**Supplementary File S4: Protein sequences of XTHs employed in the phylogenetic analysis**

>1GBG

MSYRVKRMLMLLVTGLFLSLSTFAASASAQTGGSFYEPFNNYNTGLWQKADGYSNGNMFNCTWRANNVSMTSLGEMRLSLTSPSYNKFDCGENRSVQTYGYGLYEVNMKPAKNVGIVSSFFTYTGPTDGTPWDEIDIEFLGKDTTKVQFNYYTNGVGNHEKIVNLGFDAANSYHTYAFDWQPNSIKWYVDGQLKHTATTQIPQTPGKIMMNLWNGAGVDEWLGSYNGVTPLSRSLHWVRYTKR

>HvXTH22

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>HvXTH20

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>HvXTH16

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>HvXTH19

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>HvXTH15

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>HvXTH11

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>HvXTH3

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>HvXTH2

MGKPGALVPVVALAFALVLGLELVSGGNFYEECDATWEPQNCWTYDGGNSLSLALVSNSSGLSSTSQLLYFSWSSPLNESMCGCSGSMIRSKRQFIYGTVSTMIQLVKGDSAGTVTTYYTSSVGDDHDEIDFEFLGNETGQPYTLHTNVYAAGVGGKEMQFRPWFDPTDGYHNYTIAWTPCAVVWYVDGAPIRAFRNYERTHGVAFPTTRPMHAYSSIWAAEDWATQGGRVRADWTRAPFVASYRGIDLDICECYGGDCVYTCAGAFRGCGGLTGDQRGKMQWVQDNYRIYDYCADHEAGKVPGVECSLPQY

>HvXTH14

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>HvXTH12

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>HvXTH10

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>HvXTH13

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>HvXTH17

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>HvXTH21

MASGPSRTVPCSVLPLLLLLAGVARAAGNFYQDVDITWGDGRGKILGGGDLLTLSLDRASGSGFQSKNQYLYGRFDMQIKLVPGDSAGTVATFYLSSQGSAHDEIDFEFLGNASGQPYTVHTNVYSQGKGGREQQFRMWFDPTADFHTYSVLWNPTHILFYVDGTPIREHRNREAATGVPYLRSQAMRVYASVWDAEEWATQGGRVRTDWSRAPFVASYKGLAASGCASQDAAACANSNGAWMYQELDATALDRLQWVQKNYMIYNYCTDTWRFKDGAPPECASK

>HvXTH24

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>HvXTH23

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>HvXTH18

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>HvXTH1

MARPSFSLHLCLAVLALAAAASEAGFYDQFDVVGSGNNVRVNDDGIAQQVALTLDQGNGGSGFSSKDKYLYGEFSVQMKLIGGNSAGTVTSFYLTSGEGDGHDEIDIEFMGNLSGDPYVMNTNVWASGDGKKEHQFYLWFDPTADFHTYKIVWNPKNIIFQVDDVPVRTFKKYDDLPYPSSQPMTVHATLWDGSYWATRHGDVKIDWTQAPFVVNYRGYTSNGCVSNGGSSACPAGSDAWMSTELDAKALGTVAWAESKYMSYDYCTDGWRFPNGFPAECSRRN

>HvXTH6

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>HvXTH5

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>HvXTH7

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>HvXTH4

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>HvXTH9

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>HvXTH8

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>AtXTH33

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>AtXTH8

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>AtXTH28

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>AtXTH30

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>AtXTH17

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>AtXTH27

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>AtXTH4

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>AtXTH10

MTLINRSKPFVLLVGFSIISSLLLWVSQASVVSSGDFNKDFFVTWSPTHVNTSNDGRSRTLKLDQESGASFSSIQTFLFGQIDMKIKLIRGSSQGTVVAYYMSSDQPNRDEIDFEFLGNVNGQPYILQTNVYAEGLDNREERIHLWFDPAKDFHTYSILWNIHQIVFMVDQIPIRLYRNHGEKGVAYPRLQPMSVQASLWNGESWATRGGHDKIDWSKGPFVASFGDYKIDACIWIGNTSFCNGESTENWWNKNEFSSLTRVQKRWFKWVRKYHLIYDYCQDYGRFNNKLPKECSLPKY

