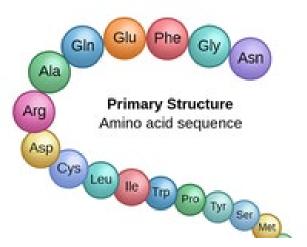


Bioinformatics for Protein Expression

Day 2: Tuesday 21st March



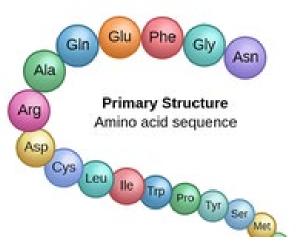
- How much can we learn and predict from sequence alone?
- How does this help us with our purifications?





How can bioinformatics help me?

- In this lecture you will learn how (using just your protein sequence) you can:
 - Predict domains
 - Identify post translational modifications
 - Calculate the molecular mass
 - Determine the isoelectric point
 - And most importantly, learn how to get your "extinction co-efficients" so you can calculate protein concentration accurately
 - Identify distant homologs





First useful resource - Uniprot

• Uniprot.org



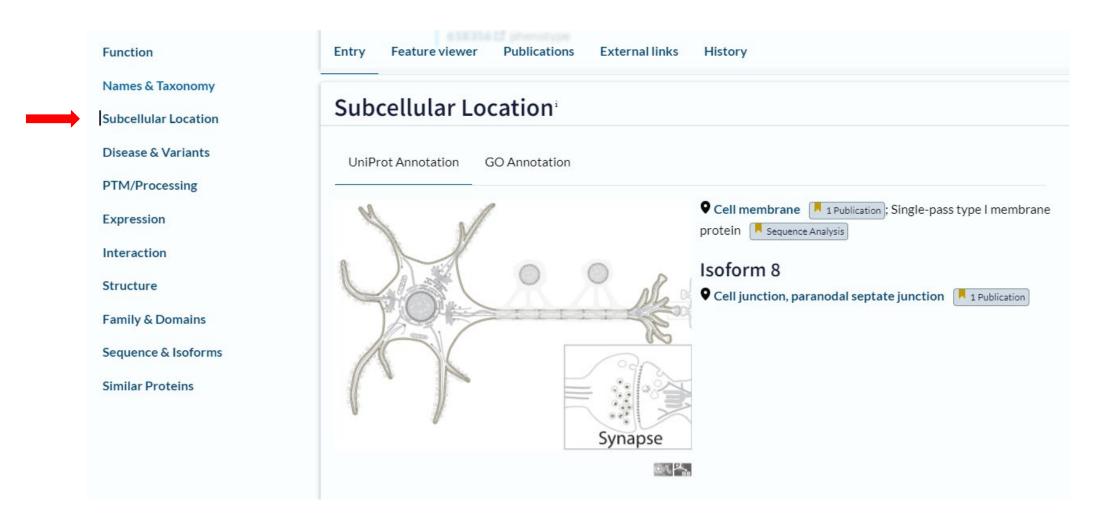


Uniprot – brief functional description

-	Function	09485	56 · NFASC_HUMAN						
	Names & Taxonomy	Protein ⁱ	Neurofascin	Amino acids	1347				
	Subcellular Location	Gene ⁱ	NFASC	Protein	Evidence at protein level				
	Disease & Variants	Status ⁱ	UniProtKB reviewed (Swiss-Prot)	existence ¹					
	PTM/Processing	$Organism^{\mathrm{i}}$	Homo sapiens (Human)	Annotation score ⁱ	5/3				
	Expression								
	Interaction	Entry Featu	re viewer Publications External links	History					
	Structure	BLAST Align 🛃 Download 🔻 ᡠ Add Add a publication Entry feedback							
	Family & Domains	Functior	Function						
	Sequence & Isoforms	Cell adhesion, a	nkyrin-binding protein which may be involved in ne	urite extension, axo	onal guidance, synaptogenesis, myelination				
	Similar Proteins	and neuron-glia	l cell interactions. 📕 By Similarity						



