMFNKDNGQAPFTITPIFSDLPVQGMMEPMNNATKGCNESVDVETGPCSC

Tenrec QDCSIVCGPKPQPPPPAPWIIILGLDAMCVIMWFSYMFVLLIFFGAFFAVWCYRKRYFVS  
Macrobat QDCSAVCGPEPKPPPPVPWRILGLDAMYVIMWTTYMAFLLVFFGAFFAVWCYRKRYFVS  
Hyrax QDCSAVCGPKPQPPPPPTPWIIFGLDAMYVVMWLTYMAFLLVFFGAFFAVWCYRKRYFVS  
Tree shrew QDCSVMCGPKPQPPPPVPWRIFGLDAMYVVMWITYMAFLLVFFGAFFAVWCYRKRYFVS  
Armadillo QDCSLTCGPKPQPPPPAPWVILGLDAMFVIMWITYMAFLLVFFGAFFAVWCYRKRYFVS  
Kangaroo rat XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXKRYFVF  
Shrew XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXKRYFVS  
Dolphin QDCSIVCGPKPQPPAPPVWRILGLDAMYVIMWSTYMAFLLVFFGAFFAVWCYRKRYFVS  
Cow QDCSAVCGPKPQPPPPVPWRILGLDAMYVIMWSTYMAFLLVFFGAFFAVWCYRKRYFVS  
Pig QDCSIVCGPKPQPPPPVPWRILGLDAMYVIMWSSYMAFLLVFFGAFFAVWCYRKRYFVS  
Weasel XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  
Panda QDCSAVCGPKPQPPPPAPWRIILGLDAMYVIMWTTYMAFLLVFFGAFFAVWCYRKRYFVS  
Dog QDCSVVCGPKPQPPPPAPWRIILGLDAMYVIMWITYMAFLLMFFGAFFAVWCYRKRYFVS  
Cat QDCSIVCGPKPQPPPPVPWRILGLDAMYVIMWITYMAFLLVFFGAFFAVWCYRKRYFVS  
Microbat QDCSAVCGPRPQPPPPVPWRILGLDAMYVIMWATYMAFLLMFFGAFFAVWCYRKRYFVS  
Horse QDCSVVCGPKPQPPPPAPWRIILGLDAMYVIMWTTYMAFLLMFFGAFFAVWCYRKRYFVS  
Mouse lemur QDCSATCGPKPQPPPLVPWRILGLDAMYVIMWLTYMAFLLVFFGAFFAVWCYRKRYFVS  
Pika QDCSAMCGPKPQPPPPVPWRILGLDAMYVIMWITYMAFLLVFFGAFFAVWCYRKRYFVS  
Rabbit QDCSVVCGPKPQPPPPPIPWRIIFGLDAMYVIMWITYMAFLLMFFGTFFAVWCYRKRYFVS  
Orangutan QDCSIVCGPKPQPPPPAPWTILGLDAMYVIMWITYMAFLLVFFGAFFAVWCYRKRYFVS

|                 |                                                               |
|-----------------|---------------------------------------------------------------|
| Human           | QDCSIVCGPKPQPPPPAPWTLIGLDAMYVIMWITYMAFLLVFFGAFFAVWCYRKRYFVS   |
| Chimpanzee      | QDCSIVCGPKPQPPPPAPWTLIGLDAMYVIMWITYMAFLLVFFGAFFAVWCYRKRYFVS   |
| Gorilla         | QDCSIVCGPKPQPPPPAHWTILGLDAMYVIMWITYMAFLLVFFGAFFAVWCYRKRYFVS   |
| Marmoset        | QDCSIVCGPKPQPPPPAPWMLIGLDAMYVIMWITYMAFLLMFFGAFFAVWCYRKRYFVS   |
| Macaque         | QDCSIVCGPKPQPPPPAPWTLIGLDAMYVIMWITYMAFLLVFFGAFFAVWCYRKRYFVS   |
| Gibbon          | QDCSIVCGPKPQPPPPAPWMLIGLDAMYVIMWITYMAFLLVFFGAFFAVWCYRKRYFVS   |
| Baboon          | QDCSIVCGPSPSPRRPPAPWTLIGLDAMYVIMWITYMGFLLVFFGAFFAVWCYRKRYFVS  |
| Bushbaby        | QDCSATCGPKPQPPPPVPWRIFGLDAMYVIMWITYMAFLLVFFGAFFAVWCYRKRYFVS   |
| Tarsier         | QDCSVVCGPKPQPPPPVPWRIFGLDAMYVIMWITYMAFLLVFFGAFFAVWCYRKRYFVS   |
| Mouse           | QDCSIVCGPKPQPPPPMPWRIWGLDAMYVIMWVTVAFLEVFVFFGALLAVWCHRRRYFVS  |
| Rat             | QDCSAVCGPKPQPPPPVPWRILGLDAMYVIMWVAYMAFLVLFFGGLLAVWCHRRRYFVS   |
| Hamster         | QDCSIVCGPKPQPPTPVWRILGLDAMYVIMWVTYMAFLFIFFGLLAVWCHRRRYFVS     |
| Guinea pig      | QDCSIVC-----VPWRLLGWDAMYVIMWITYMAFLVFFGACFAVWCYRKRYFVS        |
| Opossum         | QDCSITCGPKPQPPPPPTWIIILGLDAMYVIMWIFYMGFLLFFGMFFIIWCYRKRYFVS   |
| Tasmanian devil | QDCSITCGPKPQPPPPVPWLIFGLDAMYVIMWIFYMGFLLVFFGMFFIVWCYXXXXXXX   |
| Platypus        | QDCSIVCGPKPQPLPPVPWRIFGLDAMYVIMWLSYMGFLFVFFGAFFGVWCYRKRYFVS   |
| Elephant        | QDCSVVCGPKPQPPPPAPWTFIFGLDAMYVIMWITYMAFLVFFGFSFFAVWCYRKRYFVS  |
| Wallaby         | QDCSITCGPKPQPPTPAPWLILGLDAMYVIMWIFYMAFLLVFFGMFFIVWCYRKRYFVS   |
| Sloth           | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXKQYFVS   |
| Hedgehog        | QDCSVVCGPKPQPPPPPIPWRIILGLDAMYVIMWATYMAFLLVFFGVFFAMWCYRKRYFVS |
| Squirrel        | QDCSIVCGPKPQPAPPPIPWRIIFGLDAMYVIMWITYMAFLVFFGAFFALWCYXXXXXXX  |

|                 |                                                               |
|-----------------|---------------------------------------------------------------|
| Tenrec          | EYTPIDSNIAFSVNASDKGEASCCDQLGAAFEGLRRLFTQWGAFCVRNPGCVIFFSLVF   |
| Macrobat        | EYTPIDSNIAFSVNARDKGEASCCDPLGAAFEGLRRLFTQWGSFCVRNPGCVIFFSLVF   |
| Hyrax           | EYTPIDSNIAFSVNTSDKGAASCCGPLGAAFESSLRRLFTQWGAFCVRNPGCVVFFSLVF  |
| Tree shrew      | EYTPIDSNIAFSVNASDKGEASCCDPLGAAFEGLRRLFTQWGSFCVRNPGSIIFFSLVF   |
| Armadillo       | EYAPIDSKIASSVNSSNKGEASCCDALSVTLEGFMRQLFTRWGSFCFRNPGCVIFFSLVF  |
| Kangaroo rat    | EYTPIDSNIAFSVNSSDKGDTSCCDPLGAAFEGLRRLFTQWGAFCVRNPXXXXXSLIL    |
| Shrew           | EYTPIDSNIAFSVNASDKGEASCCDPLGAAFEGLRRLFTQWGSFCVRNPGVILFFSLAF   |
| Dolphin         | EYTPIDGNIAFSVNASDKGSPSCDLSLGAAFEARLQRLFTRWGLFCVQHPGCVIFFSV-F  |
| Cow             | EFTPIDGNIPFSINASDKGPTCCDPLGAAFEAHLRRLFEWWGSFCVRHPGCVVFFSVAF   |
| Pig             | EYTPIDGNIAFSVNSSDKGQAFCCDPLGAAFERGLRRLFAQWGAFCVRHPGCVVFFSLAF  |
| Weasel          | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX |
| Panda           | EYTPIDSNIAFSVNASDKGEASCCDALAAFEGLRRLFSRWGSFCVRNPGCIIFFSLAF    |
| Dog             | EYTPIDSNIAFSVNAGDTGEASCCDALGAAFEGLRRLFTQWGSFCIRNPGCIIFFSLAF   |
| Cat             | EYTPIDSNIAFSVNANDRGEASCCDALGAAFEGLRRLFSQWGSFCVRNPGPIIFFSLAF   |
| Microbat        | EYTPIDSSIAFPMSVSDTGEASCCDPLGAAFEGLRRLFTRWGSFCVRNPGCVIFFSLAF   |
| Horse           | EYTPIDSNIAFSVNASDKGEAACCDPLGAAFEGLRRLFARWGSFCVRNPGCVVFFSLAF   |
| Mouse lemur     | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX |
| Pika            | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX |
| Rabbit          | EYTPIDSNIAFSVNTSDKGEASCCDLLGAAFEGLRRLFTRWGSFCVRNPGCVIFFSLGF   |
| Orangutan       | EYTPIDSNIAFSVNADKGEASCCDPVSAAFEGLRRLFTRWGSFCVRNPGCVIFFSLVF    |
| Human           | EYTPIDSNIAFSVNASDKGEASCCDPVSAAFEGLRRLFTRWGSFCVRNPGCVIFFSLVF   |
| Chimpanzee      | EYTPIDSNIAFSVNASDKGEASCCDPVSAAFEGLRRLFTRWGSFCVRNPGCVIFFSLVF   |
| Gorilla         | EYTPIDSNIAFSVNASDKGEASCCDPVSAAFEGLRRLFTRWGSFCVRNPGCVIFFSLVF   |
| Marmoset        | EYTPIDSNIAFSVNASDKGEVSCCDPVSAAFEGLRRLFTRWGSFCVRNPGCVIFFSLVF   |
| Macaque         | EYTPIDSNIAFSVNASDKGEASCCDPVSAAFEGLRRLFTRWGSFCVRNPGCVIFFSLVF   |
| Gibbon          | EYTPIDSNIAFSVNASDKGEASCCDPVSAAFEGLRRLFTRWGSFCVRNPGCVIFFSLVF   |
| Baboon          | EYTPIDSNIAFSVNASDKGEASCCDPVSAAFEGLRRLFTRWGSFCVRNPGCVIFFSLVF   |
| Bushbaby        | EYTPIDSSIAFSVNGSDKGEASCCDPVGAAFEGLRRLFTRWGSFCVRNPGCVIFFSLVF   |
| Tarsier         | EYTPIDSNIAFSVNSSDKGEVSCCDPLGVAFEGLRRLYTWWG---FLNPGCVIFFSLVF   |
| Mouse           | EYTPIDSNIAFSVNSSDKGEASCCDPLGAAFDCLRRMFTKWGAFCVRNPCTCIIFFSLAF  |
| Rat             | EYTPIDSNIAFSSNSSDKGEASCCDPLGVAFDDCLRRMFTKWGAFCVRNPCTCIIFFSLVF |
| Hamster         | EYTPIDSNIAFSSNTSDKGEASCCDPLGAAFDCLRRMFTKWGAFCVRNPCTCIIFFSLVF  |
| Guinea pig      | EYTPIDSNMALGGDTSDKGEIACCDPLGTCTFEGCLRHLFTRWGAFCVQRPYVIFSLVF   |
| Opossum         | EYTPIDGNIAFSINASDRGEASCCDQLGVAFEGLTQVFTRWGSFCVRKPVLVIFLSLVF   |
| Tasmanian devil | XXXXXXXXXXXXXXXXXXGEASCGDRLGAVFESCLTQGFTRWGSFCVRNPVPVVICSLFF  |
| Platypus        | EYAPIDSNIAFSVNASDKGEASRCERLGEMFESGLRWAFSRWGSFCVRHPLPVVVASLAF  |
| Elephant        | EYTPIDSNMAFSVNASDKGEASCCDPLGAAFEGLRRLFTRWGVFCVRNPGCVVFFSLVF   |
| Wallaby         | EYTPIDGNIAFSVNASDRGEASCEQLGAAFEGLIKGFTQWGSFCVRNP-CVIFCSLVF    |
| Sloth           | EYTPIDSNIAFSVNASDQXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX       |
| Hedgehog        | EYTPIDSNIAFSVNASDKGEVSCCDPVSAAFENCLRQLFSQWGSFCVRNPGCIIFFSVAF  |
| Squirrel        | XXXXXXXXXXXXXXXXXXEASCCDRLGAAFEGLRRLFTQWGSFCVRNPGCVIFFSVVF    |

