

H.sapiens	-----	M	1
M.fascicularis	-----	M	1
P.troglodytes	-----	M	1
P.paniscus	-----	M	1
N.leucogenys	-----	M	1
M.musculus	-----	M	1
R.norvegicus	-----	M	1
S.scrofa	-----	M	1
C.hircus	-----	M	1
C.lupus	-----	M	1
M.putorius	MFTTPQAVKQVPRKARLPSTPPSYLLPPAERRGDHWAGFRAPWSPFRNSQCVCLDPSSQGTM		60
O.orca	-----	M	1
C.simum	-----	M	1
D.rerio	-----	MTPKWELVS	9
A.mississippiensis	-----	MV	2
V.pacos	-----	M	1
C.ferus	-----	M	1
P.sinensis	-----	MLQVAM	6
M.lucifugus	-----	M	1
L.chalumnae	-----	MQNSGNQKPKQKPALRIVR	18
P.hodgsonii	-----	M	1
B.mutus	-----	M	1
C.elegans	-----	MTPSHPEVPPPRQKQ-----	TLFEY 20

H.sapiens	LPRWELALYLLASLGFHFYSFYEVYKVSREHEEELDQEF----	ELETDTLFGGLKKDPTD	57
M.fascicularis	LPRWELALYLLASLGFHFYSFYEVYKVSREHEEELDQEF----	ELETDTLFGGLKKDPTD	57
P.troglodytes	LPQWELALYLLASLGFHFYSFYEVYKVSREHEEELDQEF----	ELETDTLFGGLKKDPTD	57
P.paniscus	LPQWELALYLLASLGFHFYSFYEVYKVSREHEEELDQEF----	ELETDTLFGGLKKDPTD	57
N.leucogenys	LPRWELALYLLASLGFHFYSFYEVYKVSREHEEELDQEF----	ELETDTLFGGLKKDPTD	57
M.musculus	LPGWELTLCLLVSLGFHFYSFYEVYKVSREHEEELDQEF----	ELEMDTLFGGLKKDPTD	57
R.norvegicus	LSRWELTLCLLVSLGFHFYSFYEVYKVSREHEEELDQEF----	ELEMDTLFGGLK-----	52
S.scrofa	LPRWELSYLLASLGFHFYSFYEVYKVSREHEEELDQEF----	DLETDSLFGGLKKDPTD	57
C.hircus	LPWWELSYLLASLGFHFYSFYEVYKVSREHEEELDRQF----	DLETGTLFGGLKKDPTD	57
M.putorius	LPWELSYLLASLGFHFYSFYEVYKVSREHEEELDRQF----	DLETGTLFGGLKKDPTD	57
O.orca	LPRWELSYLLASLGFHFYSFYEVYKVSREHEEELDRQF----	ALEIGTLFGGLKKDPTD	116
C.simum	LPRWELSYLLASLGFHFYSFYEVYKVSREHEEELDRQF----	DLDTDTLFGGLKKDPTD	57
D.rerio	LPRWELSYLLASLGFHFYSFYEVYKVSREHEEELDRQF----	DLETDTLFGGLKKDPTD	57
A.mississippiensis	LPRWELSYLLASLGFHFYSFYEVYKVSREHEEELDRQF----	QLERGFLLWGFKKPTD	65
V.pacos	LPLWEMCLYLLASLGFHFYSFYEVYKVSREHEEELDRQF----	ELEKNAFLWGGLKKDPTD	58
C.ferus	LPRWELFLYLLASLGFHFYSFYEVYKVSREHEEELDRQF----	DLETDTLFGGLKKDPTD	57
P.sinensis	LPRWELFLYLLASLGFHFYSFYEVYKVSREHEEELDRQF----	DLETDTLFGGLKKDPTD	57
M.lucifugus	LPRWELFLYLLASLGFHFYSFYEVYKVSREHEEELDRQF----	DLETDTLFGGLKKDPTD	57
L.chalumnae	LPRWELFLYLLASLGFHFYSFYEVYKVSREHEEELDRQF----	DLETDTLFGGLKKDPTD	57
P.hodgsonii	LPRWELFLYLLASLGFHFYSFYEVYKVSREHEEELDRQF----	DLETDTLFGGLKKDPTD	57
B.mutus	LPRWELFLYLLASLGFHFYSFYEVYKVSREHEEELDRQF----	DLETDTLFGGLKKDPTD	57