Uniprot – subcellular localisation



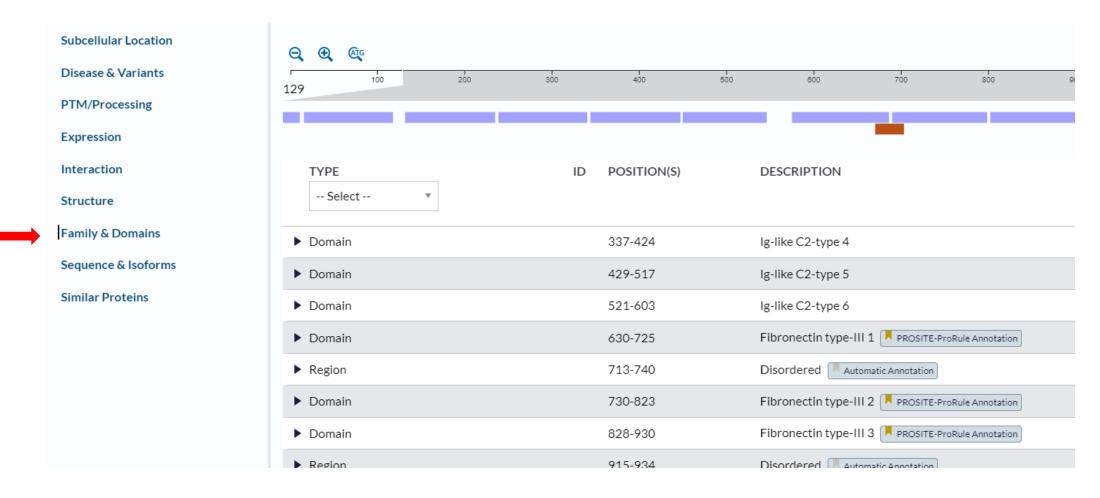


Uniprot – post-translational modifications

PTM/Processing						
Expression						2
Interaction	100 200 300 1	400 500 600	0 700	009 008	1,000 1,100 1,200	1,300 1347
Structure			I	I	11	
Family & Domains	7.05		DO SITI ON VO	0011205	DECODIDENCI	A.
Sequence & Isoforms	TYPE Select	ID •	POSITION(S)	Select V	DESCRIPTION	- 1
Similar Proteins						_
	▶ Signal		1-24	UniProt	Sequence Analysis	BLAST
	▶ Chain	PRO_0000015049	9 25-1347	UniProt	Neurofascin	BLAST 🔂 Add
	Disulfide bond		63-118	UniProt	PROSITE-ProRule Annotation	BLAST ₩ Add
	 Glycosylation 		409	UniProt	N-linked (GlcNAc) asparagine 📕 1 Publication	
	 Glycosylation 		446	UniProt	N-linked (GlcNAc) asparagine	



Uniprot – Domain composition





Uniprot – sequence data

	Subcellular Location	Sequence & Isoforms ¹
	Disease & Variants	BLAST 13 isoforms Align 13 isoforms
	PTM/Processing	SequenceCompleteSequenceThe displayed sequence is furtherstatus ⁱ processing ⁱ processed into a mature form.
	Expression	This entry describes 13 isoforms ⁱ produced by Alternative splicing .
	Interaction	
	Structure	O94856-1 This isoform has been chosen as the canonical sequence. All positional information in this entry refers to it. This is also the
	Family & Domains	sequence that appears in the downloadable versions of the entry.
\longrightarrow	Sequence & Isoforms	Name 1 See also sequence in UniParc or sequence clusters in UniRef
	Similar Proteins	Tools 🔻 土 Download 🇀 Add Highlight 👻 Copy sequence
		Length 1,347 Last updated 2005-12-06 v4 Mass (Da) 150,027 Checksum ⁱ 4DC555E5AA06C223
		10 20 30 40 50 60 70 80 MARQPPPPWV HAAFLLCLLS LGGAIEIPMD PSIQNELTQP PTITKQSAKD HIVDPRDNIL IECEAKGNPA PSFHWTRNSR
		90 100 110 120 130 140 150 160 FFNIAKDPRV SMRRRSGTLV IDFRSGGRPE EYEGEYQCFA RNKFGTALSN RIRLQVSKSP LWPKENLDPV VVQEGAPLTL
		170 180 190 200 210 220 230 240 QCNPPPGLPS PVIFWMSSSM EPITQDKRVS QGHNGDLYFS NVMLQDMQTD YSCNARFHFT HTIQQKNPFT LKVLTTRGVA
		250 260 270 280 290 300 310 320 ERTPSFMYPQ GTASSQMVLR GMDLLLECIA SGVPTPDIAW YKKGGDLPSD KAKFENFNKA LRITNVSEED SGEYFCLASN