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|-----------------|----------------------------------------------------------------------|
| Tenrec          | IGVCSLGLMFVQVTTNPVDLWSSPSSQARHEKEYFDTHFGPFFRTEQLIIRAPQTRKHTY         |
| Macrobat        | IATCSSGLVFVQVTTNPVHLWSAPSSQARLEKEYFDTHFGPFFRTEQLIIRAPHTATHY          |
| Hyrax           | IGVCCSGLVFLRVTTNPIDLWSAPSSQTRQEKEYFDTHFGPFFRTEQLIIRAPHTAKHTY         |
| Tree shrew      | IAACSSGLVFVRVTTNPVDLWSAPNSQARLEKEYFDAHFGPFFRTEQLIIRAPHTDRHTY         |
| Armadillo       | IGVCSGLVFVRVTTNPVDLWSAPSSQARLEKEYFDAHFGPFFRTEQLIIRAPHTARHTY          |
| Kangaroo rat    | XXXXXXXXXXXXXXXXXXXXXWSSPNSQARLEKEYYDTHFGPFFRTEQLIIRAPHTSVHIY        |
| Shrew           | IGACASGLVFVRITTNPVELWSAPSSQARQEKQYFDTHFGPFFRTEQLIIRAPHTKAHTY         |
| Dolphin         | IAACSSGLVFVQVTTDPVDLWSAPGSQARREKEYFDTHFGPFFRTEQLIIRAPLTPHMY          |
| Cow             | IAACSSGLVFIQVTTDPVDLWSAPGSQARLEKEYFDTHFGPFFRTEQLIIRAPHTPHIY          |
| Pig             | IVACSSGLVFIRVTTDPVDLWSAPGSQARREKEYFDTHFGPFFRTEQLIIRATNNQSHIY         |
| Weasel          | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX |
| Panda           | IAACSSGLVFVRVTTNPVDLWSAPGSQARLEKEYFDTHFGPFFRTEQLIIRAPNTSAHTY         |
| Dog             | IAACSSGLVFSRVTTNPVDLWSAPGSQARLEKEYFDAHFGPFFRTEQLIIRAPHTSVHTY         |
| Cat             | IAACSSGLVFVRVTTNPVDLWSAPSSQARLEKEYFDTHFGPFFRTEQLIIRAPHTSAHTY         |
| Microbat        | IAACSSGLVFVRITTNPVDLWSAPSSQARLEKEYFDTHFGPFFRTEQLIIRAPHTAVHTY         |
| Horse           | IAACSSGLVFVRVTTNPVDLWSAPSSQARLEKEYFDAHFGPFFRTEQLIIRAPHTGHVHTY        |
| Mouse lemur     | XXXXXXXXXXXXXVTTIPVDLWSAPASQARLEKEYFDQHFGPFFRTEQLIIRAPLTKHHTY        |
| Pika            | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXFNPHSGLLFRTEQLIIRAPHTDKHIY      |
| Rabbit          | IAACSSGLVYVRVTTNPIDLWSAPSSQARQDKEFFDAHFGPFFRTEQLIIRAPHTNKHTY         |
| Orangutan       | VTACSSGLVFVRVTTNPVDLWSAPSSQARLEKEYFDQHFGPFFRTEQLIIRAPLTKHHTY         |
| Human           | ITACSSGLVFVRVTTNPVDLWSAPSSQARLEKEYFDQHFGPFFRTEQLIIRAPLTKHHTY         |
| Chimpanzee      | ITACSSGLVFVWVTTNPVDLWSAPSSQARLEKEYFDQHFGPFFRTEQLIIRAPLTKHHTY         |
| Gorilla         | ITACSSGLVFVRVTTNPVDLWSAPSSQARLEKEYFDQHFGPFFRTEQLIIRAPLTKHHTY         |
| Marmoset        | IACSSGLVFVRVTTNPVDLWSAPSSQARLEKEYFDQHFGPFFRTEQLIIRAPLTKHHTY          |
| Macaque         | IACSSGLVFVRVTTNPIDLWSAPSSQARLEKEYFDQHFGPFFRTEQLIIRAPLTKHHTY          |
| Gibbon          | ITACSSGLVFVRVTTNPVDLWSAPSSQARLEKEYFDQHFGPFFRTEQLIIRAPLTKHHTY         |
| Baboon          | IACSSGLVFVRVTTNPIDLWSAPSSQARLEKEYFDQHFGPFFRTEQLIIRAPLTKHHTY          |
| Bushbaby        | ITTCSSGLVFIRVTTNPVDLWSAPRSQARLEKEYFDQHFGPFFRTEQLIIRAPLTKHHTY         |
| Tarsier         | IVVCSGSMVIRVTTNPVDLWSAPSSQARLEKEYFDQHFGPFFRTEQLIIRAPLTKHHTY          |
| Mouse           | ITVCCSSGLVFVQVTTNPVELWSAPHSQARLEKEYFDKHFGPFFRTEQLIIRAPNTSVHIY        |
| Rat             | IAACSSGLVFVQVTTNPVELWSAPHSQARLEKEYFDKHFGPFFRTEQLIIRAPNTSVHIY         |
| Hamster         | ITACSSGLVFVRVTTNPVELWSAPHSRARLEKEYFDKHFGPFFRMEQLIIRAPNTSEHIY         |
| Guinea pig      | IASCSSGLVFVRLTTNPVDLWSAPSSQARLEKEYFDTHFGPFFRTEQLIIRAPHTGKHPY         |
| Opossum         | ISVCCSGLVFMRLTTNPVDLWSAPSSQAHLKEYFDTHFGPFFRTEQLIIRAPHTNPHTY          |
| Tasmanian devil | IACSSGLVFMRLATNPVDLWSAPNSQAHLKEYFDTHFGPFFRTEQLIIRAPHTKGHIY           |
| Platypus        | IAACSSGLASVRITTNPVDLWSASGSQARREKEYFDTRFGPFFRTEQLIIRAPNTSRHTF         |
| Elephant        | IGVCCSGLVFVRVTTNPIDLWSAPNSQGRREKEYFDMHFGPFFRTEQLIIRAPNTSKHIY         |
| Wallaby         | IAACSSGLVFMRLTTNPVDLWSAPNSQAHLKEYFDTHFGPFFRTEQLIIRAPNTSKHIY          |
| Sloth           | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX |
| Hedgehog        | IAACSSGLVFVQVTTNSVDLWSAP-SQARLEKE-YDTHG-PFFRTXXXXXXXXXXXXXHTY        |
| Squirrel        | IAACSSGLAFVRVTTNPVDLWSSASSQARQDKEYFDTHFGPFFRTEQLIIRAPNTSKHIY         |

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|--------------|----------------------------------------------------------------------|
| Tenrec       | SPYPSGADVSGFPFLDKEILHQXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX-XXX       |
| Macrobat     | QPYPTETDVPFGPFLDIEILHQXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX-XXX       |
| Hyrax        | QPYPSGADVPGFPFLNIEILHQVLDLQTAIENITASYNNETVTLQDICLAPLSPYN-KNC         |
| Tree shrew   | KPYPSGADVPGFPFLDLEILHQVLDLQTAIENITASYNNETVTLQDICLAPLSPYN-KNC         |
| Armadillo    | SPYPSGADVPGFPFLNIGILHQVLDLQTAIENITASYNNETVTLQDICLAPLSPYN-KNC         |
| Kangaroo rat | EPYPSGANVPFGFPFLDLEILHQVLDLQTDIENIVAFYNNETVTLQDICVAPLSPYN-KNC        |
| Shrew        | EPYPSGSDVPFGFPFLDKEILHQVLELQTAIENITASYNNETVTLQDICLTPLSPIN-RNC        |
| Dolphin      | HPYPSGADVPGFPFLAVDILHQVLDLQTAIENITASYNNETVTLQDICLAPLSPYN-KHC         |
| Cow          | EPYPSGADVPGFPFLAVDILHQVLDLQTAIESITASYNNETVTLRDCVAPLSPYN-QNC          |
| Pig          | HPYPAGADVPGFPFLSRDILHQVLDLQTAIENITASYNNETVTLQDICLAPLSPYN-KNC         |
| Weasel       | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX |
| Panda        | QPYPSGSDVPFGFPFLDIGILHQVLDLQTAIENITAFYNNETVTLQDICVAPLSPYN-KNC        |
| Dog          | QPYPSGSDVPFGFPFLDIGILHQVLDLQTAIENITATYNNETVTLQDICVAPLSPYN-KNC        |
| Cat          | QPYPSGSDVPFGFPFLDLAILHQVLDLQTAIENITASYNNETVTLQDICVAPLSPYN-KNC        |
| Microbat     | EPYPSGSDVPFGFPFLDKGILHQVLDLQTAIEHITASHNETVTLQDICLAPLSPYN-KNC         |
| Horse        | EPYPSGADVPGFPFLALEVLHQVLDLQTAIENITASYNNETVTLQDICLAPLSPYN-KNC         |
| Mouse lemur  | EPYPSGADVPGFPFLDVEILHQVLDLQTAIENITASYNNETVTLRDCVAPLSPYN-ENC          |
| Pika         | QPYPSGADVPGFPFLDKQILHQVLDLQTAIENITASYNNETVTLQDICLAPLAPYN-KNC         |
| Rabbit       | QPYPSGADVPGFPFLDKQILHQVLDLQTAIEDITASYNNETVTLQDICLAPLSPYN-KNC         |
| Orangutan    | QPYPSGADVPGFPFLDIQILHQVLDLQIAIENITASYNNETVTLQDICLAPLSPYN-TNC         |
| Human        | QPYPSGADVPGFPFLDIQILHQVLDLQIAIENITASYNNETVTLQDICLAPLSPYN-TNC         |
| Chimpanzee   | QPYPSGADVPGFPFLDIQILHQVLDLQIAIENITASYNNETVTLQDICLAPLSPYN-TNC         |
| Gorilla      | QPYPSGADVPGFPFLDIQILHQVLDLQIAIENITASYNNETVTLQDICLAPLSPYN-THC         |



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|-----------------|---------------------------------------------------------------|
| Marmoset        | QPYPSGADVPFGPFLDIQILHQVLDLQIAIENITASYNNETVTLQDICLAPLSPYN-TNC  |
| Macaque         | QPYPSGADVPFGPFLDIQILHQVLDLQIAIENITASYNNETVTLQDICLAPLSPYN-TNC  |
| Gibbon          | QPYPSGADVPFGPFLDIQILHQVLDLQIAIENITASYNNETVTLQDICLAPLSPYN-TNC  |
| Baboon          | QPYPSGADVPFGPFLDIQILHQVLDLQIAIENITASYNNETVTLQDICLAPLSPYN-TNC  |
| Bushbaby        | EPYPSGADVPFGPFLNVEILHQVLDLQTAIENITASYNNETVTLQDICVAPLSPYN-KNC  |
| Tarsier         | QPYPSGADVPFGPFLDLEILHQVLDLQTTIENITASYNNGTVTLQDICLAPLSPYN-KNC  |
| Mouse           | EPYPAGADVPFGPFLNKEILHQVLDLQIAIESITASYNNETVTLQDICVAPLSPYN-KNC  |
| Rat             | EPYPSGADVPFGPFLNKEILHQVLDLQIAIESITASYNNETVTLQDICVAPLSPYN-KNC  |
| Hamster         | EPYPSGSDVSFGPFLNKEILHQVLDLQIAIESITTSYNKTVTLQDICVAPLSPYN-KNC   |
| Guinea pig      | SPYPSGADVPFGPFLDKEILHQVLDLQIAIENITAYYNNETVTLGDICLAPLSPYN-KNC  |
| Opossum         | EPYPSGADVPFGPFLDKGILHQVLDLQTAIENITAFYNNETVTLFQDICLAPLSPYN-NNC |
| Tasmanian devil | QPYPSGADVPFGPFLDKGILHQVLDLQTAIENITASYNNETVTLQDICLAPLSPYN-NNC  |
| Platypus        | SPYPSGTDVPFGPFLDKTILHKVLDLQTAIENITASYNNETVTLQDICLAPLSPYN-DNC  |
| Elephant        | QPYPSGTDVPFGPFLNIEILHQVLDLQTAIENITALCQNTVTLQDICLAPLSPYN-KNC   |
| Wallaby         | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  |
| Sloth           | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  |
| Hedgehog        | QP-PSGSDV-FGPF-DIELHQXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX |
| Squirrel        | QPYPSGADVPFGPFLDKEILHQXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX    |