C.elegans	PPLKEVPICLFAVTVCTMAYAWYGVYRASQQFEWSIGDYGIWSSPPIIGNLTGMLMKDVSN		80

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H.sapiens	FEWSFWMWGWKQWLWVLLLGHMVVSQMATLLARKHRPWILMLYGMWAC---	WCVLGTPGV	114
M.fascicularis	FEWSFWMWGWKQWLWVLLLGHMVVSQMATLLARKHRPWILMLYGMWAC---	WCVLGTPGV	114
P.troglodytes	FEWSFWMWGWKQWLWVLLLGHMVVSQMATLLARKHRPWILMLYGMWAC---	WCVLGTPGV	114
P.paniscus	FEWSFWMWGWKQWLWVLLLGHMVVSQMATLLARKHRPWILMLYGMWAC---	WCVLGTPGV	114
N.leucogenys	FEWSFWMWGWKQWLWVLLLGHMVVSQMATLLARKHRPWILMLYGMWAC---	WCVLGTPGV	114
M.musculus	FEWNFMWGWKRRVLWVLFIGHMAVSQLATLLTKKRPWIVMVGWAC---	WCVLGAPGV	114
R.norvegicus	-----	KHRPWIIMYGMWAC---	WCVLGAPGV 76
S.scrofa	FEWSFWMWGWKQRLAWLLLGHVGVSVQVANLLARKHRPWILAAYGMWAC---	HCALGTRGT	114
C.hircus	FEWSFWMWGWKQRLAWLLLGHVGVSVQVANLLSRKHKPWILAAYGMWAC---	RCVLGTRGT	114
C.lupus	FEWSFWMWGWKQRLVRFPLFGHMVVSQMANVLARKHRPWILGAYGMWAS---	WCVLGAHGT	114
M.putorius	FEWSFWMWGWKQRLRPLFGHVAVSQLANVLARKHRPWILGAYGIWAS---	WCVLGAHGT	173
O.orca	FEWSFWMWGWKQRLVWLLLGHMVVSQVANLLTRKHKPWILAYGMWAC---	WCVELTQGT	114
C.simum	FEWSFWMWGWKQWLWVLLLGHAAVVSQMANLLARKHRPWILAYGMWAC---	WCVLGAPGV	114
D.rerio	FEWSFWMWGWKQRLWVLLLGHVAVSRLAYYLQPQYRLAVFAMYGLISA---	GWLLGVRGV	122
A.mississippiensis	FEWSFWMWGWKQRLWVLLLGHVAVSRLAYYLQPQYRLAVFAMYGLISA---	GWLLGVRGV	122
V.pacos	FEWNFMWGWKQRLAWLLLGHVGVSVQVANLLSRKHKPWILAAYGMWAC---	QCVLGAQGT	114
C.ferus	FEWNFMWGWKQRLAWLLLGHVGVSVQVANLLSRKHKPWILAAYGMWAC---	QCVLGAQGT	114
P.sinensis	FEWTFWMWGWKERIWLWLLLGHVAVSRLAYYLQPQYRLAVFAMYGLISA---	WFLGKINGL	119
M.lucifugus	FEWSFWMWGWKQRLWVLLLGHVAVSRLAYYLQPQYRLAVFAMYGLISA---	WFLGKINGL	119
L.chalumnae	FEWSFWMWGWKQRLWVLLLGHVAVSRLAYYLQPQYRLAVFAMYGLISA---	WFLGKINGL	119
P.hodgsonii	FEWSFWMWGWKQRLWVLLLGHVAVSRLAYYLQPQYRLAVFAMYGLISA---	WFLGKINGL	119
B.mutus	FEWSFWMWGWKQRLWVLLLGHVAVSRLAYYLQPQYRLAVFAMYGLISA---	WFLGKINGL	119
C.elegans	WEWSRWSPPFALSYL--PVFFGHVLFVFNIGSAILPESAF--IPIIYTLCSIAAAYVNFPPFLV		137

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Figure S1

H. sapiens	AMVLLHHTTISFCVAQF-RSQLLTWLCSLLLLSTLRLQGVVEVKRRWYKTENEYLLQFTL	173
M. fascicularis	AMVLLHHTTISFCVAQF-RSQLLTWLCSLLLLSTLRLQGVVEVKRRWYKTENEYLLQFTL	173
P. troglodytes	AMVLLHHTTISFCVAQF-RSQLLTWLCSLLLLSTLRLQGVVEVKRRWYKTENEYLLQFTL	173