>AtXTH21

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>AtXTH32

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>AtXTH16

MGRILNRTVLMTLLVVTMAGTAFSGSFNEEFDLTWGEHRGKIFSGGKMLSLSLDRVSGSGFKSKKEYLFGRIDMQLKLVAGNSAGTVTAYYLSSEGPTHDEIDFEFLGNETGKPYVLHTNVFAQGKGNREQQFYLWFDPTKNFHTYSLVWRPQHIIFMVDNVPIRVFNNAEQLGVPFPKNQPMKIYSSLWNADDWATRGGLVKTDWSKAPFTAYYRGFNAAACTVSSGSSFCDPKFKSSFTNGESQVANELNAYGRRRLRWVQKYFMIYDYCSDLKRFPQGFPPECRKSRV

>AtXTH3

MDYMRIFSVFVVTLWIIRVDARVFGGRGIEKFVTFGQNYIVTWGQSHVSTLHSGEEVDLYMDQSSGGGFESKDAYGSGLFEMRIKVPSGNTGGIVTAFYLTSKGGGHDEIDFEFLGNNNGKPVTLQTNLFLNGEGNREERFLLWFNPTKHYHTYGLLWNPYQIVFYVDNIPIRVYKNENGVSYPSKPMQVEASLWNGDDWATDGGRTKVNWSYSPFIAHFRDFALSGCNIDGRSNNVGACESSNYWWNAGNYQRLSGNEQKLYEHVRSKYMNYDYCTDRSKYQTPPRECY

>AtXTH31

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>AtXTH11

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>AtXTH9

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>AtXTH1

MEYLSIFGFVSVLYLIIRVDARAYEVNGIDQSKVGFDDNYVVTWGQNNVLKLNQGKEVQLSLDHSSGSGFESKNHYESGFFQIRIKVPPKDTSGVVTAFYLTSKGNTHDEVDFEFLGNKEGKLAVQTNVFTNGKGNREQKLALWFDPSKDFHTYAILWNPYQIVLYVDNIPVRVFKNTTSQGMNYPSKPMQVVVSLWNGENWATDGGKSKINWSLAPFKANFQGFNNSGCFTNAEKNACGSSAYWWNTGSYSKLSDSEQKAYTNVRQKYMNYDYCSDKVRFHVPPSECKWNN

>AtXTH2

MNRIRYCFELVSVLFLMFTANARARGRGAIDFDVNYVVTWGQDHILKLNQGKEVQLSMDYSSGSGFESKSHYGSGFFQMRIKLPPRDSAGVVTAFYLTSKGDTHDEVDFEFLGNRQGKPIAIQTNVFSNGQGGREQKFVPWFDPTTSFHTYGILWNPYQIVFYVDKVPIRVFKNIKKSGVNYPSKPMQLVASLWNGENWATSGGKEKINWAYAPFKAQYQGFSDHGCHVNGQSNNANVCGSTRYWWNTRTYSQLSANEQKVMENVRAKYMTYDYCSDRPRYPVPPSECRWNQ

>AtXTH15

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>AtXTH29

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>AtXTH23

MAMISYSTIVVALLASFMICSVSANFQRDVEITWGDGRGQITNNGDLLTLSLDKASGSGFQSKNEYLFGKIDMQIKLVAGNSAGTVTAYYLKSPGSTWDEIDFEFLGNLSGDPYTLHTNVFTQGKGDREQQFKLWFDPTSDFHTYSILWNPQRIIFSVDGTPIREFKNMESQGTLFPKNQPMRMYSSLWNAEEWATRGGLVKTDWSKAPFTASYRGFNEEACVVINGQSSCPNVSGQGSTGSWLSQELDSTGQEQMRWVQNNYMIYNYCTDAKRFPQGLPRECLAA

>AtXTH14

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>AtXTH26

MAGLQAKTLMFVLAAALATLGRTFVEADFSKNFIVTWGKDHMFMNGTNLRLVLDKSAGSAIKSKVAHLFGSVEMLIKLVPGNSAGTVAAYYLSSTGSTHDEIDFEFLGNATGQPYTIHTNLYAQGKGNREQQFRPWFNPTNGFHNYTIHWNPSEVVWFVDGTPIRVFRNYESEGIAYPNKQGMKVFASLWNAEDWATQGGRVKTNWTLAPFVAEGRRYKARACLWKGSVSIKQCVDPTIRSNWWTSPSFSQLTASQLTKMQKIRDGFMIYDYCKDTNRFKGVMPPECSKKQF

>AtXTH24

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>AtXTH18

MKLSCGTSFAFLIMFLFAAQSMHVYAGSFHKDVQIHWGDGRGKVRDRDGKLLSLSLDKSSGSGFQSNQEFLYGKAEVQMKLVPGNSAGTVTTFYLKSPGTTWDEIDFEFLGNLSGHPYTLHTNVYTKGSGDKEQQFHLWFDPTVNFHTYCITWNPQRIIFTVDGIPIREFKNSESIGVPFPTKQPMRLYASLWEAEHWATRGGLEKTDWSKAPFTAFYRNYNVEGCVWANGKSSCPANSSWFTQQLDSNGQTRMKGVQSKYMVYNYCNDKRRFPRGVPVECS