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|-----------------|---------------------------------------------------------------------------|
| Tenrec          | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXAPASLNDTSLHDPCLGTFGG |
| Macrobat        | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXAPASLNDTSLHDPCLGTFGG |
| Hyrax           | TILSVLNIFYQNSHVSVDHNVGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG              |
| Tree shrew      | TIMSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Armadillo       | TIMSVLNIFYQNSHVSVDHVKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG              |
| Kangaroo rat    | TIMSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Shrew           | TILSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Dolphin         | TIMSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Cow             | TILSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Pig             | TILSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Weasel          | XXXXXXXXHHHQNSHVSVDHKGDDFFVYADYHTHLLYCVRAPASLNDTSLHDPCLGTFGG              |
| Panda           | TILSVLNIFYQNSHVSVDHKGDDFFVYADYHTHLLYCVRAPASLNDTSLHDPCLGTFGG               |
| Dog             | TIMSVLNIFYQNSHVSVDHKGDDFFVYADYHTHLLYCVRAPASLNDTSLHDPCLGTFGG               |
| Cat             | TILSVLNIFYQNSHVSVDHKGDDFFVYADYHTHLLYCVRAPASLNDTSLHDPCLGTFGG               |
| Microbat        | TILSVLNIFYQNSHVSVDHKGDDFFVYADYHTHLLYCVRAPASLNDTSLHDPCLGTFGG               |
| Horse           | TIMSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Mouse lemur     | TILSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Pika            | TILSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Rabbit          | TILSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Orangutan       | TIMSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Human           | TILSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Chimpanzee      | TILSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Gorilla         | TILSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Marmoset        | TIMSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Macaque         | TIMSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Gibbon          | TIMSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Baboon          | TIMSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Bushbaby        | TILSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Tarsier         | TIMSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Mouse           | TIMSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Rat             | TIMSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Hamster         | TILSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Guinea pig      | TILSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Opossum         | TILSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Tasmanian devil | TILSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Platypus        | TIMSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Elephant        | TILSVLNIFYQNSHVSVDHKGDDFFVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG               |
| Wallaby         | XXXXXXXXXXXXXXXXXXXXXXXXXXXXVYADYHTHFLYCVRAPASLNDTSLHDPCLGTFGG            |
| Sloth           | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXAPASLNDTSLHDPCLGTFGG |
| Hedgehog        | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXAPASLNDTSLHDPCLGTFGG |
| Squirrel        | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXAPASLNDTSLHDPCLGTFGG |

|          |                                                            |
|----------|------------------------------------------------------------|
| Tenrec   | PVFPWLVLGGYDAQNYNNATDLVITFPVNNHYNDTKLQKALAWERXXXXFVKYKNPNL |
| Macrobat | PVFPWLVLGGYDDQNYNNATDLVITFPVNNHYNDTKLQKALAWERXXXXFVKYKNPNL |
| Hyrax    | PVFPWLVLGGYDDQNYNNATDLVITFPVNNHYNDTKLQKALAWERXXXXFVKYKNPNL |



|                 |                                                                    |
|-----------------|--------------------------------------------------------------------|
| Tree shrew      | PVFPWLVLGGYDDQNYGNATALVITFPVNNYYNDTEKLQQAQAWKEKEFINFVKNYKNPNL      |
| Armadillo       | PVFPWLVLGGYDDQNYNNATALVITFPVNNYYNDTEKLQRAQAWEREFINFVKYKNPNL        |
| Kangaroo rat    | PVFPWLVLGGYDDQNYNNATALVITFPVNNYYNDTEKLQKAQAWEKELINFVKYNSNPNL       |
| Shrew           | PVFPWLVLGGYDDQNYNNATALVMTFPVNNYYNDTEKLRRTEAWEREFINFVKSYKHPNL       |
| Dolphin         | PVFPWLVLGGYDDENYNNATALVITFPVNNYRNDTEKLQKAQAWEREFINFVKYKNPNL        |
| Cow             | PVFPWLVLGGYDDQNYNNATALVITFPVNNYYNDTEKLQRAQAWEREFINFVQNYENPNL       |
| Pig             | PVFPWLVLGGYDDQNYNNATALVITFPVNNYYNDTEKLQRAQAWSEFINFVKYKNPNL         |
| Weasel          | PVFPWLVLGGYDDQNYNNATALVITFPVNNYYNDTEKLQRAQAWKEKEFINFVKNYENPNL      |
| Panda           | PVFPWLVLGGYDDQNYNNATALVITFPVNNYYNDTEKLQRAQAWKEKEFINFVKNYENPNL      |
| Dog             | PVFPWLVLGGYDDQNYNNATALVITFPVNNYYNDTEKLQRAQAWKEKEFINFVKNYENPNL      |
| Cat             | PVFPWLVLGGYDDQNYNNATALVITFPVNNYYNDTERLQKAHVWEKEKEFINFVKYKNPNL      |
| Microbat        | PVFPWLVLGGYDDQNYNNATALVMTFPVNNYYNDTEKLQRAQAWEREFINFVKYKNPNL        |
| Horse           | PVFPWLVLGGYDDQNYNNATALVITFPVNNYYNDTEKLQRALAWEREFINFVKYKNPNL        |
| Mouse lemur     | PVFPWLVLGGYDDQNYNNATALVITFPVSNNYYNDTEKLQRAQAWKEKEFINFVKYKNPNL      |
| Pika            | PVFPWLVLGGYDDQNYNNATALVITFPVNNYYNDTEKLQRAQAWKEKEFIDFVKYKNPNL       |
| Rabbit          | PVFPWLVLGGYDDQNYNNATALVITFPVSNNYYNDTEKLQRAQAWKEKEFINFVKYKNPNL      |
| Orangutan       | PVFPWLVLGGYDDQNYNNATALVITFPVNNYYNDTEKLQRAQAWKEKEFINFVKYKNLNL       |
| Human           | PVFPWLVLGGYDDQNYNNATALVITFPVNNYYNDTEKLQRAQAWKEKEFINFVKYKNPNL       |
| Chimpanzee      | PVFPWLVLGGYDDQNYNNATALVITFPVNNYYNDTEKLQRAQAWKEKEFINFVKYKNPNL       |
| Gorilla         | PVFPWLVLGGYDDQNYNNATALVITFPVNNYYNDTEKLQRAQAWKEKEFINFVKYKNPNL       |
| Marmoset        | PVFPWLVLGGYDDQNYNNATALVITFPVSNNYYNDTEKLQRAQAWKEKEFINFVKYKNSNL      |
| Macaque         | PVFPWLVLGGYDDQNYNNATALVITFPVNNYYNDTEKLQRAQAWKEKEFINLVRNYKNPNL      |
| Gibbon          | PVFPWLVLGGYDDQNYNNATALVITFPVNNYYNDTEKLQRAQAWKEKEFINFVKSYKNPNL      |
| Baboon          | PVFPWLVLGGYDDQNYNNATALVITFPVNNYYNDTEKLQRAQAWKEKEFINLVRNYKNPNL      |
| Bushbaby        | PVFPWLVLGGYDDENYNNATALVITFPVNNYYNDTEKLQRAQAWKEKEFIDFVKYKNPNL       |
| Tarsier         | XXXXXXXXXXXXQNYNNATALVITFPVNNYYNDTEKLQRAQAWKEKELINFVKYKNPNL        |
| Mouse           | PVFPWLVLGGYDDQNYNNATALVITFPVNNYYNDTERLQRAWAWKEKEFISFVKYKNPNL       |
| Rat             | PVFPWLVLGGYDDQNYNNATALVITFPVNNYYNDTEKLQRAWAWKEKEFINFVKYKNPNL       |
| Hamster         | PVFPWLVLGGYDDQNYNNATALVITFPVSNNYYNDTEKLQRAQAWKEKEFIDFVKSYKNPNL     |
| Guinea pig      | PVFPWLVLGGYDDQNYNNATALVITFPVNNYYDDPEKLQRAQAWKEKEFIHFVSNYKNPNL      |
| Opossum         | PIFPWLVLGGYDDQNYNNATALVITLPVNNYYNTEKLQKAQAWKEKEFINFVKYKNPNL        |
| Tasmanian devil | PIFPWLVLGGYDDQNYNNATALVITLPVNNYYNTEKLQKAQAWKEKEFISFVKYKNPNL        |
| Platypus        | PVFPWLVLGGYDDQNYNNATALVITFPVNNYHNDTEKLRRAEAWKEKEFIRFVRDYKDPNL      |
| Elephant        | PVFPWLVLGGYDDQNYNNATALVITFPVNNYYNDTEKLQRAQAWEREFINFVKNYENPNL       |
| Wallaby         | PIFPWLVLGGYDEQNYNNATALVITLPVNNYYNTEKVQRAQAWETEFIHFIKNYRNPNL        |
| Sloth           | PVFPWLVLGGYDDQNYNNATALVITFPVNNYYNTEKLQRAQAWEREFINFKN-YKNPNL        |
| Hedgehog        | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXFIHFVSNYKNPNL |
| Squirrel        | XXXXXXXXXXXXQNYNNATALVITFPVNNYYNDTEKLQRAQAWKEKEFINFVKYKNPNL        |

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|--------------|---------------------------------------------------------------|
| Tenrec       | TISFTAERSIEDELNRQSNSDVFTVAISYTMFVYISIAVGHIRSCHRLMVDSKVSGLGIA  |
| Macrobat     | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX |
| Hyrax        | TISFTAERSIEDELNRSGDVFTTVISYAIMFLYISIALGHIKSCSRLLXXXXXXXA      |
| Tree shrew   | TISFTSERSIEDELNRNSNDVFTTVISYAIMFLYISIALGHIKSCHRFLVDSKISLGLIA  |
| Armadillo    | TISFIAERSVEDELDRNSNDVFTIIISYAVMFLYISIALGHIKSLSRFLXXXXXXX      |
| Kangaroo rat | TISFTTERSIEDELNRNSNDVFTIIAISYAIMFLYISIALGHIKSCSRLLXXXXXXX     |
| Shrew        | TISFTAERSIEDELNRKSDVFTTVISYAIMFLYISIALGHIKSCRLLVDSKISLGLIA    |
| Dolphin      | TISFKAERSIEDEINRNSNDIFTVLISYIGIMFLYISIALGHIESCSRFLVDSKISLGLIA |
| Cow          | TISFKAERSIEDELNRNSNDVFTVLISYGMFLYISIALGHIKSCRLLVDSKISLGLIA    |
| Pig          | TISFMAERSIEDELNRNSDLFTILISYAIMFLYISIALGHIKSCSRLVDSKISLGLIA    |
| Weasel       | TISFTTERSIEDELNRNSGDVFTVLISYAVMFLYISIALGHIKSWSRFLVDSKISLGLIA  |
| Panda        | TISFTTERSIEDELNRNSGDVFTVLISYAVMFLYISIALGHIKSCSRFLVDSKISLGLIA  |
| Dog          | TISFTTERSIEDELNRNSGDVFTVLISYAVMFLYISIALGHIKSCSRFLVDSKISLGLIA  |
| Cat          | TISFTTERSIEDELNRNSGDIFTVIIISYAIMFLYISIALGHIKSCSRLVDSKISLGLIA  |
| Microbat     | TISFTAERSIEDELNRNSDISTVVTISYAVMFLYISIALGHIQSCSRLVDSKVSGLGIA   |
| Horse        | TISFSAERSIEDELNRNSDVFTTVISYAVMFLYISIALGHIKSCSRLVDSKISLGLIA    |
| Mouse lemur  | TISFSAERSIEDELNRNSDVFTVLISYAIMFLYISIALGHIKSCRLLVDSKVSGLGIA    |
| Pika         | TISFTAERSIEDELNRNSDVFTTVISYAVMFLYISIALGHIKSCRLLS-----GFA      |
| Rabbit       | TISFTAERSIEDELDRNSNDVFTTVISYAVMFLYISIALGHIKSCRRFLVDSKVSGLGIA  |
| Orangutan    | TISFTAERSIEDELNRNSDVFTIVISYAIMFLYISIALGHIKSCRLLVDSKVSGLGIA    |
| Human        | TISFTAERSIEDELNRNSDVFTTVISYAIMFLYISIALGHIKSCRLLVDSKVSGLGIA    |
| Chimpanzee   | SISFTAERSIEDELNRNSDVFTTVISYAIMFLYISIALGHIKSCRLLVDSKVSGLGIA    |
| Gorilla      | TISFTAERSIEDELNRNSDVFTTVISYAIMFLYISIALGHIKSCRLLVDSKVSGLGIA    |
| Marmoset     | TISFTAERSIEDELNRNSDIFTVIIISYAIMFLYISIALGHIKSCRLLVDSKVSGLGIA   |
| Macaque      | TISFSAERSIEDELNRNSDIFTVVISYAIMFLYISIALGHIKSCRLLVDSKISLGLIA    |
| Gibbon       | TISFTAERSIEDELNRNSDVFTTVISYAIMFLYISIALGHIKSCRLLVDSKVSGLGIA    |