Uniprot – sequence data

Subcellular Location	Sequence & Isoforms ¹
Disease & Variants PTM/Processing	BLAST 13 isoforms Align 13 isoforms Sequence status ⁱ Complete Sequence processing ⁱ The displayed sequence is further processed into a mature form.
Expression	This entry describes 13 isoforms ⁱ produced by Alternative splicing .
Interaction Structure	094856-1 This isoform has been chosen as the canonical sequence. All positional information in this entry refers to it. This is also the
Family & Domains	sequence that appears in the downloadable versions of the entry.
Sequence & Isoforms	Name 1 See also sequence in UniParc or sequence clusters in UniRef
Similar Proteins	Tools 🔻 土 Download 🏠 Add Highlight 🔹 Copy sequence
	Length 1,347 Last updated 2005-12-06 v4 Mass (Da) 150,027 Checksum ⁱ 4DC555E5AA06C223
	10 20 30 40 50 60 70 80 MARQPPPPWV HAAFLLCLLS LGGAIEIPMD PSIQNELTQP PTITKQSAKD HIVDPRDNIL IECEAKGNPA PSFHWTRNSR
	90 100 110 120 130 140 150 160 FFNIAKDPRV SMRRRSGTLV IDFRSGGRPE EYEGEYQCFA RNKFGTALSN RIRLQVSKSP LWPKENLDPV VVQEGAPLTL
	QCNPPPGLPS PVIFWMSSSM EPITQDKRVS QGHNGDLYFS NVMLQDMQTD YSCNARFHFT HTIQQKNPFT LKVLTTRGVA
	250 260 270 280 290 300 310 320 ERTPSFMYPQ GTASSQMVLR GMDLLLECIA SGVPTPDIAW YKKGGDLPSD KAKFENFNKA LRITNVSEED SGEYFCLASN



Uniprot – sequence formats

FASTA format

>sp|094856|NFASC_HUMAN Neurofascin OS=Homo sapiens OX=9606 GN=NFASC PE=1 SV=4 MAROPPPPWVHAAFLLCLLSLGGAIEIPMDPSIQNELTOPPTITKQSAKDHIVDPRDNIL IECEAKGNPAPSFHWTRNSRFFNIAKDPRVSMRRRSGTLVIDFRSGGRPEEYEGEYQCFA RNKFGTALSNRIRLQVSKSPLWPKENLDPVVVQEGAPLTLQCNPPPGLPSPVIFWMSSSM EPITQDKRVSQGHNGDLYFSNVMLQDMQTDYSCNARFHFTHTIQQKNPFTLKVLTTRGVA ERTPSFMYPQGTASSOMVLRGMDLLLECIASGVPTPDIAWYKKGGDLPSDKAKFENFNKA LRITNVSEEDSGEYFCLASNKMGSIRHTISVRVKAAPYWLDEPKNLILAPGEDGRLVCRA NGNPKPTVQWMVNGEPLQSAPPNPNREVAGDTIIFRDTQISSRAVYQCNTSNEHGYLLAN AFVSVLDVPPRMLSPRNQLIRVILYNRTRLDCPFFGSPIPTLRWFKNGQGSNLDGGNYHV YENGSLEIKMIRKEDOGIYTCVATNILGKAENQVRLEVKDPTRIYRMPEDQVARRGTTVO LECRVKHDPSLKLTVSWLKDDEPLYIGNRMKKEDDSLTIFGVAERDQGSYTCVASTELDQ DLAKAYLTVLADQATPTNRLAALPKGRPDRPRDLELTDLAERSVRLTWIPGDANNSPITD YVV0FEED0F0PGVWHDHSKYPGSVNSAVLRLSPYVNY0FRVIAINEVGSSHPSLPSERY RTSGAPPESNPGDVKGEGTRKNNMEITWTPMNATSAFGPNLRYIVKWRRRETREAWNNVT VWGSRYVVGOTPVYVPYEIRVQAENDFGKGPEPESVIGYSGEDYPRAAPTEVKVRVMNST AISLQWNRVYSDTVQGQLREYRAYYWRESSLLKNLWVSQKRQQASFPGDRLRGVVSRLFP YSNYKLEMVVVNGRGDGPRSETKEFTTPEGVPSAPRRFRVRQPNLETINLEWDHPEHPNG IMIGYTLKYVAFNGTKVGKQIVENFSPNQTKFTVQRTDPVSRYRFTLSARTQVGSGEAVT EESPAPPNEATPTAAPPTLPPTTVGATGAVSSTDATAIAATTEATTVPIIPTVAPTTIAT TTTVATTTTTAAATTTTESPPTTTSGTKIHESAPDEQSIWNVTVLPNSKWANITWKHNF GPGTDFVVEYIDSNHTKKTVPVKAQAQPIQLTDLYPGMTYTLRVYSRDNEGISSTVITFM TSTAYTNNQADIATQGWFIGLMCAIALLVLILLIVCFIKRSRGGKYPVREKKDVPLGPED PKEEDGSFDYSDEDNKPLQGSQTSLDGTIKQQESDDSLVDYGEGGEGQFNEDGSFIGQYT VKKDKEETEGNESSEATSPVNAIYSLA



Uniprot – editing the sequence

• But, what if I am only making one domain of this?