>AtXTH19

MKSFTFLILFLFAAQSISVYAGSFHKDVKIHWGDGRGKIHDNQGKLLSLSLDKSSGSGFQSNQEFLYGKAEVQMKLVPGNSAGTVTTFYLKSPGTTWDEIDFEFLGNISGHPYTLHTNVYTKGSGDKEQQFHLWFDPTANFHTYCITWNPQRIIFTVDGIPIREFMNAESRGVPFPTKQPMRLYASLWEAEHWATRGGLEKTDWSKAPFTAYYRNYNVEGCVWVNGKSVCPANSQWFTQKLDSNGQTRMKGVQSKYMVYNYCSDKKRFPRGVPPECS

>AtXTH7

MVVSLFSSRNVFYTLSLCLFAALYQPVMSRPAKFEDDFRIAWSDTHITQIDGGRAIQLKLDPSSGCGFASKKQYLFGRVSMKIKLIPGDSAGTVTAFYMNSDTDSVRDELDFEFLGNRSGQPYTVQTNVFAHGKGDREQRVNLWFDPSRDFHEYAISWNHLRIVFYVDNVPIRVYKNNEARKVPYPRFQPMGVYSTLWEADDWATRGGIEKINWSRAPFYAYYKDFDIEGCPVPGPADCPANSKNWWEGSAYHQLSPVEARSYRWVRVNHMVYDYCTDKSRFPVPPPECSAGI

>AtXTH5

MGRLSSTLCLTFLILATVAFGVPPKKSINVPFGRNYFPTWAFDHIKYLNGGSEVHLVLDKYTGTGFQSKGSYLFGHFSMHIKMVAGDSAGTVTAFYLSSQNSEHDEIDFEFLGNRTGQPYILQTNVFTGGAGNREQRINLWFDPSKDYHSYSVLWNMYQIVFFVDDVPIRVFKNSKDVGVKFPFNQPMKIYSSLWNADDWATRGGLEKTNWEKAPFVASYRGFHVDGCEASVNAKFCETQGKRWWDQKEFQDLDANQYKRLKWVRKRYTIYNYCTDRVRFPVPPPECRRDRDI

>AtXTH20

MVSFCGRRFAFLIIFLFAAQYERVYAGSFHKDVQIHWGDGRGKILDNVGNLLSLSLDKFSGSGFQSHQEFLYGKVEVQMKLVPGNSAGTVTTFYLKSPGTTWDEIDFEFLGNISGHPYTLHTNVYTKGTGDKEQQFHLWFDPTVDFHTYCIIWNPQRVIFTIDGIPIREFKNSEALGVPFPKHQPMRLYASLWEAEHWATRGGLEKTDWSKAPFTAFYRNYNVDACVWSNGKSSCSANSSWFTQVLDFKGKNRVKWAQRKYMVYNYCTDKKRFPQGAPPECS

>AtXTH12

MAAFATKQSPLLLASLLILIGVATGSFYDSFDITWGAGRANIFESGQLLTCTLDKTSGSGFQSKKEYLFGKIDMKIKLVPGNSAGTVTAYYLSSKGETWDEIDFEFLGNVTGQPYVIHTNVFTGGKGNREMQFYLWFDPTADFHTYTVLWNPLNIIFLVDGIPIRVFKNNEANGVAYPKSQPMKIYSSLWEADDWATQGGKVKTDWTNAPFSASYRSFNDVDCCSRTSIWNWVTCNANSNSWMWTTLNSNQLGQLKWVQKDYMIYNYCTDFKRFPQGLPTECNLN

>AtXTH13

MAAFTTKQSLLLLSLLLLISLSAGSFYDNFDITWGNGRANIVESGQLLTCTLDKISGSGFQSKKEYLFGKIDMKMKLVAGNSAGTVTAYYLSSKGETWDEIDFEFLGNVTGQPYVLHTNVFTGGKGNREMQFYLWFDPTADFHTYTVLWNPLNIIFLVDGIPIRVFKNNEANGVAYPKSQPMKIYSSLWEADDWATQGGKVKTDWTNAPFSASYKSFNDVDCCSRTSLLNWVTCNANSNSWMWTTLNSNQYGQMKWVQDDYMIYNYCTDFKRFPQGLPTECNLN