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|-----------------|----------------------------------------------------------------|
| Baboon          | TISFSAERSIEDELNRESNSDIFTVVISYAIMFLYISLALGHIKSCRRLLVDSKISLGLIA  |
| Bushbaby        | TISFSAERSIEDEINRESNSDLFTIVISYAVMFVYISLALGHIKSCHRLVDSKVSLGLIA   |
| Tarsier         | TISFTTER--IEDLNRESNSDFTVVISYGMFLYISLALGHIKSCRKXXVDSKISLGLIA    |
| Mouse           | TISFTAERSIEDELNRESNSDVFTVIISYVVMFLYISLALGHIQSCSRLLVDSKISLGLIA  |
| Rat             | TISFTAERSIEDELNRESNSDVFTVLISYAVMFLYISLALGHIQSWNRVLVDSKISLGLIA  |
| Hamster         | TISFIAERSIEDELNRESNSDVFTTIAISYAIMFLYISLALGHIKSCSRLLVDSKISLGLIA |
| Guinea pig      | TISFTAERSIEDELNRESNSDVFTIVISYAVMFLYISLALGHIRGCCRFLLDSKISLGLIV  |
| Opossum         | TISFSAERSIEDEINRESNGDVFTVLISYAVMFLYISIALGHIKSCHRFLVDSKISLGLIA  |
| Tasmanian devil | TISFSAERSIEDEINRESNGDVFTVLISYAVMFLYISIALGHIKSFHRFLVDSKISLGLIA  |
| Platypus        | TISFSAERSIEDELNRESNSDIFTVVISYAVMFLYISLALGHIKFSRLLVDSKISLGLIA   |
| Elephant        | TISFTAERSIEDELNRESNSDVLTIVISYAIMFFYISVALGHIKSCSRLLVDSKISLGLVA  |
| Wallaby         | TISFSAERSIEDEINRESNGDVFTILISYGMFLYISIALGHIKRSCHRFLVELKSSLGLIA  |
| Sloth           | TISFTAERSIEDELNRESNSDIFTIISYAIMFLYISVALGHIKSCRRFLVDSKISLGLIA   |
| Hedgehog        | TVSFSAEQSIIEDELNRESNSDVFTIMISYGMFLYISIALGHIKSCSRILVDSKVSLGLIA  |
| Squirrel        | TISFTTERSIEDELNRESNGDIFTVVISYAIMFLYISLALGXVDSKISLGLIT          |

|                 |                                                                |
|-----------------|----------------------------------------------------------------|
| Tenrec          | GILIVLSSVACSLGIFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTYQORDERLQGET  |
| Macrobat        | XXFIVLSSVACSLGIS-YIGIPLTLIVIEVIPFLVLAIGVDNIFILVQTYQORDERLQGET  |
| Hyrax           | GIVIVLSSVCSLGIIFSYYIGIPLT-IVIEVIPFLVLAVGVDNIFILVQTYQORDERHQGET |
| Tree shrew      | GILIVLSSVACSLGIFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTYQORDERLHGET  |
| Armadillo       | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX   |
| Kangaroo rat    | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX   |
| Shrew           | GILIVLSSVACSLGIFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTYQORDERLQGES  |
| Dolphin         | GILIVLSSVACSLGIFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTYQORDERLQGET  |
| Cow             | GVLIVLSSVACSLGIFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTYQORDERLQGET  |
| Pig             | GILIVLSSVACSLGIFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTYQORDERLQGET  |
| Weasel          | GILIVLSSVACSLGIFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTYQORDERLQGET  |
| Panda           | GILIVLSSVACSLGIFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTYQORDERLQGET  |
| Dog             | GILIVLSSVACSLGIFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTYQORDERLQGET  |
| Cat             | GILIVLSSVACSLGIFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTYQORDERLHGET  |
| Microbat        | GIFIVLSSVACSLGIFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTYQORDERLEGET  |
| Horse           | GILIVLSSVACSLGIFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTYQORDERLQGET  |
| Mouse lemur     | GILIVLSSVACSLGVFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTYQORDERLQGET  |
| Pika            | RLLMGLRSVDCSLGIFSYIGIPLTLIVIEIISFPLAVA--NNIFILVQTYQORDERLQGET  |
| Rabbit          | GILIVLSSVACSLGIFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTYQORDERLQGET  |
| Orangutan       | GILIVLSSVACSLGVFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQAYQORDERLQGET  |
| Human           | GILIVLSSVACSLGVFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQAYQORDERLQGET  |
| Chimpanzee      | GILIVLSSVACSLGVFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQAYQORDERLQGET  |
| Gorilla         | GILIVLSSVACSLGVFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQAYQORDERLQGER  |
| Marmoset        | GILIVLSSVCSLGVFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQAYQORDERLQGET   |
| Macaque         | GILIVLSSVACSLGIFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQAYQORDERLQGET  |
| Gibbon          | GILIVLSSVACSLGVFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQAYQORDERLQGET  |
| Baboon          | GILIVLSSVCSLGIIFSYYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQAYQORDERLQGET |
| Bushbaby        | GILIVLSSVCSLGIIFSYYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTYQORDERLQGET |
| Tarsier         | GILIVLSSVACSLGIFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTYQORDERLQGET  |
| Mouse           | GILIVLSSVACSLGIFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTYQORDERLQGET  |
| Rat             | GILIVLSSVCSLGIIFSYYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTYQORDERLQGET |
| Hamster         | GILIVLSSVACSLGVFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTYQORDERLQGET  |
| Guinea pig      | GILIVLSSVCSLGIIFSYYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTYQORDERLQGET |
| Opossum         | GILMVLSSVCSLGLFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTFQORDERLQGET   |
| Tasmanian devil | GILMVLSSVCSLGLFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTFQORDERLQGET   |
| Platypus        | GILIVLSSVACSLGIFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTFQORDERLQGET  |
| Elephant        | GILIVLSSVACSLGIFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTYQORDERHQGET  |
| Wallaby         | GILMVLSSVCSLGLFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTFQORDERLPGET   |
| Sloth           | GILIVLSSVCSLGIIFSYYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQAYQXXXXXXXXXX |
| Hedgehog        | GILIVLSSVACSLGIFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTYQORDERLQGET  |
| Squirrel        | GIVIVLSSVACSLGIFSYIGIPLTLIVIEVIPFLVLAVGVDNIFILVQTYQORDERLQGET  |

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|--------------|-----------------------------------------------------------------|
| Tenrec       | LDQHVGRLGEVAPSMFLSSSFSETVAFFLGALSVMFAVHTFSLFAGMAVFIDFLLQITCF    |
| Macrobat     | LDQQLGRILGEVA-SMLSSSFSETVAFFLGALSMMPAVHTFSLFAGMAVLIDFLLQITCF    |
| Hyrax        | LDQQVGRVLGEVAPSIFFLSSSFSETVAFFLGALSTMPAVHTFSLFAGMAVFIDFLLQITCF  |
| Tree shrew   | LDQQLGRVLGEVAPSMFLSSSFSETVAFFLGALSMMPAVHTFSLFAGMAVLIDFLLQITCF   |
| Armadillo    | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXALSMMPAVRTFSLFAGMAVFIDFLLQITCF |
| Kangaroo rat | LDQQLGRVLGEVAPTMFLSSSFSETVAFFLGALSTMPAVHTFSLFAGMAILIDFLLQITCF   |



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|-----------------|----------------------------------------------------------------|
| Mouse           | VSLGLDLIKRQEKNHLDILCCVRGADDGQGSASESYLFRFFKNYFAPLLKDWLRPIVV     |
| Rat             | VSFLGLDLIKRQEKNRDLILCCVRGPDGQESQASESYLFRFFKNAFAPLLTDWLRPVVM    |
| Hamster         | VSLGLDLIKRQEKNRDLILCCVGGTDNGRGIQASESYLFRFFKNSFAPLLKDWLRPIVI    |
| Guinea pig      | VSLGLMDIRRQEKNRDLILCCVQGANDRSVQASESCLFHFFKNSYSPLLLKDWMRPLVV    |
| Opossum         | VSLGLDLIKRQEKNKLDILCCVKIAEDRTGQPSESYLFKFFKNVFSSILLKDWMRPIVI    |
| Tasmanian devil | VSLGLDLIKRQEKNKLDILCCVRIAEDRTDSQPSESYLFQFFKNAFSPLLKDWMRPIVI    |
| Platypus        | VSLGLDLVKRQERNRDLILCCVRGGDEAAGQPSQGYLFQFFKNVYSPLLLKDWMRPLII    |
| Elephant        | VSLGLDLIKRQEKNRDLILCCVRGADDGASVQASESCLFRFFKNSYSPLLLKDWMRPIVV   |
| Wallaby         | VSLGLDLIKRQEKNKLDILCCVRIAEDRTSPQPSESCLFQFFKNGFSPLLLKDWMRPLVI   |
| Sloth           | VSLGLDLIKRQERNRDLILCCVRGTDGTSIQASENCLFQFFKNSYSPLLLKDWMRPIVV    |
| Hedgehog        | VSLGLDLIKRQEKNRMDILCCVRGAEDGTSVQASESYLFRFFKNSYSPLLLKDWMRPIVV   |
| Squirrel        | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXI |

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|-----------------|---------------------------------------------------------------|
| Tenrec          | AVFVGFLSFSIAVLNKVEIGLDQSLSMPSDSYVKDYFQSLSQYLHAGPPVYFVLEEGBDY  |
| Macrobat        | AVFMGVLFSFSIAVLNKVEIGLDQSLSVPPDSYVMDYFKSLSQYLHAGPPVYFVLEEGBNY |
| Hyrax           | AIFVGVLFSFSIAVLNKVEIGLNQSLSMPPDSYVIDYKLSLSQYLHAGPPVYFVLEEGBXX |
| Tree shrew      | AMFVGVLFSFSIAVLNKVEIGLDQSLSMPPDSYVVDYFKSLSQYLHAGPPVYFVLEEGBDY |
| Armadillo       | AVFVGVLFSFNI AVLNKVEIGLDQARSMPDXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  |
| Kangaroo rat    | AVFVGILSFSIAVLNKVEIGLDQSLSMPPDSYVTDYFRSLKQYLHSGPPVYFVLEEGBDY  |
| Shrew           | AVFVGVLFSFSIAVLNKVEIGLDQALSMPDSYVVDYFKSLSQYLHAGPPVYFVVEGBNY   |
| Dolphin         | AVFVGVLFSFSIAVLNKVEIGLDQSLSMPPDSYVTDYFQSLSRYLHAGPPVYFVMEGBDY  |
| Cow             | AVFVGVLFSFSIAVLNKVEIGLDQSLSMPPDSYVTDYFQSLNQYLHAGPPVYFVLEEGBDY |
| Pig             | AVFVGVLFSFSIAVLNKVEIGLDQSLSMPPDSYVMDYFQSLSRYLHAGPPVYFVVEGBNY  |
| Weasel          | AVFVGVLFSFSIAVLNKVEIGLDQSLSMPPDSYVLDYFTSLR-YLHAGPPVYFVLEEGBDY |
| Panda           | AVFVGVLFSFSIAVLNKVEIGLDQSLSMPPDSYMLDYFRSLK-SLHAGPPVYFVLEEGBDY |
| Dog             | AVFVGILSFSIAVLNKVEIGLDQSLSMPPDSYMMDYFKSLK-YLHAGPPVYFVLEEGBDY  |
| Cat             | AIFVGVLFSFSAVLNKVEIGLDQSLSMPPDXXXXXXXXXXXX-XXXXXXXXXXXXXXXXXX |
| Microbat        | AVFVGVLFSFSIAVLNKVEIGLDQSLSMPPDSYVMDYFRSLSRFLHAGPPVYFVVEGBDY  |
| Horse           | AVFVGVLFSFSIAVLNKVEIGLDQFLSMPPDSYVIDYFQSLRQYLHAGPPVYFVLEEGBDY |
| Mouse lemur     | AVFVGVLFSFSIAVLNKVEIGLDQHLSMPPDSYVVDYKLSISQYLHAGPPVYFVVEGBDY  |
| Pika            | AVFVGILSFSIAVLNKVEIGLDQSLSMPPDSYVVDYFRSLGQYLHAGPPVYFVLEEGBDY  |
| Rabbit          | AVFVGVLFSFSIAVLNKVEIGLDQSLSMPPDSYVVDYFKSLGQYLHAGPPVYFVLEEGBNY |
| Orangutan       | AIFVGVLFSFSIAVLNKVDIGLDQSLSMPPDSYVVDYFKSLSQYLHAGPPVYFVLEEGBDY |
| Human           | AIFVGVLFSFSIAVLNKVDIGLDQSLSMPPDSYVMDYFKSLSQYLHAGPPVYFVLEEGBDY |
| Chimpanzee      | AVFVGVLFSFSIAVLNKVDIGLDQSLSMPPDSYVVDYFKSLSQYLHAGPPVYFVLEEGBDY |
| Gorilla         | AIFVGVLFSFSIAVLNKVDIGLDQSLSMPPDSYVVDYFKSLSQYLHAGPPVYFVLEEGBDY |
| Marmoset        | AVFVGVLFSFSIAVLNKVDIGLDQSLSMPPDSYVVDYFKSLSQYLHAGPPVYFVLEEGBDY |
| Macaque         | AIFVGVLFSFSIAVLNKVDIGLDQFLSMPPDSYVVDYFKSMSQYLHAGPPVYFVLEEGBDY |
| Gibbon          | AIFVGVLFSFSIAVLNKVDIGLEQSLSMPPDSYVVDYFKSLSQYLHAGPPVYFVLEEGBNY |
| Baboon          | AIFVGVLFSFSIAVLNKVDIGLDQFLSMPPDSYVVDYFKSMSQYLHAGPPVYFVLEEGBDY |
| Bushbaby        | AVFVGVLFSFSAVLNKVEIGLDQYLSMPDSYVVDYFKSLSQYLHAGPPVYFVLEEGBNY   |
| Tarsier         | AVFVGVLFSFSIAVLNKVEIGLDQSLSMPPDSYVVDYFKAISQYLHAGPPVYFVLEEGBDY |
| Mouse           | AVFVGVLFSFSAVLNKVDIGLDQSLSMPPDSYVIDYFKSLAQYLHSGPPVYFVLEEGBNY  |
| Rat             | AVFVGILSFSIAVLNKVEIGLDQSLSMPPDSYVIDYFKSLGQYLHSGPPVYFVLEEGBNY  |
| Hamster         | AVFVGVLFSFSIAVMNKVEIGLDQSLSMPPDSYVIDYFKSLGQYLHSGPPVYFVLEEGBDY |
| Guinea pig      | AIFVGLLSFSAVLNKVEIGLDQSLSMPPDSYVIDYFRSLGQYLHAGPPVYFVVEGBDY    |
| Opossum         | SVFVGILSFSIAVLNKVEIGLDQSLSMPPDSYVLDYFKSLNQYLHAGPPVYFVLEEGBDY  |
| Tasmanian devil | SVFVGILSFSIAVLNKVEIGLDQSLSMPPDSYVLDYFKSLNQYLHAGPPVYFVLEEGBNY  |
| Platypus        | SVFVGILSFSIAVLNKVEIGLDQSLSMPPDSYVMDYFKALGQYLHAGPPVYFVLEEGBDY  |
| Elephant        | AIFVGVLFSFSIAVLNKVEIGLSQSLSMPPDSYVMDYFKSLSQYLHAGPPVYFVLEEGBDY |
| Wallaby         | SVFVGILSFSIAVLNKVEIGLDQSLSVPDXXXXXXXXXXXXXXXXXXXXXXXXXXXXX    |
| Sloth           | TVFVGVLFSFSIAVLNKVEIGLDQALSMPDSYVVDYFQSLSRYLHAGPPVYFVLEEGBDY  |
| Hedgehog        | AVFVGVLFSFSIAVMNKVEIGLDQSLSMPPDSYMTDYFKFLGQYLHAGPPVYFVLEEGBDY |
| Squirrel        | AVFVGVLFSFSIAVLNKVEIGLDQSLSMPPDSYVIDYFKSLGQYLHSGPPVYFVLEEGBNY |

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|              |                                                               |
|--------------|---------------------------------------------------------------|
| Tenrec       | TSLKGQNMVCGGTGCSNDSLVQQIFNAAQLDSYTRIGFAPSSWIDDYFDWIKPQSSCCRV  |
| Macrobat     | TSLAGQNMVCGGVGCNDSLVQQIFNAAELNYTRIGFAPSSWIDDYFDWIKPQSSCCRV    |
| Hyrax        | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX |
| Tree shrew   | TSLRGQNMVCGGTGCDNNSLVQQLFDAQLDSYTRIGFAPSSWIDDYFDWVKPQSSCCRI   |
| Armadillo    | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX |
| Kangaroo rat | TSQEGQNMVCGMGCDNDSLVQQIFNAAQLDNYTRIGFAPSSWIDDYFDWVKPQSSCCRV   |
| Shrew        | TSLKGQNMVCGGMGCDNDSLVQQIFNAAQMDNYTRIGFAPSSWIDDYFDWIKPQSSCCRV  |
| Dolphin      | ASLKGQNMVCGGLGCNDSLVQQIFTAAQLDNYTRIGFALSSLNDDYFDWVKPQSSCCRV   |
| Cow          | TSTKGQNMVCGGLGCNDSLVQQVFTAAQLDSYTRIGFAPSSWIDDYFDWVKPQSSCCRI   |

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|-----------------|----------------------------------------------------------------------|
| Pig             | TSLKQGNMVC GGLGCNND SLVQQIFTAAQLDNYTRIGFAPSSWIDDYFDWIKPQSSCCRV       |
| Weasel          | SSLKQGNMVC GGMGCNND SLVQQIFTAAQLDNYTRIGFAPSSWIDDYFDWVKPQSSCCRV       |
| Panda           | SSLKQGNMVC GTGCNND SLVQQIFTAAQLDNYTRIGFAPSSWLDYFDWVKPQSSCCRV         |
| Dog             | TSLEGQNMVC GGMGCNND SLVQQIFSAQLDNYTRIGFAPSSWIDDYFDWVKPQSSCCRV        |
| Cat             | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX |
| Microbat        | TSLQGGNLVC GGMGCNND SLVQQLFDAEELDYTRIGFAPSSWIDDYFDWVKPQSSCCRV        |
| Horse           | TSLKQGNMVC GGMGCNND SLVQQIFTAAQLDNYTRIGFAPSSWIDDYFDWVKPQSSCCRV       |
| Mouse lemur     | TSPKGQNMVC GGVGCNND SLVQQIFNAAQLDNYTRIGFAPSSWIDDYFDWVKPLSTCCRV       |
| Pika            | TSLQGGNMVC GGMGCNND SLVQQIFNAAQLDNYTRIGFAPSSWIDDYFDWVKPQSSCCRV       |
| Rabbit          | TSLQGGNMVC GGLGCNND SLVQQIFNAAQLDNYTRIGFAPSSWIDDYFDWVKPQSSCCRV       |
| Orangutan       | TSPKGQNMVC GGMGCNND SLVQQIFNAAQMDNYTRIGFAPSSWIDDYFDWVKPQSSCCRV       |
| Human           | TSSKGQNMVC GGMGCNND SLVQQIFNAAQLDNYTRIGFAPSSWIDDYFDWVKPQSSCCRV       |
| Chimpanzee      | TSSKGQNMVC GGMGCNND SLVQQIFNAAQLDNYTRIGFAPSSWIDDYFDWVKPQSSCCRV       |
| Gorilla         | TSSKGQNMVC GGMGCNND SLVQQIFNAAQLDNYTRIGFAPSSWIDDYFDWVKPQSSCCRV       |
| Marmoset        | TSPKGQNMVC GGMGCNND SLVQQIFNAAQLDNYTRIGFAPSSWIDDYFDWVKPQSSCCRV       |
| Macaque         | TSPKGQNMVC GGMGCNND SLVQQIFNAAQLDNYTRIGFAPSSWIDDYFDWVKPQSSCCRV       |
| Gibbon          | TSPKGQNMVC GTGCNND SLVQQIFNAAQLDNYTRIGFAPSSWIDDYFDWVKPQSSCCRV        |
| Baboon          | TSPKGQNMVC GGMGCNND SLVQQIFNAAQLDNYTRIGFAPSSWIDDYFDWVKPQSSCCRV       |
| Bushbaby        | TSLQGGNMVC GGMGCNND SLVQQIFNAAQLDNYTRIGFAPSSWIDDYFDWVKPQSSCCRV       |
| Tarsier         | TSPTGQNMVC GGMGCNND SLVQQIFNAAQLDNYTRIGFAPSSWLDYFDWVKPQSSCCRV        |
| Mouse           | SSRKQGNMVC GGMGCNND SLVQQIFNAAELDYTRVGFAPSSWIDDYFDWVSPQSSCCRL        |
| Rat             | SSRKQGNMVC GGMGCNND SLVQQIFNAAELDYTRVGFAPSSWIDDYFDWVSPQSSCCRL        |
| Hamster         | TTHKGQNMVC GGMGCNND SLVQQIFNAAELDYTRIGFAPSSWIDDYFDWVAPQSSCCRL        |
| Guinea pig      | TSRPGQNMVC GGMGCNND SLVQQIFNAAQLDNYTRIGFAPSSWIDDYFDWVKPQSSCCRL       |
| Opossum         | TSLEGQNMVC GGMGCNND SLVQQIFNAAELDYTRIGFAPSSWIDDYFDWIKPQSSCCRI        |
| Tasmanian devil | TSLEGQNMVC GGMGCNND SLVQQIFNAAELDYTRIGFAPSSWIDDYFDWIKPQSSCCRI        |
| Platypus        | TTLEGQNMVC GGMGCNND SLVQQIFNAAELDYTRIGFAPSSWIDDYFDWVKPQSSCCRV        |
| Elephant        | TSLRGQNMVC GGMGCNND SLVQQLFNAAELDYTRVGFAPSSWIDDYFDWVKPQSSCCRV        |
| Wallaby         | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX |
| Sloth           | TSLAGQNVVC GTGCNND SLVQQIFNAAELDYTRIGFTPSSWIDDYFDWIKPQSSCCRV         |
| Hedgehog        | TSLKQGNMVC GGMGCNND SLVQQIFTAAQLDNYTRIGFTPXXXXXXXXXXXXXXXXXXXXXX     |
| Squirrel        | ASLQGGNMVC GGMGCNND SLVQQIFNAAQLDNYTRIGFAPSSWIDDYFDWVKPQSTCCRV       |

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|--------------|----------------------------------------------------------------------|
| Tenrec       | FNVTEQFCNASVVD PACVRCRPLTPEGKQRPQGGDFMRFLPMFLSDNPNPKCGKGGAAY         |
| Macrobat     | YNNTDQFCNASVADPTCIRCRPLTPEGKQRPQGGDFMRFLPMFLSDNPNPKCGKGGAAY          |
| Hyrax        | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX |
| Tree shrew   | YNITDQFCNASVVD PACVRCRPLTPEGKQRPQGGDFMRFLPMFLSDNPNPKCGKGXXXXX        |
| Armadillo    | XXXXXXXXXXXXVDPACVRCRPLTPEGKQRPQGGDFMRFLPLFLSDNPNPKCGKGGAAY          |
| Kangaroo rat | YNSTDQFCNASVVNPECIRCRPLTPENKQRPQNRDFMKFLPMFLSDTP--KCGKGGAAY          |
| Shrew        | YNSTDQFCNASVVDPTCLRCRPLTPEGKQRPQGGDFMRFLPMFLSDNPNPKCGKGGAAY          |
| Dolphin      | YNSTDQFCNASVVD PACVHCRPLTPEGKQRPQGGDFMRFLPMFLSDNPNPKCGKGGAAY         |
| Cow          | YNSTEQFCNASVVNPTCVRCRPLTPEGKQRPQGGDFMRFLPMFLSDNPNPKCGKGGAAY          |
| Pig          | YNSTDQFCNASVVDPTCIRCRPLTSEGKQRPQGGDFMRFLPMFLSDNPNPKCGKGGAAY          |
| Weasel       | YNGTDRFCNASVVD PACGRCRPLTPEGKQRPQGGDFMRFLPMFLSDNPNPKCGKGGAAY         |
| Panda        | YNSTDQFCNASVVD PGCVRCRPLTPEGKQRPQGGDFMRFLPMFLSDNPNPKCGKGGAAY         |
| Dog          | YNSTDQFCNASVVD PACVRCRPLTQEGKRRPQGGDFMRFLPMFLSDNPNPKCGKGGAAY         |
| Cat          | YNSTDQFCNASVVD PACIRCRPLTQEGKQRPQGGDFMRFLPMFLSDNPNPKCGKGGAAY         |
| Microbat     | HNGSGQFCNASVADPGCIRCRPLTPEGKQRPQGGDFMRFLPMFLSDNPNPKCGKGGAAY          |
| Horse        | YNSTDQFCNASVVD PACVRCRPLTPEGKQRPQGRDFMRFLPMFLSDNPNPRCGKGGAAY         |
| Mouse lemur  | YNTSGQFCNASVAD PACVRCRPLTPEGKQRPQGGDFMRFLPMFLSDNPNPKCGKGGAAY         |
| Pika         | SNVTEQFCNASVVD PACVRCRPLTPEGKQRPQGGDFMRFLPMFLSDNPNPKCGKGGAAY         |
| Rabbit       | SNVTEQFCNASVVD PACVRCRPLTPEGKQRPQGGDFMRFLPMFLSDNPNPKCGKGGAAY         |
| Orangutan    | DNITDQFCNASVVD PACVRCRPLTPEGKQRPQGGDFMRFLPMFLSDNPNPKCGKGGAAY         |
| Human        | DNITDQFCNASVVD PACVRCRPLTPEGKQRPQGGDFMRFLPMFLSDNPNPKCGKGGAAY         |
| Chimpanzee   | DNITDQFCNASVVD PACVRCRPLTPEGKQRPQGGDFMRFLPMFLSDNPNPKCGKGGAAY         |
| Gorilla      | DSITDQFCNASVVD PACVRCRPLTPEGKQRPQGGDFMRFLPMFLSDNPNPKCGKGGAAY         |
| Marmoset     | DNITDQFCNASVVD PACIRCRPLTAEGKQRPQGRDFMKFLPMFLSDNPNPKCGKGGAAY         |
| Macaque      | DNITDQFCNASVVD PACVRCRPLTPEGKQRPQGGDFMRFLPMFLSDNPNPKCGKGGAAY         |
| Gibbon       | DNITDQFCNASVVD PACVRCRPLTPEGKQRPQGGDFMRFLPMFLSDNPNPKCGKGGAAY         |
| Baboon       | DNITDQFCNASVVD PACVRCRPLTPEGKQRPQGGDFMRFLPMFLSDNPNPKCGKGGAAY         |
| Bushbaby     | YNTTEQFCNASVVD PACVRCRPLTPEGKQRPQGGDFMRFLPMFLADNPNPKCGKGGAAY         |
| Tarsier      | YNITEQFCNASVVDPTCVRCRPLTPEGKQRPQGGDFMRFLPMFLSDNPNPKCGKGGAAY          |
| Mouse        | YNVTHQFCNASVMDPTCVRCRPLTPEGKQRPQGGDFMRFLPMFLSDNPNPKCGKGGAAY          |
| Rat          | YNVTHQFCNASVIDPTCVRCRPLTPEGKQRPQGGDFMRFLPMFLSDNPNPKCGKGGAAY          |
| Hamster      | YNATHQFCNASVIDPTCIRCRPLTPEGKQRPQGGDFMRFLPMFLSDNPNPKCGKGGAAY          |