>sp|094856|NFASC_HUMAN Neurofascin OS=Homo sapiens OX=9606 GN=NFASC PE=1 SV=4 MAROPPPPWVHAAFLLCLLSLGGAIEIPMDPSIQNELTOPPTITKQSAKDHIVDPRDNIL IECEAKGNPAPSFHWTRNSRFFNIAKDPRVSMRRRSGTLVIDFRSGGRPEEYEGEYQCFA RNKFGTALSNRIRLQVSKSPLWPKENLDPVVVQEGAPLTLQCNPPPGLPSPVIFWMSSSM EPITQDKRVSQGHNGDLYFSNVMLQDMQTDYSCNARFHFTHTIQQKNPFTLKVLTTRGVA ERTPSFMYPQGTASSOMVLRGMDLLLECIASGVPTPDIAWYKKGGDLPSDKAKFENFNKA LRITNVSEEDSGEYFCLASNKMGSIRHTISVRVKAAPYWLDEPKNLILAPGEDGRLVCRA NGNPKPTVQWMVNGEPLQSAPPNPNREVAGDTIIFRDTQISSRAVYQCNTSNEHGYLLAN AFVSVLDVPPRMLSPRNQLIRVILYNRTRLDCPFFGSPIPTLRWFKNGQGSNLDGGNYHV YENGSLEIKMIRKEDQGIYTCVATNILGKAENQVRLEVKDPTRIYRMPEDQVARRGTTVQ LECRVKHDPSLKLTVSWLKDDEPLYIGNRMKKEDDSLTIFGVAERDQGSYTCVASTELDQ DLAKAYLTVLADQATPTNRLAALPKGRPDRPRDLELTDLAERSVRLTWIPGDANNSPITD YVV0FEED0F0PGVWHDHSKYPGSVNSAVLRLSPYVNY0FRVIAINEVGSSHPSLPSERY RTSGAPPESNPGDVKGEGTRKNNMEITWTPMNATSAFGPNLRYIVKWRRRETREAWNNVT VWGSRYVVGOTPVYVPYEIRVQAENDFGKGPEPESVIGYSGEDYPRAAPTEVKVRVMNST AISLQWNRVYSDTVQGQLREYRAYYWRESSLLKNLWVSQKRQQASFPGDRLRGVVSRLFP YSNYKLEMVVVNGRGDGPRSETKEFTTPEGVPSAPRRFRVRQPNLETINLEWDHPEHPNG IMIGYTLKYVAFNGTKVGKQIVENFSPNQTKFTVQRTDPVSRYRFTLSARTQVGSGEAVT EESPAPPNEATPTAAPPTLPPTTVGATGAVSSTDATAIAATTEATTVPIIPTVAPTTIAT TTTVATTTTTAAATTTTESPPTTTSGTKIHESAPDEQSIWNVTVLPNSKWANITWKHNF GPGTDFVVEYIDSNHTKKTVPVKAQAQPIQLTDLYPGMTYTLRVYSRDNEGISSTVITFM TSTAYTNNQADIATQGWFIGLMCAIALLVLILLIVCFIKRSRGGKYPVREKKDVPLGPED PKEEDGSFDYSDEDNKPLQGSQTSLDGTIKQQESDDSLVDYGEGGEGQFNEDGSFIGQYT VKKDKEETEGNESSEATSPVNAIYSLA



Uniprot

- You can manually edit this to contain your sequence of interest
- This can be done in any editing software, eg. NotePad

INFASC_truncation.fasta - Notepad

File Edit Format View Help

>NFASC truncation

IECEAKGNPAPSFHWTRNSRFFNIAKDPRVSMRRRSGTLVIDFRSGGRPEEYEGEYQCFA RNKFGTALSNRIRLQVSKSPLWPKENLDPVVVQEGAPLTLQCNPPPGLPSPVIFWMSSSM EPITQDKRVSQGHNGDLYFSNVMLQDMQTDYSCNARFHFTHTIQQKNPFTLKVLTTRGVA ERTPSFMYPQGTASSQMVLRGMDLLLECIASGVPTPDIAWYKKGGDLPSDKAKFENFNKA LRITNVSEEDSGEYFCLASNKMGSIRHTISVRVKAAPYWLDEPKNLILAPGEDGRLVCRA NGNPKPTVQWMVNGEPLQSAPPNPNREVAGDTIIFRDTQISSRAVYQCNTSNEHGYLLAN AFVSVLDVPPRMLSPRNQLIRVILYNRTRLDCPFFGSPIPTLRWFKNGQGSNLDGGNYHV YENGSLEIKMIRKEDQGIYTCVATNILGKAENQVRLEVKDPTRIYRMPEDQVARRGTTVQ LECRVKHDPSLKLTVSWLKDDEPLYIGNRMKKEDDSLTIFGVAERDQGSYTCVASTELDQ DLAKAYLTVLADQATPTNRLAALPKGRPDRPRDLELTDLAERSVRLTWIPGDANNSPITD YVVQFEEDQFQPG