P. paniscus	AMVLLHHTTISFCVAQF-RSQLLTWLCSLLLLSTLRLQGVVEVKRRWYKTENEYLLQFTL	173
N. leucogenys	AMVLLHHTTISFCVAQF-RSQLLTWLCSLLLLSTLRLQGVVEVKRRWYKTENEYLLQFTL	173
M. musculus	VMVLLHSTIAFCVAQF-RSVLLSWLCSLLLLSTLRLQGVVEVKRRWYKTENEYLLQFTL	173
R. norvegicus	VMVLLHSTIAFCVAQF-RSMLLSWLCSLLLLSTLRLQGVVEVKRRWYKTENEYLLQFTL	135
S. scrofa	AMVLLHHTTISFCVAQF-RSLALSWSLFLLLSTLRLQDVEEVKRGWYETENEYLLQFTL	173
C. hircus	AMVLLHHTTISFCVAQF-RSQFLSWLCSLLLLSTLRLQDVEEVKRGWCTENECYLLQFTL	173
C. lupus	AIIFLHTLISFCVAQF-RSLALTWLCFLLLSTLRLQDVEEVKRGWYQTEENEYLLQFTL	173
M. putorius	AIIFLHTLISFCVAQF-RSLFLTWLCFLLLSTLRLQDVEEVKRGWYQTEENEYLLQFTL	232
O. orca	AMVLIHTTISFCVAQF-RSLFSLWLCFLLLSTLRLQDVEEVKRGWYETENEYLLQFTL	173
C. simum	AMVFLHTTISFCVAQF-RSLLLSWLCFLLLSTLRLQDVEEVKRGWYQTEENEYLLQFTL	173
D. rerio	IQLMHLHSISLVDAQL-RSPVLSWFCFLLLSTLNLVSAQLDQVQWYTESDQYLLFLFST	181
A. mississippiensis	ALILLHIFISFSVAQF-QMSILTWLCFLLLSTLRLPALAEAKRGWYDTEENEYLLFL	174
V. paco	AVVLLHTAISYCAQF-RSPFLSWLCSLLLLSTLRLQDVEEVKRGWYQTEENEYLLQFTL	173
C. ferus	AVVLLHTAISYCAQF-RSFLPSWLCFLLLSTLRLQDVEEVKRGWYQTEENEYLLQFTL	173
P. sinensis	AVLLLHIAISFSVAQF-QTAVLTWLCFLLLSALRVPALAEAKRGWYDSENEYLLFL	178
M. lucifugus	AMVILHHTVISFCVAQF-RSLFSLWLCFLLLSTLRLQDVEEIKRGWYETENEYLLQFTL	173
L. chalumnae	VMIFFLHTIASFTVAQL-RRPILLSWLCFLMLLYTLHMSLEEQDVEEYLLFLFSL	190
P. hodgsonii	AMVLLHHTTISFSVAQF-RSQFLSWLCSLLSLLSTLRLQDVEEVKRGWCTENECYLLQFTL	173
B. mutus	AMVLIHATISFCVAQF-RSQFLSWLCSLLSLLSTLRLQDVEEVKRGWYQTEENEYLLQFTL	173
C. elegans	AVSMAQGTVVFLTAMAYAKKTAVWVLSALPVLVY---SMHE----TNSLSDPPFLIFFTL	189
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H. sapiens	TVRCLYYTFSFLELCWQQLPAA-----STSYSPWMLAYVFFYPVHNGPI	219
M. fascicularis	TVRCLYYTFSFLELCWQQLPAA-----STSYSPWMLAYVFFYPVHNGPI	219
P. troglodytes	TVRCLYYTFSFLELCWQQLPAA-----STSYSPWMLAYVFFYPVHNGPI	219
P. paniscus	TVRCLYYTFSFLELCWQQLPAA-----STSYSPWMLAYVFFYPVHNGPI	219
N. leucogenys	TVRCLYYTFSFLELCWQQLPAA-----STSYSPWMLAYVFFYPVHNGPI	219
M. musculus	TVRCLYYTFSFLELCRQPPSAQPTPSA-----QGASHSYPLLTYVFFYPVHNGPI	225
R. norvegicus	TVRCLYYTFSFLELCRQPPSAQ-----RACFSFPWLLTYVFFYPVHNGPI	219
S. scrofa	TVRCLYYTFSFLELCWQQLPAE-----RAFYSFPWMLAYVFFYPVHNGPI	181