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|-----------------|---------------------------------------------------------------------|
| Guinea pig      | YNATAQFCNASVIDPTCVRCRALTPPEGKQRPQGGDFMRFLPMFLSDNPNPKCGKGGHAA        |
| Opossum         | YNRTDKFCNASVVDPSCVRCRPLTPPEGKRRPQGEDFMKFLPMFLSDNPNPKCGKGGHAA        |
| Tasmanian devil | YNMTERFCNASVVDPSCIHCRPLTPDGKRRPQGEDFMKFLPMFLSDNPNPKCGKGGHAA         |
| Platypus        | YNGTDLFCNASVVDPSCVRCRPLTPPEGKQRPQGSDFLHFLPMFLSDNPNPKCGKGGHAA        |
| Elephant        | SNITEQFCNASVVDPTCVRCRPLTPPEGKQRPQKDFMKFLPMFLSDNPNPKCGKGGHAA         |
| Wallaby         | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXGHAS    |
| Sloth           | YNTTEQFCNASXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXGHAA |
| Hedgehog        | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXRFLPMFLSDNPNPSCGKGGHAA  |
| Squirrel        | YNITDQFCNASXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXGHAA |

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|-----------------|---------------------------------------------------------------|
| Tenrec          | SSAVNILANNTRVGATYFMTYHTVLQTSADFDAMKKARLLATNIMETMGINGSQYRLFP   |
| Macrobat        | GSAVNILGNDSVGATYFMTYHTVLQTSADFDAMRKARLIAGNITKTMSQEGSNHHVFP    |
| Hyrax           | GSAVNILGNNTSVGATYFMTYHTVLQTSADFDALKKARLVANNITETMGINRSHYRVFP   |
| Tree shrew      | XXXXXXXXXXXXXXXXXFMITY-TVLQNSTDFIDAMKKARLIASNITETMGINGSNYRVFP |
| Armadillo       | GSAVNILGNNTAVGATYFMTYHTVLQTSADFDAMKKARLVASNITDTMGVRGXXXXXX    |
| Kangaroo rat    | SSAVNILGNDSVGATYFMTYHTVLQTSADFDAMKKAQLVASNITKTMGKGSNYRVFP     |
| Shrew           | GSAVNILGNDSVGATYFMTYHTVLQRSADFDAMSKARLIAANITRTMGLENSSYRVFP    |
| Dolphin         | SAAVNILGNDSVGATYFMTYHTVLKTSADFDAMKKARLIASNITRTMGLEGS DHRVFP   |
| Cow             | SAAVNILDNGTRVGATYFMTYHTVLQTSADFDAMEKARLIASNITRTMNGQGGDHRVFP   |
| Pig             | SSAVNILGNDSVGATYFMTYHTVLQASADFDAMQKARLIASNITRTMGLEASSYRVFP    |
| Weasel          | SSAVNILGNDSVGATYFMTYHTVLQTSADFTDAMRKAILIAGNITKTMGLEGS DHRVFP  |
| Panda           | SSAVNILGNNTAVGATYFMTYHTVLQTSADFTDAMRKAIIVASNITKTMGLEGS DHRVFP |
| Dog             | GSAVNILGNDSVGATYFMTYHTVLQTSADFTDAMRKAILIAGNITKTMSLKGSHYRVFP   |
| Cat             | SSAVNILGNDSVGATYFMTYHTVLQTSADFTDAMRKANLIASNITKTMGLEGSNYRVFP   |
| Microbat        | GSAVNILGNDSVGATYFMTYHTVLQTSADFDAMRKARLIAGNITQTMSSQGSNYRVFP    |
| Horse           | SSAVNILGNDSVGATYFMTYHTVLQTSADFDAMKKARLIAGNITKTMGLEGGNYRVFP    |
| Mouse lemur     | SSAVNILGSDTGVGATYFMTYHTVLQTSADFDAMKKARLIS-NITETMG--CSSYRVFP   |
| Pika            | ATAVNILGNNTAVGATYFMTYHTVLQNSADFDAMKKAKLVASNITATMGLKGS DHRVFP  |
| Rabbit          | GTAVNILGNTEVGATYFMTYHTVLQTSADFDAMKKAQLIAGNATATMGLKGSRCRVFP    |
| Orangutan       | SSAVNILGNTRVGATYFMTYHTVLQTSADFDALKKARLVASNVTETMGINGSAYRVFP    |
| Human           | SSAVNILGHGTRVGATYFMTYHTVLQTSADFDALKKARLIASNVTETMGINGSAYRVFP   |
| Chimpanzee      | SSAVNILGNTRVGATYFMTYHTVLQTSADFDALKKARLIASNVTETMGINGSAYRVFP    |
| Gorilla         | SSAVNILGNTRVGATYFMTYHTVLQTSADFDALKKARLIASNVTETMGINGSAYRVFP    |
| Marmoset        | SSAVNILSNGTGVGATYFMTYHTVLQTSADFDALKKARLIASNITETMGINGSAYRVFP   |
| Macaque         | SSAVNILGNTRVGATYFMTYHTVLQTSADFDALKKARLIASNVTETMGINGSAYRVFP    |
| Gibbon          | SSAVNILGNTRVGATYFMTYHTVLQTSADFDALKKARLIASNVTETMGINGSAYRVFP    |
| Baboon          | SSAVNILGNTRVGATYFMTYHTVLQTSADFDALKKARLIASNVTETMGINGSAYRVFP    |
| Bushbaby        | SSAVNILSNDTGVGATYFMTYHTVLQTSADFDAMKKARLIASNITETMGINGS DHRVFP  |
| Tarsier         | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  |
| Mouse           | GSAVNIVGDDTYIGATYFMTYHTILKTSADYTDAMKKARLIASNITETMRSGSDYRVFP   |
| Rat             | SSAVNIMGDDTYIGATYFMTYHTILKTSADYIDALKKARLIASNITETMRSGSDYRVFP   |
| Hamster         | SSAVNIIGDDTYVGATYFMTYHTVLKTSADYIDAMKKAQLVARNITETMNSKGSNYRVFP  |
| Guinea pig      | GSAVNLLGNATGVGATYFMTYHTVLQTSADYIDALRKARLVADNITRTMSAKGSNYRVFP  |
| Opossum         | SSAVHLTNRSEVGATYFMTYHTVLHSSSDYIDALKKARMVAANITDTMGLAGRPYRVFA   |
| Tasmanian devil | SAAVHFKNNTYIGATYFMTYHTVLHSSSDYIDAMRKARMVAANITDTMGLQDKNYRVFP   |
| Platypus        | SSAVNLANGSTSIGATYFMTYHTVLKTSADFDAMQKARTVAQNITESVGLPEGGYRVFP   |
| Elephant        | GSAVNILGNNTSVGATYFMTSHTVLQTSADFDAMKKARLIASNITETMRKGSNYRVFP    |
| Wallaby         | SSAVHIKNHTEVGATYFMTYHTVLHSSSDYIDAMRKARIVASNITETMGLQNKNYRVFP   |
| Sloth           | GSAVNILGNSTAVGATYFMTYHTVLKTSADFDAMKKARLVASNITDTMGIKEKNYRVFP   |
| Hedgehog        | GSAVNILGNDSVGATYFMTYHTVLQTSADFDAMKKARLVADNITKTMGLEESSYRVFP    |
| Squirrel        | SSAVNILGNNTGIGATYFMTYHTVLQTSADFDAMKKARLVASNITETMSTKGSNYRVFP   |

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|--------------|----------------------------------------------------------------------|
| Tenrec       | YSVFYVFYEQYLTIIIDDTIFNLGVSLGAIFLVTLVLLGCDLWSAVIMCVTIAMILVNMFG        |
| Macrobat     | YSVFYVFYEQYLTIIIDDTIFNLGVSLGAIFLVTVVLLGCELWSAVIMCVTIAMILVDMFG        |
| Hyrax        | YSVFHVYEQYLTIIIDDTIFNLGVSLGAIFLVTFVLLGCELWSAVIMCVTIAMILVNMFG         |
| Tree shrew   | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXAMIVNMFG |
| Armadillo    | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX         |
| Kangaroo rat | YSVFYVFYEQYLTIIIDDAIFNLSMSLGSIFLVTMVVLGCDLWSAVIMCVTIAMILVNMFG        |
| Shrew        | YSEFYVFYEQYLTIVVDITIFNLSVSPAAILLVTMVLLSCELRAAVIMCSSITMILXXXXX        |
| Dolphin      | YSVFYVFYEQYLTMIIDDTIFNLGVSLGAIFVTVVLLGCELWSAVIMCVTIAMILVNMFG         |
| Cow          | YSVFYVFYEQYLTMIIDDTIFNLGVSLGAIFLVAVVLLGCELWSAVIMCATIAMILVNMFG        |
| Pig          | YSVFYVFYEQYLTVIDDTIFNLGVSLGAIFLVTVVLLMGCELWATVIMCVTIAMILVNMFG        |
| Weasel       | YSVFYVFYEQYLTIIIDDTIFNLGVSLGAIFLVTLVLLGCELWSAVIMCVTIAMILVNMFG        |
| Panda        | YSVFYVFYEQYLTIIIDDTIFNLGVSLGAIFLVTLVLLGCELWSAVIMCVTIAMILVNMFG        |