Uniprot

- You can manually edit this to contain your sequence of interest
- This can be done in any editing software, eg. NotePad

INFASC_truncation.fasta - Notepad

- 🗆

File Edit Format View Help

>NFASC truncation

MSHHHHHH IECEAKGNPAPSFHWTRNSRFFNIAKDPRVSMRRRSGTLVIDFRSGGRPEEY EGEYQCFARNKFGTALSNRIRLQVSKSPLWPKENLDPVVVQEGAPLTLQCNPPPGLPSPV IFWMSSSMEPITQDKRVSQGHNGDLYFSNVMLQDMQTDYSCNARFHFTHTIQQKNPFTLK VLTTRGVAERTPSFMYPQGTASSQMVLRGMDLLLECIASGVPTPDIAWYKKGGDLPSDKA KFENFNKALRITNVSEEDSGEYFCLASNKMGSIRHTISVRVKAAPYWLDEPKNLILAPGE DGRLVCRANGNPKPTVQWMVNGEPLQSAPPNPNREVAGDTIIFRDTQISSRAVYQCNTSN EHGYLLANAFVSVLDVPPRMLSPRNQLIRVILYNRTRLDCPFFGSPIPTLRWFKNGQGSN LDGGNYHVYENGSLEIKMIRKEDQGIYTCVATNILGKAENQVRLEVKDPTRIYRMPEDQV ARRGTTVQLECRVKHDPSLKLTVSWLKDDEPLYIGNRMKKEDDSLTIFGVAERDQGSYTC VASTELDQDLAKAYLTVLADQATPTNRLAALPKGRPDRPRDLELTDLAERSVRLTWIPGD ANNSPITDYVQFEEDQFQPG

• You can also add the sequence of tags such as His or GST-tags



Or you can get the sequence from a plasmid map

• For this course, there is a link to the software and plasmids files we're using: http://www.atomicvirology.path.cam.ac.uk/brazil

Atomic Virology Lab University of Cambridge



Theoretical and practical course in protein biochemistry, biophysics and structural biology

Departamento de Biologia Celular e Molecular e Bioagentes Patogênicos Faculdade de Medicina de Ribeirão Preto, 20 to 31 March 2023

Useful software links

ProtParam: https://web.expasy.org/protparam/

ApE plasmid editor: https://jorgensen.biology.utah.edu/wayned/ape/

UniProt knowledgebase: https://www.uniprot.org/

NCBI BLAST: https://blast.ncbi.nlm.nih.gov/Blast.cgi

AlphaFold: https://github.com/deepmind/alphafold

ColabFold: https://github.com/sokrypton/ColabFold

Vector maps

His6-EGFP His6-mTurquoise2 His6-mVenus His6-mCherry antiGFPnanobody-GST GST-3Cprotease

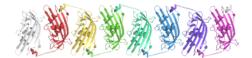
Copyright 2013-2023 Atomic Virology Lab All Rights Reserved



Or you can get the sequence from a plasmid map

• Use ApE to open the plasmid file and extract the sequence data

Atomic Virology Lab University of Cambridge



Theoretical and practical course in protein biochemistry, biophysics and structural biology

Departamento de Biologia Celular e Molecular e Bioagentes Patogênicos Faculdade de Medicina de Ribeirão Preto, 20 to 31 March 2023

Useful software links

ProtParam: https://web.expasy.org/protparam/

ApE plasmid editor: https://jorgensen.biology.utah.edu/wayned/ape/

UniProt knowledgebase: https://www.uniprot.org/

NCBI BLAST: https://blast.ncbi.nlm.nih.gov/Blast.cgi

AlphaFold: https://github.com/deepmind/alphafold

ColabFold: https://github.com/sokrypton/ColabFold

Vector maps

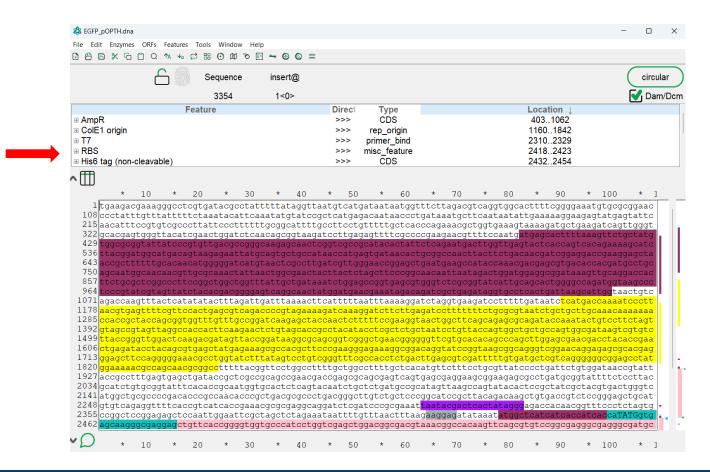
His6-EGFP His6-mTurquoise2 His6-mVenus His6-mCherry antiGFPnanobody-GST GST-3Cprotease