C. hircus	AVRCLCYTFSFLELCWRPPPAE-----RPSYSLPWMLAYVFFYPVHNGPV	219
C. lupus	TVRCLYYTFSFLELCWQMPNG-----HSFYSFPWMLAYVFFYPVHNGPI	219
M. putorius	TVRCLYYTFSFLELCWQEVPCG-----SSFYSFPWMLAYVFFYPVHNGPI	278
O. orca	TVRCLYYTFSFLELCWQQPAA-----RTFCSPWMLAYVFFYPVHNGPI	219
C. simum	TVRCLYYTFSFLELCWQPRPAG-----RTSYSPWMLAYVFFYPVHNGPI	219
D. rerio	AVCSLHCISFCLEMCWHPQLQAGRPKHCSLQNCALKTLTYQFLKLTAFCFYHPLFYNGPI	241
A. mississippiensis	TVRCLYYTFSFLELCWQGST-----KQRYHSFLWMLAYVFFYPVHNGPI	219
V. paco	TVRCLYYTFSFLELCWQPRPAG-----HTFYSFPWMLAYVFFYPVHNGPV	219
C. ferus	TVRCLYYTFSFLELCWQPRPAG-----HTFYSFPWMLAYVFFYPVHNGPI	219
P. sinensis	TVRCLYYTFSFLELCWQGST-----KQRYHSFPWMLAYVFFYPVHNGPI	223
M. lucifugus	TVRCLYYTFSFLELCWQQLPCG-----RTFYSLPWMLAYVFFYPVHNGPI	219
L. chalumnae	AICSLRYTFSFLEHCWYQSS-----EKKYKFLWMLAYLFFYPVHNGPV	235
P. hodgsonii	AVRCLCYTFSFLELCWRPPPAE-----RPSYSLPWMLAYVFFYPVHNGPV	219
B. mutus	TVRCLYYTFSFLELCWQPPPAE-----RPFYSLPWMLAYVFFYPVHNGPV	219
C. elegans	SYSMIHYISYCLEHLKGESRKE---D-----DTILKRYLRMMFFAFYQPYLF-SLI	236
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H. sapiens	LSFSEFIKQMQQQEHDSLKASLCLVALGLGRLLCWWWLAELMAHLMYMHAIYSSIPLET	279
M. fascicularis	LSFPEFIKQMQQQEHESLKGNSLCLVALGLGRLLCWWWLAELMAHLMYMHAIYSSIPLEA	279
P. troglodytes	LSFSEFIKQMQQQEHDSLKASLCLVALGLGRLLCWWWLAELMAHLMYMHAIYSSIPLET	279
P. paniscus	LSFSEFIKQMQQQEHDSLKASLCLVALGLGRLLCWWWLAELMAHLMYMHAIYSSIPLET	279
N. leucogenys	LSFPDFIKQMQQQEHDSLKASLCLVALGLGRLLCWWWLAELMAHLMYMHAIYSSIPLET	279
M. musculus	LNFPEFFRQMQQPELNSLQHSLSLIVAKGLGRLLCWWWLAELMVHLMYMHAIYSSAPLLES	285
R. norvegicus	LNFPEFFRQMQQPELNSLQHSLSLILAKGLGRLLCWWWLAELMVHLMYMHAIYSSIPLES	241
S. scrofa	LSFPEFLTQMPPREQSSLSKASFSILVRLGLRLLFYWVWVLMVHLMYMHAIYSSAPLLSA	279
C. hircus	LSFPEFIAQMQQQEQSSPKTSLSLIALGLGRLLFYWVWVLMVHLMYMHAIYSSASLLRA	279
C. lupus	LSFPEFIAKVMQQQEQSSPKTSLSLIALGLGRLLFYWVWVLMVHLMYMHAIYSSASLLKA	279
M. putorius	LSFPEFIAKVMQQQEQSSPKTSLSLIALGLGRLLFYWVWVLMVHLMYMHAIYSSASLLRA	338
O. orca	LSFPEFIAQMQQQEQSSPKTSLSLIALGLGRLLFYWVWVLMVHLMYMHAIYSSASLLRA	279
C. simum	LSPFEFIRQMQQQERRSKASLSVLVGLGRLLCWWWLAELMVHLMYMHAIYSSPTLLGA	279
D. rerio	MTYKDFSEQIERPLCK---VSALHVFSGILRLCWWWLAELMIHLMYMHAIYSSSLLRA	298
A. mississippiensis	MNFDEFSKQMRREQEACRLKTNFRILLGMVRIFFWWWLAELMIHLMYMHAFYSSSHPLEA	279