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|-----------------|---------------------------------------------------------------|
| Dog             | YSVFYVFYEQYLTIIDDTIFNLSVSLGAIFLVTLVLLGCELWSAVIMCVTIAMILVNMFG  |
| Cat             | YSVFYVFYEQYLTIIDDTIFNLSVSLGAIFLVTVILLGCDLWSAVIMCITIAMILVNMFG  |
| Microbat        | YSVFYVFYEQYLTIIDDTIFNLGVSLGAIFLVTMVLLGCELWSAVIMCVTIAMILVNMFG  |
| Horse           | YSVFYVFYEQYLTIIDDTIFNLGVSLGAIFLVTMVLLGCELWSAVILCVTIAMILVNMFG  |
| Mouse lemur     | YSVFYVFYEQYLTIIDDTIFNLGVSLGAVFLVAMVLLGCELWSAVIMCATIAMILVNMFG  |
| Pika            | YSVFYVFYEQYLTIIDDTIFNLGVSLGAVFAVAVVLLGCELWAAVIMCVTITMILVNMFG  |
| Rabbit          | YSVFYVFYEQYLTIIDDTIFNLGVSLGAVFVAVVLLGCELWSAVIMCVTITMILVNMFG   |
| Orangutan       | YSVFYVFYEQYLTIIDDTIFNLGVSLGAIFLVTMVLLGCELWSAVIMCATIAMVLVNMFG  |
| Human           | YSVFYVFYEQYLTIIDDTIFNLGVSLGAIFLVTMVLLGCELWSAVIMCATIAMVLVNMFG  |
| Chimpanzee      | YSVFYVFYEQYLTIIDDTIFNLGVSLGAIFLVTMVLLGCELWSAVIMCATIAMVLVNMFG  |
| Gorilla         | YSVFYVFYEQYLTIIDDTIFNLGVSLGAIFLVTMVLLGCELWSAVIMCTTIAMVLVNMFG  |
| Marmoset        | YSVFYVFYEQYLTIIDDTIFNLGASLGAIFLVTMVLLGCELWSTVIMCTTIAMVLVNMFG  |
| Macaque         | YSVFYVFYEQYLTIIDDTIFNLGVSLGAIFLVTMVLLGCELWSAVIMCTTIAMVLVNMFG  |
| Gibbon          | YSVFYVFYEQYLTIIDDTIFNLGVSLGAIFLVTMVLLGCELWSAVIMCATIAMVLVNMFG  |
| Baboon          | YRVFYVFYEQYLTIIDDTIFNLGVSLGAIFLVTMVLLGCELWSAVIMCATIAMVLVNMFG  |
| Bushbaby        | YSVFYVFYEQYLTIIDDTIFNLGVSLGAVFLVAVVLLGCELWSAVLMCATIAMVLVNMFG  |
| Tarsier         | XXVFYVFYEQYLTIIDDTIFNLGTSLGAIFLVTMVLLGCELWSAVLMCATIAMILVNMFG  |
| Mouse           | YSVFYVFYEQYLTIIDDTIFNLSVSLGSIFLVTLVVLGCELWSAVIMCITIAMILVNMFG  |
| Rat             | YSVFYVFYEQYLTIIDDAIFNLSVSLGSIFLVTLVVLGCELWSAVIMCLTIAMILVNMFG  |
| Hamster         | YSVFYVFYEQYLTIIDDTIFNLSVSLGSIFLVTLVVLGCELWSAVIMCITIAMILVNMFG  |
| Guinea pig      | YSVFYVFYEQYLTIIDDTIFNLGVSLGSIFLVTMVVLGCELWSAVIMCATIAMILVNMFG  |
| Opossum         | YSVFYVFYEQYLTIIDDTIFNLGVSLGAIFLVTAVLLGCDLWSAVIMCVTIAMILVNMFG  |
| Tasmanian devil | YSVFYVFYEQYLTIIDDTIFNLGVSLGAIFLVTIILLGCDLWSSVIMCVTIAMILVNMFG  |
| Platypus        | YSVFYVFYEQYLTIIDDTIFNLGVSLGAIFLVTAVLLGCEVWAAVVLCLTIAMILVNMFG  |
| Elephant        | YSVFYVFYEQYLTIIDDTIFNLGVSLGAVFLVTFLVLLGCELWSAVIMCVTIAMILVNMFG |
| Wallaby         | YSVFYVFYEQYLTIIDDTIFNLGVSLGAIFLVTVLLGCDVWSAVIMCVTIAMILVNMFG   |
| Sloth           | YSVFYVFYEQYLTIIDDTIFNLGVSLGAIFLVTVVLGCELWAAVLMCTTIAMVLANMFG   |
| Hedgehog        | YSVFYVFYEQYLTIIDDTIFNLGVSLGAIFLVTMVLLGCEIWSAVIMCVTIAMILVNMFG  |
| Squirrel        | YSVFYVFYEQYLTIIDDTIFNLGVSLGSIFLVTVIVLGCELWSAVIMCVTIAMILVNMFG  |

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|-----------------|-----------------------------------------------------------------|
| Tenrec          | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTVSTKGSRVGRAEALSCMGSSVFS     |
| Macrobat        | IMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTVSAGSRVERAEEALSHMGSSVFS     |
| Hyrax           | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTVSTKGSRVGRAEALSHMGSSVFS     |
| Tree shrew      | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFAVSTKGSRVARAEEALAHMGSSXXX    |
| Armadillo       | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXVFS |
| Kangaroo rat    | VMWLWGISLNAVSLVNLVMSCGIXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXVFS |
| Shrew           | XXXXXXXXXXXXXXXXXXXXSCGISVEFCSHITRAFTVSARGSRVERAEEALSHMGSSVFS   |
| Dolphin         | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTVSTKGSRVRAEEALSRMGSSVFS     |
| Cow             | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTVSTKGSRVRAEEALSHMGSSVFS     |
| Pig             | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTLSTKGSRVDRAEEALAHMGSSVFS    |
| Weasel          | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTVSTKGSRVRAEEALSHMGSSVFS     |
| Panda           | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTVSTKGSRVQRAEEALSHMGSSVFS    |
| Dog             | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTVSAGSRVERAEEALSHMGSSVFS     |
| Cat             | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTVSMKGSRAQRAEEALAHMGSSVFS    |
| Microbat        | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTVSAGSRVARAEEALSHMGSSVFS     |
| Horse           | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTVSAGSRVERAEEALSHMGSSVFS     |
| Mouse lemur     | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTVSTKGSRVARAEEALAHMGSSVFS    |
| Pika            | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTVSGKGSRAARAEDALAHMGSSVFS    |
| Rabbit          | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTVSGKGSRVARAEEALAHMGSSVFS    |
| Orangutan       | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTVSTKGSRVRAEEALAHMGSSVFS     |
| Human           | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTVSMKGSRVRAEEALAHMGSSVFS     |
| Chimpanzee      | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTVSTKGSRVRAEEALAHMGSSVFS     |
| Gorilla         | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTVSTKGSRVRAEEALAHMGSSVFS     |
| Marmoset        | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTVSTKGSRVDRAEEALAHMGSSVFS    |
| Macaque         | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTVSTKGSRVRAEEALAHMGSSVFS     |
| Gibbon          | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTVSTKGSRVRAEEALAHMGSSVFS     |
| Baboon          | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTVSTKGSRVRAEEALAHMGSSVFS     |
| Bushbaby        | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTVSTKGSRVRAEEALAHMGSSVFS     |
| Tarsier         | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTVSTKGSRVRAEQALAHMGSSXXX     |
| Mouse           | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTMSTKGSRVRAEEALAHMGSSVFS     |
| Rat             | VMWLWGISLNAVSLVNLVMTCGISVEFCSHITRAFTMSTKGSRVRAEEALAHMGSSVFS     |
| Hamster         | VMWLWDISLNAVSLVNLVMSCGISVEFCSHITRAFTMSTKGSRVRAEEALAHMGSSVFS     |
| Guinea pig      | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTVSCRKSRVDRAQEALAHMGSSIFS    |
| Opossum         | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFAVSTKGSRVARANEALSNMGSCVFS    |
| Tasmanian devil | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTMSTKGSRVRAEEALSHMGSCVFS     |



|          |                                                                   |
|----------|-------------------------------------------------------------------|
| Platypus | VLWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTLSTRGSRVERAEEALANMGSSVFS      |
| Elephant | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFTVSTKGSRVSRAEALSHMGSSVFS       |
| Wallaby  | VMWLWGISLNAVSLVNLVMSCGISVEFCSHITRAFAVSRKRTRAARAEEALSHMGSCVFS      |
| Sloth    | VMWLWGISLNAVSLVNLVMSXXXXXXXXXXXXXXXXXXXXXXXXXGSRVERAEEAL-HMGSSVFS |
| Hedgehog | VMWLWGISLNAVSLVNLVMSCGISVEFCSHVTRAFTVSTKGSRVQRAEEALAHMGSSVFS      |
| Squirrel | VMWLWGISLNAVSLVNLVMSCGISVEFCSHVTRAFTVSAKGSRVDRAEALALMGSSVFS       |