Copyright 2013-2023 Atomic Virology Lab All Rights Reserved



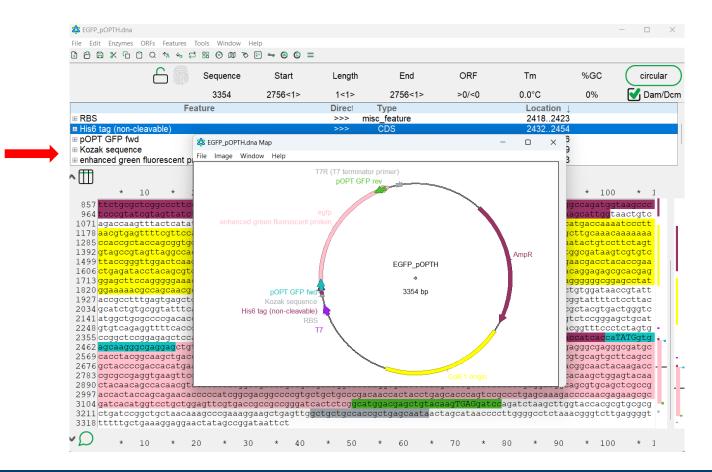
http://www.atomicvirology.path.cam.ac.uk/brazil

• Open your vector map – different features are highlighted





• You can also view this as a graphic map





• Identify the relevant open reading frame (ORF)