V. paco	LSFPEFIKQMQQQEHESLKGNSLCLVALGLGRLLCWWWLAELMVHLMYMHAIYSSSLLRA	279
C. ferus	LSFPEFIKQMQQQEHESLKGNSLCLVALGLGRLLCWWWLAELMVHLMYMHAIYSSSLLRA	279
P. sinensis	MTFNEFTKQMRREQEACSLKSNLCLVLLGLGVVRIFFWWWLAELMIHLMYMHAIYSSSLLRA	283
M. lucifugus	LSFPEFIRQMPPQEQSLPRLSLVLRARGLGRLLFYWVWVLMVHLMYMHAFYSSAPLLRA	279
L. chalumnae	ISYDFESKIQKQQTTRVSKMEVYALTLISICRIFLWWWLAESMIHLMYHAIYSSPTLLDA	295
P. hodgsonii	LSFPEFIAQMQQQEQSSPKTSLSLIALGLGRLLFYWVWVLMVHLMYMHAIYSSASLLRA	279
B. mutus	LSFPEFIAQMQQQEQSSPKTSLSLIALGLGRLLFYWVWVLMVHLMYMHAIYSSASLLRA	279
C. elegans	VLYPDFERQLRERKTRQ---RNWLDCAWSGVRIAFWWWLMEASLHFLYHEALLKNAPLYYS	294
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H. sapiens VSCWTLGGGLAQAQLFFVYKYLVLFGVPALLMRDLGLTPPALPRCVSTMFSFTGMWRYF 339
M. fascicularis VSGWTLGGGLAQAQLFFVYKYLVLFGVPALLMRDLGLTPPALPRCVSTMFSFTGMWRYF 339
P. troglodytes VSCWTLGGGLAQAQLFFVYKYLVLFGVPALLMRDLGLTPPALPRCVSTMFSFTGMWRYF 339
P. paniscus VSCWTLGGGLAQAQLFFVYKYLVLFGVPALLMRDLGLTPPALPRCVSTMFSFTGMWRYF 339
N. leucogenys VSCWTLGGGLAQAQLFFVYKYLVLFGVPALLMRDLGLTPPALPRCVSTMFSFTGMWRYF 339
M. musculus VSCWTLGGGLAQAQLFFVYKYLVLFGVPALLMRDLGLTPPALPRCVSTMFSFTGMWRYF 345
R. norvegicus VSCWTLGGGLAQAQLFFVYKYLVLFGVPALLMRDLGLTPPALPRCVSTMFSFTGMWRYF 301
S. scrofa VSCWTLGGGLAQAQLFFVYKYLVLFGVPALLMRDLGLSPPLPRCVSTMFSFTGMWRYF 339
C. hircus VSSWTLGGGLAQAQLFFVYKYLVLFGVPALLMRDLGRPPPLPRCVSTMFSFTGMWRHF 339
C. lupus VSCWTLGGGLAQAQLFFVYKYLVLFGVPALLMRDLGLTPPALPRCVSTMFSFTGMWRYF 339
M. putorius VSCWTLGGGLAQAQLFFVYKYLVLFGVPALLMRDLGLTPPALPRCVSTMFSFTGMWRYF 398
O. orca VSCWTLGGGLAQAQLFFVYKYLVLFGVPALLMRDLGLTPPALPRCVSTMFSFTGMWRYF 339
C. simum VSSWTLGGGLAQAQLFFVYKYLVLFGVPALLMRDLGLTPPALPRCVSTMFSFTGMWRYF 339
D. rerio LPPWAMGGGLAALQVFFVYKYLVLFGVAPLLMRDLGLTPPALPRCVSTMFSFTGMWRHF 358
A. mississippiensis MSDWTLGGGLAQAQLFFVYKYLVLFGVPALI IQMDGLKPPALPRCVSTMHSFTGMWRSF 339
V. pacos VSCWTLGGGLAQAQLFFVYKYLVLFGVPALLMRDLGLTPPALPRCVSTMFSFTGMWRYF 339
C. ferus VSCWTLGGGLAQAQLFFVYKYLVLFGVPALLMRDLGLTPPALPRCVSTMFSFTGMWRYF 339
P. sinensis VSYWTLGGGLAQAQLFFVYKYLVLFGIPALI IRMDGLKPPALPRCVSTMHSFAGMWRSF 343
M. lucifugus VSCWTLGGGLAQAQLFFVYKYLVLFGIPALLMRDLGLTPPALPRCVSTMFSFTGMWRYF 339
L. chalumnae VESWALGGGLAQAQLFFVYKYLVLFGIPNLVVRMDGLEPPRLPRCVSTMFSFTGMWRHF 355