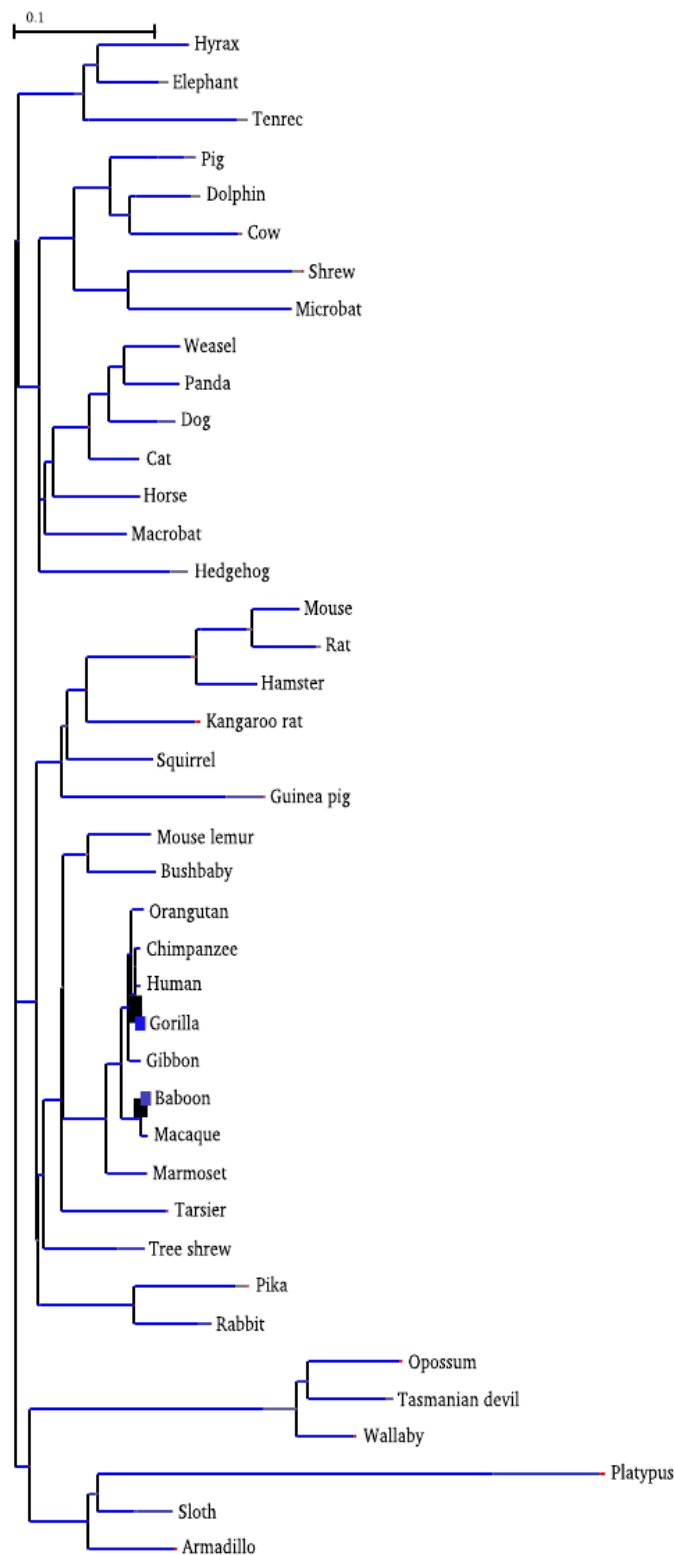
|                 |                                                                 |
|-----------------|-----------------------------------------------------------------|
| Tenrec          | GITLTKFGGIVVLALAKSKIFQIFYFRMYFAMVILGATHGLIFLPVFLSYIGPSINKAKR    |
| Macrobat        | GITLTKFGGIVVLAFAKSQIFQIFYFRMYLAMVLLGASHGLIFLPVLLSYIGPSINKAKS    |
| Hyrax           | GITLTKFVGIVVLAFAKSQIFQIFYFRMYLAMVLLGVTHGLIFLPVLLSYIGPSINKAKS    |
| Tree shrew      | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXPSINKAKS   |
| Armadillo       | GITLTKFGGIVVLAFAKSQIFQIFYFRMYLAMVLLGATHGLVFLPVFLSYVGPSVNKARS    |
| Kangaroo rat    | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXPSVNKAKR   |
| Shrew           | GITLTKFGGIVVLAFAKSQIFQIFYFRMYLAMVLLGATHGLIFLPVLLSYIGPSVNKAKS    |
| Dolphin         | GITLTKFGGIVVLAFAKSQIFKRFYFRMYFAMVLLGATHGLIFLPVLLSYIGPPINKAKS    |
| Cow             | GITLTKFGGIVVLAFAKSQIFQIFYFRMYLAMVLLGATHGLIFLPVLLSYIGPSINKAKS    |
| Pig             | GITLTKFGGIVVLAFAKSQIFQIFYFRMYLAIVLLGATHGLIFLPVLLSYIGPSINKAKS    |
| Weasel          | GITLTKFGGIVVLAFAKSQIFQIFYFRMYLAMVLLGATHGLIFLPVLLSYIGPSINKAKS    |
| Panda           | GITLTKFGGIVVLAFAKSQIFQIFYFRMYLAMVLLGATHGLIFLPVLLSYVGPSINKARS    |
| Dog             | GITLTKFGGIVVLAFAKSQIFQVIFYFRMYLAMVLLGATHGLIFLPVLLSYIGPSINKAKS   |
| Cat             | GITLTKFGGIVVLAFAKSQIFQIFYFRMYLAMVLLGATHGLIFLPVLLSYIGPSINKAKS    |
| Microbat        | GITLTKFGGIVVLAFAKSQIFQIFYFRMYLAMVLLGAHGLVFLPVLLSYIGPSVNKAKS     |
| Horse           | GITLTKFGGIVVLAFAKSQIFQIFYFRMYLAMVLLGATHGLIFLPVLLSYIGPSINKAKT    |
| Mouse lemur     | GITLTKFGGIVVLAFAKSQIFQIFYFRMYLAMVLLGATHGLVFLPVLLSYIGPSINKAKS    |
| Pika            | GITLTKFGGIVVLAFAKSQIFQIFYFRMYLAMVLLGATHGLIFLPVLLSYIGPSTNKAKS    |
| Rabbit          | GITLTKFGGIVVLAFAKSQIFQIFYFRMYLAMVLLGATHGLIFLPVLLSYIGPSTNKAKS    |
| Orangutan       | GITLTKFGGIVVLAFAKSQIFQIFYFRMYLAMVLLGATHGLIFLPVLLSYIGPSVNKAKS    |
| Human           | GITLTKFGGIVVLAFAKSQIFQIFYFRMYLAMVLLGATHGLIFLPVLLSYIGPSVNKAKS    |
| Chimpanzee      | GITLTKFGGIVVLAFAKSQIFQIFYFRMYLAMVLLGATHGLIFLPVLLSYIGPSVNKAKS    |
| Gorilla         | GITLTKFGGIVVLAFAKSQIFQIFYFRMYLAMVLLGATHGLIFLPVLLSYIGPSVNKAKS    |
| Marmoset        | GITLTKFGGIVVLAFAKSQIFQIFYFRMYLAMVLLGATHGLIFLPVLLSYIGPLVNKAKS    |
| Macaque         | GITLTKFGGIVVLAFAKSQIFQIFYFRMYLAMVLLGATHGLIFLPVLLSYIGPSVNKAKS    |
| Gibbon          | GITLTKFGGIVVLAFAKSQIFQIFYFRMYLAMVLLGATHGLIFLPVLLSYIGPSVNKARS    |
| Baboon          | GITLTKFGGIVVLAFAKSQIFQIFYFRMYLAMVLLGATHGLIFLPVLLSYIGPSVNKAKS    |
| Bushbaby        | GITLTKFGGIVVLAFAKSQIFQIFYFRMYLAMVLLGATHGLVFLPVLLSYIGPSINKAKS    |
| Tarsier         | XXXXXXXXXXVVLAFAKSQINKIFQIFYFRMYLAMVLLGATHGLVFLPVLLSYIGPSINKAKR |
| Mouse           | GITLTKFGGIVVLAFAKSQIFEIFYFRMYLAMVLLGATHGLIFLPVLLSYIGPSVNKAKR    |
| Rat             | GITLTKFGGIVVLAFAKSQIFEIFYFRMYLAMVLLGATHGLIFLPVLLSYIGPSVNKAKR    |
| Hamster         | GITLTKFGGIVVLAFAKSQIFEIFYFRMYLAIVLLGATHGLIFLPVLLSYVGPSVNKAKR    |
| Guinea pig      | GITLTKFGGIVVLAFAKSQIFQIFYFRMYLAMVLLGATHGLIFLPVLLSYIGPSVNKAKI    |
| Opossum         | GITLTKFGGIVVLAFARSQIFQIFYFRMYLAMVLLGATHGLIFLPVLLSYIGPSVNKAKS    |
| Tasmanian devil | GITLTKFGGIVVLAFARSQIFQIFYFRMYLAMVLLGATHGLIFLPVLLSYIGPSVNKAKS    |
| Platypus        | GITLTKFGGIVVLAFASKSQIFQIFYFRMYLAMVLLGATHGLIFLPVLLSYIGPPVNRKAC   |
| Elephant        | GITLTKFGGIVVLAFAKSQIFQIFYFRMYLAMVLLGVTHGLIFLPVLLSYIGPSINKAKS    |
| Wallaby         | GITLTKFGGIVVLAFARSQIFQIFYFRMYLAMVLLGATHGLIFLPVLLSYIGPSVNKAKS    |
| Sloth           | GITLTKFGGIVVLAFAKSQIFQIFYFRMYLAMVLLGATHGLIFLPVLLSYIGPSINKARS    |
| Hedgehog        | GITLTKFGGIVVLAFAKSKIFQIFYFRMYLAMVLLGATHGLIFLPILLSYIGPSINKARS    |
| Squirrel        | GITLTKFGGIVVLAFAKSQIFQIFYFRMYLAMVLLGATHGLIFLPVLLSYIGPSLNKAKS    |

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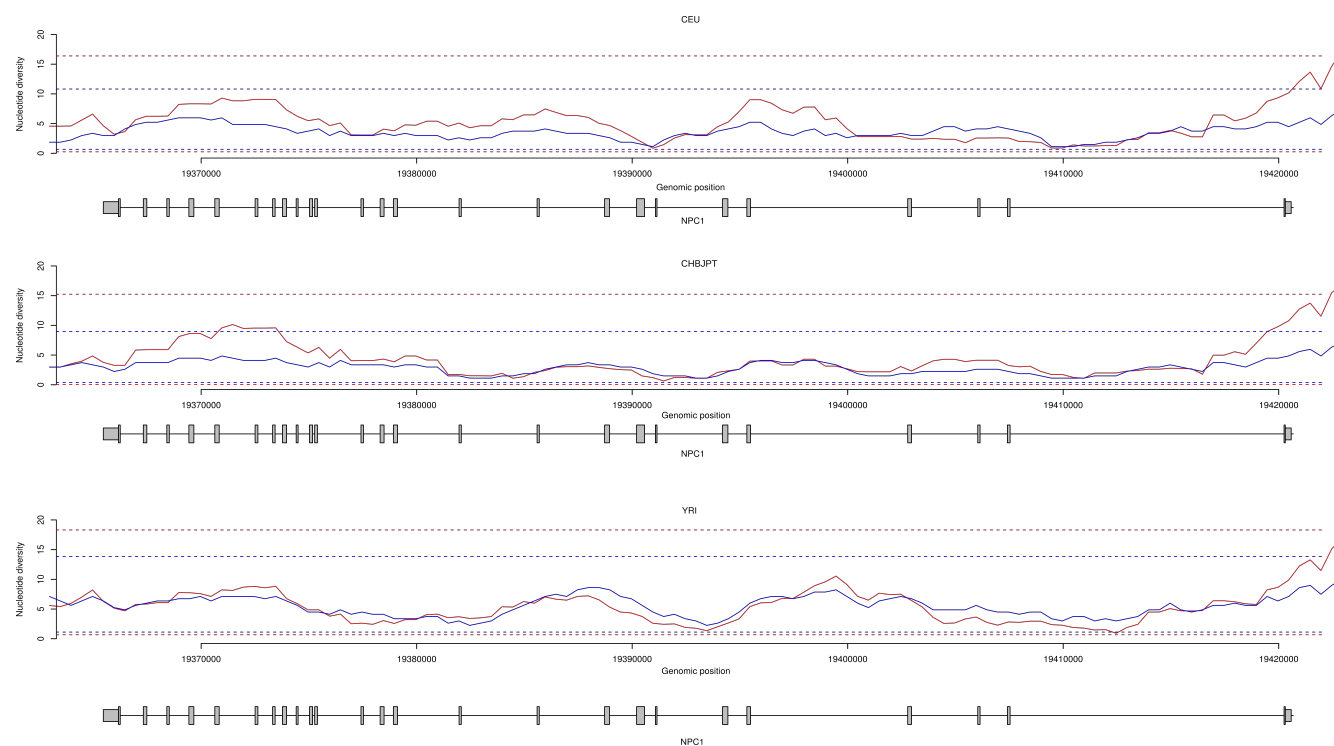
|              |                      |
|--------------|----------------------|
| Tenrec       | STAQERYQDTERERLLNF   |
| Macrobat     | LATQERYQGTEREQLLNF   |
| Hyrax        | SATQEORYGTERERLLNF   |
| Tree shrew   | RNTQDRYKGTTERERLLNF  |
| Armadillo    | RTTQERYKGTTERERLLNF  |
| Kangaroo rat | HTTQDPYKGTTERERLLNF  |
| Shrew        | LSTRERYKGTTEREHLNF   |
| Dolphin      | LAAQERHRGTTERERLLNF  |
| Cow          | LTTQORYRGTEREQLLNF   |
| Pig          | LATQERYKGTTEREQLLNF  |
| Weasel       | LATQERYKGTTEREQLLN-  |
| Panda        | VATQERYKGTTEREQLLNF  |
| Dog          | LASQERYKGTTEREQLLNF  |
| Cat          | LATQEORYKGTTEREQLLNF |
| Microbat     | LATQORHRGTTEREQ-LNF  |

|                 |                    |
|-----------------|--------------------|
| Horse           | LATQERYKGTEREQLLNF |
| Mouse lemur     | RATEDRYRGTERERLLNF |
| Pika            | CATQERYKGTERERLLNF |
| Rabbit          | CATQERYKGTERERLLNF |
| Orangutan       | CATEERYKGTERERLLNF |
| Human           | CATEERYKGTERERLLNF |
| Chimpanzee      | CATEERYKGTERERLLNF |
| Gorilla         | CATEERYKGTERERLLNF |
| Marmoset        | HATEERFKGTERERLLNF |
| Macaque         | CATEERYKGTERERLLNF |
| Gibbon          | CATEERYKGTERERLLNF |
| Baboon          | CATEERYKGTERERLLNF |
| Bushbaby        | CATEDRYKGTERERLLNF |
| Tarsier         | HATEDRFKGTERERLLNF |
| Mouse           | HTTYERYRGTERERLLNF |
| Rat             | HTTQERYKGTERERLLNF |
| Hamster         | HTTQERYKGTERERLLNF |
| Guinea pig      | HSTRERYRGTERDRLLNF |
| Opossum         | HAAQERNRGTERERLLNF |
| Tasmanian devil | RAAQERNRGTERERLLNF |
| Platypus        | RAAQERSKGTERERLLYF |
| Elephant        | SATQEQYRGTERERLLNF |
| Wallaby         | HAAQERNRGTERERLLNF |
| Sloth           | RTTQERYKGTEQERLLNF |
| Hedgehog        | LATKERLKGTEREHLLNF |
| Squirrel        | RTTQDRYKGTERERLLNF |

**Supplemental Figure 2. Branch-site random effects likelihood (branch-site REL) analysis of *NPC1* genes.** The hue of each color indicates strength of selection, with primary red corresponding to  $\omega > 5$ , primary blue to  $\omega = 0$  and grey to  $\omega = 1$ . The width of each color component represents the proportion of sites in the corresponding class. Thicker branches have been classified as undergoing episodic diversifying selection by the sequential likelihood ratio test at corrected  $p \leq 0.05$



**Supplemental Figure 3. Sliding-window analysis of nucleotide diversity along *NPC1* using the 1000 Genomes Project data.**  $\theta_w$  (blue) and  $\pi$  (red) were calculated in sliding windows of 5 kb moving with a step of 500 bp. The 97.5<sup>th</sup> and the 2.5<sup>th</sup> percentiles (horizontal dashed lines, blue for  $\theta_w$ , red of  $\pi$ ) were calculated by applying the same procedure to 2000 randomly selected human genes.



**Supplemental Figure 4. Sliding-window analysis of  $F_{ST}$  along *NPC1* using the 1000 Genomes Project data.** The 1000 Genomes Project data were used to calculate YRI/CEU/CHB-JPT  $F_{ST}$  in sliding windows of 5kb moving with a step of 500 bp. Red horizontal lines represent the 97.5<sup>th</sup> and the 2.5<sup>th</sup> percentiles in the distribution of  $F_{ST}$  calculated for sliding windows deriving from 2000 randomly selected human genes.