188%61	Find Next			Ctrl+	+> 👂	© =												
	Find Previous			Ctrl+	+<												_	
	ORF Starts Wit	h			► rt@	0											(c	circula
	Search Strand				· • .	_												
	Minimum bp				• <(0>												Dam/
	Translate			Ctrl+	+T		Direct	Тур						ation	\downarrow			
RBS	0.005						>>>	misc_fe						8242				
His6 tag (non-c	ORF map				_		>>>	CD						2245				
pOPT GFP fwc	Selection Tran	slate					>>>	primer_						3247 6245				
Kozak sequenc	Selection Tran	slate Dire	ction		•		>>>	regula										
enhanced gree	Selection Tran	slate Upp	ercase O	NLY			222	CD	5				245	6317	3			
—	10 *	20		30		40	* 50		60		70	* 80	*	90	*	100		1
643 accgcttt 750 agcaatgg 857 ttctgcgc 964 tcccgtat 1071 agaccaag	caacaacgt tcggccctt cgtagttat tttactcat	catggg tgegea cegget ctacac atatac	aacta ggcto gacgo tttao	catgta attaac ggttta gggagt gattga	tggcg ttgct caggo tttaa	gaacta tgataa caacta aaacti	acttactc aatctgga atggatga tcattttt	tagette geeggtg aegaaat aatttaa	agcgto agcgto agacao aaggat	gaatga aacaat gggtct gatcgc cctagg	agccat taatag cgcggt tgagat tgaaga	accaaa actgga atcatt aggtgc tccttt	cgacga tggagg gcagca ctcact ttgata	gcgt gcgga ictgg igatt iatc <mark>t</mark>	gacaco taaagt ggccao aagcat <mark>catgao</mark>	cacgat ttgcag gatggt ttgg <mark>ta ccaaaa</mark>	gacca aagco actgt <mark>tccct</mark>	gc ac cc tc tt
750 agcaatgg 857 ttetgege 964 teeegtat 1071 agaccaag 1178 aacgtgag 1285 ceaeeget 1392 gtageegt	caacaacgti tcggccctto cgtagttato tttactcato ttttcgttco accagcggto agttaggcco	catggg cgcgca ccggct ctacac atatac cactga ggtttg accact	aacta ggcto gacgo tttao gcgto tttgo tttgo	catgta attaac ggttta gggagt gattga cagacc ccggat gaactc	tggco ttgct caggo ttttaa ccgta caaga tgtag	gaacta tgata caacta agaaa agcta gcacco	acttacto aatctgga atggatga ccattttt agatcaaa ccaactct gcctacat	tagette geoggtg acgaaat aatttaa ggatett tttteeg acctege	agegte agegte agacac aaggat cttgac aaggte tctget	gaatga aacaat gggtct gatcgo totagg gatct aactgg taatco	agccat taatag cgcggt tgagat tgaaga tttttt cttcag tgttac	accaaa actgga atcatt aggtgc tccttt <mark>ctgcgc cagagc cagtgg</mark>	cgacga tggagg gcagca ctcact ttgata <mark>gtaatc</mark> gcagat ctgctg	agcgt actgga actgga actgt actgt actgt acca	gacaco taaagt ggccag aagcat catgao gcttgo aatact tggcga	cacgat ttgcag gatggt ttggta caaaca tgtcct ataagt	gacca aagco actgt tccct aaaaa tctag cgtgt	gc ac cc tc tt aa gt tc
750 agcaatgg 857 ttctgcgc 964 tcccgtat 1071 agaccaag 1178 aacgtgag 1285 ccaccgct 1392 gtagccgt 1499 ttaccggg	caacaacgt tcggccctt cgtagttat tttactcata ttttcgttc accagcggt agttaggcca ttggactcaa	catggg tgegea cegget tacac atatac cactga ggtttg accact agacga	aacta ggcto gacgo ttttag gcgto tttgo tttgo ttagt	catgta attaac ggttta gggagt gattga cagacc ccggat gaactc taccgg	tggco ttgct caggo tttaa ccgta caaga tgtag	gaacta tgata caacta agaaa agctao gcacco ggcgca	acttacto aatctgga atggatga cattttt agatcaaa ccaactct gcctacat agcggtcg	tagette geeggtg aegaaat aatttaa ggatett tttteeg acetege ggetgaa	agegea ageget agacac aaggat cttgag aaggta cttget	gaatga aacaat gggtct gatcgc tctagg gatcct aactgg taatcc ggttcg	agccat taatag cgcggt tgagat tgaaga tttttt cttcag tgttac tgcaca	accaaa actgga atcatt aggtgc tccttt ctgcgc cagagc cagtgg cagccc	cgacga tggagg gcagca ctcact ttgata gtaatc gcagat ctgctg agcttg	igcgt icgga ictgg icgatt iatc <mark>t icgatt icgatt icgatt icgatt icgatt</mark>	gacaco taaagt ggccag aagcat catgao gcttgo aatact tggcga gaacga	cacgat ttgcag gatggt ttggta caaaca tgtcct ataagt acctac	gacca actgt tccct aaaaa tctag cgtgt accga	gc ac tc tc aa gt tc aa