P. hodgsonii VSSWTLGGGLAQAQLFFVYKYLVLFGVPALLMRDLGRPPPLPRCVSTMFSFTGMWRHF 339
B. mutus VSCWTLGGGLAQAQLFFVYKYLVLFGVPALLMRDLGRPPPLPRCVSTMFSFTGMWRHF 339
C. elegans LPKQDFVALGMAMGIFPHLYKAVIFGLPTLFAKLDNMDPLPGPI ILIRVTLYSKVVREF 354
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H. sapiens VGLHNFLIRYVYIPVGGSQHGLLGTLFSTAMTFAFVSYWGGDYDLWCWAALNWLGVTE 399
M. fascicularis VGLHKFLIRYVYIPVGGSQHGLLGTLFSTAMTFAFVSYWGGDYDLWCWAALNWLGVTE 399
P. troglodytes VGLHNFLIRYVYIPVGGSQHGLLGTLFSTAMTFAFVSYWGGDYDLWCWAALNWLGVTE 399
P. paniscus VGLHNFLIRYVYIPVGGSQHGLLGTLFSTAMTFAFVSYWGGDYDLWCWAALNWLGVTE 399
N. leucogenys VGLHNFLIRYVYIPVGGSQHGLLGTLTLLSTAMTFAFVSYWGGDYDLWCWAALNWLGVTE 399
M. musculus VGLHNFLIRYVYIPVGGSQHGLLGTLTLLSTAMTFAFVSYWGGSYEDLWCWAALNWLGVTE 405
R. norvegicus VGLHNFLIRYVYIPVGGSQHGLLGTLTLLSTAMTFAFVSYWGGSYEDLWCWAALNWLGVTE 361
S. scrofa VGLHDFLIRYVYIPVGGSQHGLLGTLFSTAMTFAFVSYWGGNDYLWCWAALNWLGVTE 399
C. hircus VGLHDFLIRYVYIPVGGSQHGLLGTLFSTAMTFAFVSYWGGNDYLWCWATLNWLGVTE 399
C. lupus VGLHDFLIRYVYIPVGGSQHGLLGTLFSTAVTFAFVSYWGGDYDLWCWAALNWLGVTE 399
M. putorius VGLHDFLIRYVYIPVGGSQHGLLGTLFSTAVTFAFVSYWGGDYDLWCWAALNWLGVTE 458
O. orca VGLHDFLIRYVYIPVGGSQHGLLGTLFSTAMTFAFVSYWGGNDYLWCWATLNWLGVTE 399
C. simum VGLHNFLIRYVYIPVGGSQHGLLGTLFSTALTFVSYWGGDYDLWCWAALNWLGVTE 399
D. rerio VGLYKWLIRYVYIPVGGSRHGAFRKLSTALAFGFCVFWGGCHDYLLYWALNWLGVTE 418
A. mississippiensis VGLHHFLIRYVYIPMGGSQCSVGMGLFSTAITFAFVSYWGGHNYLWYWAALNWLGVTE 399
V. pacos VGLHDFLIRYVYIPMGGSQHGLLGTLFSTAMTFAFVSYWGGNDYLWCWAALNWLGVTE 399
C. ferus VGLHDFLIRYVYIPMGGSQHGLLGTLFSTAMTFAFVSYWGGNDYLWCWAALNWLGVTE 399
P. sinensis VGLHHFLIRYVYIPMGSGHGVLGMLFSTAMTFAFVSYWGGHNYLWFAALNWLGVTE 399
M. lucifugus VGLHDFLIRYVYIPVGGSQHGLLGTLFSTAMTFAFVSYWGGHNYLWCWAALNWLGVTE 403
L. chalumnae VGLHRWLIRYVYIPMGGSQHGSLGMLSTAMAFGVYVWGGHNYLFWAALNWLGVTE 415
P. hodgsonii VGLHDFLIRYVYIPVGGSQHGLLGTLFSTAMTFAFVSYWGGNDYLWCWATLNWLGVTE 399
B. mutus VGLHDFLIRYVYIPVGGSQHGLLGTLFSTAMTFAFVSYWGGNDYLWCWATLNWLGVTE 399
C. elegans RGLYQFFKTYIFIPICAPTFLSRPKIFGVFISYGFVLLWGGFYHNNYVWGLNLLALFIE 414
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H. sapiens NGVRRLEVETPCIQDSLARYFSPQARRRFHAALASCSTSMILLSNLVLFGGNEVGKTYWNR 459