>AtXTH25

MDRSTFILSLLFTLTVSTTTLFSPVFAGTFDTEFDITWGDGRGKVLNNGELLTLSLDRASGSGFQTKKEYLFGKIDMQLKLVPGNSAGTVTAYYLKSKGDTWDEIDFEFLGNLTGDPYTMHTNVYTQGKGDREQQFHLWFDPTADFHTYSVLWNPHHIVFMVDDIPVREFKNLQHMGIQYPKLQPMRLYSSLWNADQWATRGGLVKTDWSKAPFTASYRNFRADACVSSGGRSSCPAGSPRWFSQRLDLTAEDKMRVVQRKYMIYNYCTDTKRFPQGFPKECRH

>AtXTH22

MAITYLLPLFLSLIITSSVSANFQRDVEITWGDGRGQIKNNGELLTLSLDKSSGSGFQSKNEYLFGKVSMQMKLVPGNSAGTVTTLYLKSPGTTWDEIDFEFLGNSSGEPYTLHTNVYTQGKGDKEQQFKLWFDPTANFHTYTILWNPQRIIFTVDGTPIREFKNMESLGTLFPKNKPMRMYSSLWNADDWATRGGLVKTDWSKAPFTASYRGFQQEACVWSNGKSSCPNASKQGTTTGSWLSQELDSTAQQRMRWVQRNYMIYNYCTDAKRFPQGLPKECLAA

>AtXTH6

MAKIYSPSFPGTLCLCIFTLLTLMFIRVSARPATFVEDFKAAWSESHIRQMEDGKAIQLVLDQSTGCGFASKRKYLFGRVSMKIKLIPGDSAGTVTAFYMNSDTATVRDELDFEFLGNRSGQPYSVQTNIFAHGKGDREQRVNLWFDPSMDYHTYTILWSHKHIVFYVDDVPIREYKNNEAKNIAYPTSQPMGVYSTLWEADDWATRGGLEKIDWSKAPFYAYYKDFDIEGCPVPGPTFCPSNPHNWWEGYAYQSLNAVEARRYRWVRVNHMVYDYCTDRSRFPVPPPECRA

>OsXTH1

MGSLGRRPWVGGLTAAMIFAVAVCGFCFSGASAAAAAPTFGDNFEITGAEDHVKTSADGQTWYLYLDNKTGVGFQTKERYLFGWFSMNLKLAGNDSAGVVTAYYMCSDVDAAPQRDELDFEFLGNRTGEPYIIQTNVYRSGVGGREMRHSLWFDPTADFHSYSILWNPKQIVFFVDKVPIREYRNSDKPNTFFPIMKPMYVFSSIWNADDWATRGGLEKTDWTKAPFISSYRDFTADACSWGTAAASPPSCAASTGNSWWDQPPAWALDAGQREDSAWVARNLVIYDYCDDRKRFPSPPEECLLRTTSS

>OsXTH2

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>OsXTH3

MASLAVVVVVVAVVCAAGVAAAGKFDDVVEPSWANDHVVYEGDLLKLRLDSSSGGGFASKSKFLYGKATADLKLVAGDSAGVVTAFYLSSGGDKHNEFDFEFLGNVTGEPYLVQTNLYIDGVGNREQRIDLWFDPTADFHTYAVLWNPSQVVFLVDDTPIRVYENKNATAAVKGHHRHAAAANGTSNATSAAASVPPFPSPQPMSVYSSIWNADDWATQGGRVKTDWSHAPFVATFRDVRVEGCAWAANATDSDAGEVARCTGSSWGKEGRYWWKEKDMEELTVHQNHQLVWARAHHLVYDYCVDTDRFPVQPPECAGR

>OsXTH4

MGQARAHLLASLWAFYLILAISMVTGDLTNDLDILWGNSKVFYDNSGKQTISLTLDRWTTSAFRSKSTYLFSRIDMDIKLVAGDSAGTVTTLYVSGQGMNRLLILVDDKLIRQIKNNLMYSVPYPTYQPMRVYGSIWNADDWATMGGRVKTDWSQAPFTAYFRNYRAIACPPQQSSPLCGQSSGNWFNQELDVTRKQQLQEVDANYKIYDYCTDTKRFKDNLPKECTIN