M. fascicularis NGVRRLEVETPCIQDSLARYFSPQARRRFHAALASCSTSMILLSNLVLFGGNEVGKTYWNR 459
P. troglodytes NGVRRLEVETPCIQDSLARYFSPQARRRFHAALASCSTSMILLSNLVLFGGNEVGKTYWNR 459
P. paniscus NGVRRLEVETPCIQDSLARYFSPQARRRFHAALASCSTSMILLSNLVLFGGNEVGKTYWNR 459
N. leucogenys NGVRRLEVETPCIQDSLARYFSPQARRRFHAALASCSTSMILLSNLVLFGGNEVGKTYWNR 459
M. musculus SGVRRLEVETPCVRETLARHLSQARRRHALLASCSTSMILLFNLVFLGGIQVCKTYWNR 465
R. norvegicus SGVRRLEVETPCVRETLARHLSQARRRHALLASCSTSMILLFNLVFLGGIQVCKTYWNR 421
S. scrofa SGVRRLEVETPCIQDSLARYFSPQARRRFHAALASCSTSMILLSNLVLFGGNEVGKTYWNR 459
C. hircus NGVQKLVQRPVQHSLSAQFLSPGARRRHALLASCSTSMILLSNLVLFGGNSQVGIYWR 459
C. lupus NVGQRLVETPCIQDSLARYFSPQARRRFHAALASCSTSMILLSNLVLFGGNSQVGIYWR 459
M. putorius NAVQRLVQTPYVRSVQVFLSPQARRRFHAALASCSTAMILLSNLVLFGGNSQVGIYWR 518
O. orca NGVQRLVQRPVQHSLSAQFLSPQARRRHALLASCSTSMILLSNLVLFGGNSQVGIYWR 459
C. simum NGVRRLEVETPCIQDSLARYFSPQARRRFHAALASCSTSMILLSNLVLFGGNSQVGIYWR 459
D. rerio NAFALLFSSPPLRHAIVYCLTRPMQRRLALISAFSTAFLLSNLFLFGGTHVGRIFWKK 478
A. mississippiensis NGVRRLEVSVLVRDLIDHFFLPRICRRLHVALVAVSTSMILLSNLVLFGGNDVGIYWR 459
V. pacos NGVQRLVQTPRIQDSLARYFSPQARRRFHAALASCSTSMILLSNLVLFGGNSQVGIYWR 459
C. ferus NGVQRLVQTPRVQHSLSAQFLSPQARRRFHAALASCSTSMILLSNLVLFGGNSQVGIYWR 459
P. sinensis NGVRRLEVSVLQVELIDRFSPGICRRLHVALVAISTSMILLSNLVLFGGNSQVGIYWR 463
M. lucifugus NGVRRLEVETPCIQDSLARYFSPQARRRFHAALASCSTSMILLSNLVLFGGNSQVGIYWR 459
L. chalumnae NGVQKLVQRPVQHSLSAQFLSPGARRRHALLASCSTSMILLSNLVLFGGNSQVGIYWR 475
P. hodgsonii NGVQKLVQRPVQHSLSAQFLSPGARRRHALLASCSTSMILLSNLVLFGGNSQVGIYWR 459
B. mutus NGVQKLVQRPVQHSLSAQFLSPGARRRHALLASCSTSMILLSNLVLFGGNSQVGIYWR 459
C. elegans MGSKAIYTIESVRKWEANSDVAFRRLLAWCHILPFAIGLYSNFYFLGGSDVGAAGVQR 474
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H.sapiens	IFIQG-----WPWVTLVS-----LGFLYCYSHVGGIAWAQTYATD-----	493
M.fascicularis	IFIQG-----WPWVTLPV-----LGFLYCYSHVGGIAWAQTYAMD-----	493
P.troglodytes	IFIQG-----WPWVTLVS-----LGFLYCYSHVGGIAWAQTYATD-----	493
P.paniscus	IFIQG-----WPWVTLVS-----LGFLYCYSHVGGIAWAQTYATD-----	493
N.leucogenys	IFIQG-----WPWVTLVS-----LGFLYCYSHVGGIAWAQTYAMD-----	493
M.musculus	IFLQG-----WPWVTLVS-----LGFLYCYSHVDIAWAQTYTVL-----	499
R.norvegicus	IFLQG-----WPWVTLVS-----LGFLYCYSHVGGIAWAQTYTVL-----	455