>OsXTH5

MGRLANWLDDRTSKSTPDYRIQAGSFLLKLWFRPIFIIFFMPTSSCQPMMSSSYTFQESKHTPQSAYSLRHFALAKAMGQPRAQLLPSMSMAALYLILATSPVISDMTDSLDMLWGNTQVLYDSTGHQIVSLSLDRWTTSAFRSKTKYLFARIDMDIKLVAKDSAGTVTTLYMITEGLWDIHDEIDLEFLGNTTGEPYTLHTNIYARGTGGREKQYRLWFDPTEDFHTYTIIWNPQMILILVDGTPIRQMKNQLRNDIPFPLYQPMRLYASIWDADDWATQGGRIKTDWSQAPFTAFFRNYQANACIPYKTAWICSQGSNDSSWFTQDLDEEGKQKLKDVDDNYKIYDYCTDSRRYPNGYPPECGSQ

>OsXTH6

MAPARAHHLLACLLASALLAAATPVTGGGLMTDQLEVLFGQTQLLNDSNGDQTIALTLDREMGSAFKSKTSYLFARIDMDIKLVADDSAGTVTTIYLISEKDWNTHDEIDLEFLGNVTGQPYTLHTNIFANGEGGREVQYRLWFDPTQDFHTYSVIWNPDEILILVDNMPIRQFKNHLDSGVPFPIYQPMRLFGCLWDADDWATEGGRIKTDWSQAPFVAYFRNYTADGCVPSSYAWVCGQGPASSSDWFDRGLDDVKQQQQLREAQDKYMIYNYCNDPERFPDGYPKECGLQ

>OsXTH7

MAPMPLASSSSKLCSLLILCLAFLAAVDRSTAGIFDEIELIWGASRTYFFMDGDSEALALSLDQSQGSCFRSREKYLYVQIDVEIKLIEGDSAGTVCTIYTISEGPWEIHDEIDLEFLGNVTGEPYTLHTNIFANGVGGREQQFRLWFDPTADYHTYSIVWNPKRILILVDGKAIRDFKNNEDQGVPFPTWQSMRTFGSLWSAEDWATQGGRVKTDWKQAPFVTYYRNYNVTWCRPSPGVAWCGDEPKDSTRFDLDANTLSDLQWVRSNSMIYNYCDDSVRFNATTLPKECTLQ

>OsXTH8

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>OsXTH9

MGFGSREMACALVALVLGLCCVGGARATGRIDEGLEVMWGDGRGSVSPDGQVMALSLDHTSGSGWRSKNTYLFARVDLQIKLVANNSAGTVTTCYFMSEGEWDIHDEVDLEFLGNVTGQPYTLHTNVFANGTGGKEQQFHLWFDPTTDFHTYSIVWTSQHILVLVDGTPIREMKNHADKGIAYPSSQRMRLYGSLWNADDWATQGGRVKTDWSQAPFVARYRNFTATEAASSSSPAGYDQQMDATAQQAMKWARDNYMVYDYCADSKRFPQGFPPECSMP

>OsXTH10

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>OsXTH11

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>OsXTH12

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>OsXTH13

MAAKLQGGGGGAAVMAVVVVAMVAGAASGGNFYEECDATWEPQNCWSSDNGKSLSLALVSNSSGSMIRSKRQFVYGSVSTSVQLVPGNSAGTVTTFYTSSLGDKHDEIDFEFLGNETGQPYTIHTNVYANGVGDKEMQFKPWFDPTDGSHNYTISWTPCRIVWYIDGMPIRVFRNYQSSNGVAFPTWQPMYAYSSIWAAEDWATQKGRVKTDWSKAPFVANYHGIDLDVCECYGGDCVYGCAAAFNQGGGCAGQQLTGDEMGQMKWVQDNFRIYDYCVDYKRFNGQMAPECSLPQY

>OsXTH14

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>OsXTH15

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>OsXTH16

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>OsXTH17

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>OsXTH18

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>OsXTH19

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>OsXTH20

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>OsXTH21

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>OsXTH22

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>OsXTH23

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>OsXTH24

MAAAVLAVLWACMMMMSLAPASLAASGFEEVPTIAFDEGFSPLFGEDNMVKSADGRTVSITLNRYTGSGFISSDYYHHGFFSASIKLPKDHTAGVVVAFYLSNGDVFEKTHDELDFEFLGNRYRHEWKMQTNVYGNGSTDRGREERYLMPFDPTADAHRFSILWHSRLIVFYVDGVPIREVPRTAAMGADYPSKPMALYVTIWDGSTWATDNGKYKVNYKRGPFTAVFSDLVLRGCTARSDIRLATTADDQDRCAAAEEDLMESDEYSSTMAMTARKRMAMRRFRQRQMLYTVCYDTNRYPEPFPECDVNMAERQMYWQWGESKVVRPRVRPRPGRRSKRRPSPEATAIPPPVLVSLQQAD

>OsXTH25

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>OsXTH26

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>OsXTH27

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>OsXTH28

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>OsXTH29

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