S.scrofa	IFIQG-----WPWVTLVS-----LGFLYCYSHVGGIAWAQTYAVD-----	493
C.hircus	IFIQG-----WPCVTLVS-----LGCYCYAHVGGIAWAHTYSGN-----	493
C.lupus	IFIQG-----ADGLPGPPSPARAPGRAATTTTGAWFYPSVLC-----	497
M.putorius	IFVQG-----WPYVTLVS-----LGFLYCYSHVGGIAWAQTYSD-----	552
O.orca	IFIQG-----WPCVTLVS-----LGFLYCYSHVGGIAWAQTYSVN-----	493
C.simum	IFIQG-----WPWVTLVS-----LGFLYCYSHVGGIAWAQTYSD-----	493
D.rerio	LFVQG-----LLESSLEDLCVAG-----	496
A.mississippiensis	IFVKG-----WPWATLSV-----IGFLYCYSQVGGIEWDQMYIAD-----	493
V.pacos	IFIQG-----WPWVTLVS-----LGFLYCYSHVGGIAWAQTYSD-----	491
C.ferus	IFIQG-----WPWVTLVS-----LGFLYCYSHVGGIAWAQTYSD-----	491
P.sinensis	IFVEG-----WPWATLSV-----FGFLYCYSHVGGIEWDHTHCAD-----	497
M.lucifugus	IFIQG-----WPWVTLVS-----LGFLYCYSHVGGIAWAQTYSD-----	493
L.chalumnae	IFVQG-----QNDM-----	484
P.hodgsonii	IFIQG-----WPCVTLVS-----LGCYCYAHVGGIAWAHTYSGN-----	493
B.mutus	IFIQG-----WPWVTLVS-----LGFLYCYSHVGGIAWAHAYSGN-----	493
C.elegans	FLIETITFRWPFLLIIS-----LGWFHANTAMEV--DRLKSLEKSKKEKSN	519

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FIGURE S1. Multiple sequence alignment of HHAT sequences from 22 species. Clustal Omega sequence alignment of HHAT sequences from 22 different species. Cysteines are highlighted in yellow except for Cys324 which is highlighted in green. The critical MBOAT residues Asp339 and His379 (numbering from human sequence) are highlighted in red. Sequences aligned: *H. sapiens* [NP_001116306.1], *M. musculus* [NP_659130.2], *M. fascicularis* [XP_005540793.1], *S. scrofa* [XP_005667927.1], *P. troglodytes* [JAA02252.1], *P. paniscus* [XP_003814251.1], *C. hircus* [XP_005691086.1], *C. lupus familiaris* [XP_005622394.1], *N. leucogenys* [XP_003273071.1], *O. orca* [XP_004275337.1], *C. sinum sinum* [XP_004424926.1], *D. rerio* [XP_005158569.1], *C. elegans* [NP_001022489.1], *R. norvegicus* [XP_002724948.2], *A. mississippiensis* [XP_006266096.1], *T. chinensis* [XP_006159401.1], *V. pacos* [XP_006198798.1], *C. ferus* [XP_006180810.1], *P. sinensis* [XP_006136963.1], *M. lucifugus* [XP_006089978.1], *L. chalumnae* [XP_006007432.1], *P. hodgsonii* [XP_005981119.1], *B. mutus* [XP_005888635.1].