750 agcaatgg 857 ttctgcgc 964 tcccgtat 1071 agaccaag 1178 aacgtgag 1285 ccaccgct 1392 gtagccgt 1499 ttaccggg 1606 ctgagata	caacaacgt tcggccctt cgtagttat tttactcata ttttcgttc accagcggt agttaggcca ttggactcag cctacagcg	catggg tgegea cegget ctacac atatac ggtttg accact agacga tgaget	aacta ggcto gacgo tttao tttgo ttagto tagto atgao	catgta attaac ggttta gggagt gattga coggat gaacto taccgg gaaago	tggoo ttgot caggo tttaa ccgta caaga tgtao ataao	gaacta caacta agaaaa agctao gcacco ggcgca	acttactc atctgga tcattttt agatcaaa ccaactct gcctacat agcggtcg cccgaagg	tagette geeggtg aegaaat ggatett tttteeg acetege ggetgaa gagaaag	agegea agegea agacag aaggat cttgag aaggta ctcggggg geggga	yaatga aacaat yggtot gatogo cotagg gatoct gatoc caatoo ggttog caggta	agccat taatag cgcggt tgagat tttttt cttcag tgttac tgcaca	accaaa actgga atcatt aggtgc tccttt ctgcgc cagagc cagtgg cagccc aagcgg	cgacga tggagg gcagca ctcact ttgata gcagat ctgctg agcttg cagggt	igcgt icgga ictgg ictgg ictgct iccag iccag igcag igagc iccgga	gacaco taaagt ggccag aagcat catgao gcttgo aatact tggcga gaacga acagga	cacgat ttgcag gatggt ttggta ccaaaca tgtcct ataagt acctac agagcg	gacca aagco actgt tccct aaaaa tctag cgtgt accga cacga	gc ac cc tc tt aa gt tc aa ag
750 agcaatgg 857 ttctgogc 964 tccegtat 1071 agaccaag 1178 aacgtgag 1285 ccaccgct 1392 gtagccgt 1499 ttaccggg 1606 ctgagata 1713 ggagcttc	caacaacgt toggcoetto cgtagttat tttactcato ttttogttoo accagoggto agttaggco ttggactca cctacagog cagggggaa	catggg cgggca ccggct ctacac atatac cactga ggtttg accact agacga tgagct acgcct	aacta ggcto gacgo tttag gcgto ttagt tagt atgag	catgta attaac ggttta gggagt gattga cagacc ccggat gaactc taccgg gaaagc tcttta	tggco ttggt caggo tttaa cogta caaga tgtag gataag gccao	gaacta tgataa aaacta agaaaa agctao gcacco gcacco gcgctto cctgto	acttacto aatotggatga toattttt agatcaaa coaactot gootacat agoggtcg coogaagg coogaagg	tagette geeggtg acgaaat aatttaa ggatett tttteeg acetege ggetgaa gagaaag geeacet	agegea agegte agacag aaggat cttgag ctctget cggggg geggag	yaatga aacaat yggtet gatege gateet gateet ggteg ggtteg caggta	agccat taatag cgcggt tgagat tttttt cttcag tgttac tgcaca tccggt gtcgat	accaaa actgga atcatt ccttt ctgcgc cagagc cagtgg cagccc aagcgg ttttgt	cgacga tggagg gcagca ctcact ttgata gcagat ctgctg agcttg cagggt gatgct	agegt gegga actgga actgg gatt acca gccag ggagc cgga cgga	gacaco taaagt ggccag aagcat catgac gcttgo gatact ggacgg gaacgg acaggg acagggg	cacgat ttgcag gatggt ttggta ccaaaa caaaca tgtcct ataagt acctac agagcg ggcgga	gacca aagco actgt tccct tctag cgtgt accga cacga gccta	gc ac cc tc tt aa gt tc aa ag ag
750 agcaatgg 857 ttctgoge 964 teocgtat 1071 agaccaag 1178 aacgtgag 1285 ccaccgct 1392 gtagccgt 1499 ttaccggg 1606 ctgagata 1713 ggagcttc 1820 ggaaaac	caacaacgt tcggcctt cgtagttat tttactcat ttttcgttc accagcggt agttaggcc ttggactca cctacagcg gccaggggaa gccagcacac	catggg tgeggea cegget tacac atatac cactga ggtttg accact agacga tgaget acgect	aacta ggctg gacgo tttag gcgtc tttgo tttgo atgag ggta tttt	catgta attaac ggttta gggagt gattga cagacc ccggat gaactc taccgg gaaagc tcttta tacggt	tggcc ttggc ttta ccgt ccgt ccgt ccgt ccg	gaacta tgataa caacta aaacta agaaaa agctac ggcacco ggcgca cgctto cctgto ggcct	acttacto aatotgga cattttt agatcaaa ccaactot gootacat gootacat agoggtog coogaagg cooggttto ttgotgg	tagette geeggtg acgaaat aatttaa ggatett tttteeg acetege ggetgaa gagaaag geeacet	agegea ageget agacag aaggat cttgag ctctget cggggg geggag ctgact	gaatga aacaat gggtet gatege cetagg gateet aactgg caatee ggtteg caggta caggta ctgagea	agecat taatag cgeggt tgagat tttttt cttcag tgttac tgcaca tccggt gtcgat	accaaa actgga atcatt ctgcgc cagagc cagtgg cagccc aagcgg ttttgt gcgtta	cgacga tggagg gcagca ctcact ttgata gcagat ctgctg agcttg cagggt gatgct tcccct	igegt iegga ietgg ietget ieget ieget iegga iegga iegga	gacaco taaagt ggccag aagcat catgac gcttgo gatac tggcgg gaacgg acaggg acaggggg ctgtgg	cacgat ttgcag jatggt ttggta ccaaac caaaca tgtcct ataagt acctac agagcg ggcgga gataac	gacca actgt tccct aaaaa tctag cgtgt cacga cacga gccta	gc ac cc tc tt aa gt tc aa ag at tt
750 agcaatgg 857 ttctgoge 964 tocogtat 1071 agaccaag 1178 aacgtgag 1285 ccaccgg 1392 gtagcott 1499 ttaccggg 1606 ctgagata 1713 ggagcttc 1820 ggaaaac 1927 accgcctt	caacaacgt tcggccett cgtagttat tttactcat ttttcgtcca accageggt agttaggcca ttggactca cagggggaa gccagcaac tgagtgagca	catggg cgcgca cccggct ctacac atatac cactga ggtttg accact agacga cgagct gcggco cgatac	aacta ggctg gacgg tttag gcgtg tttgg tcaag tcaag ggtat tttt cgcto	catgta attaac ggttta gggagg cagacc coggat gaacto taccgg gaaago tottta tacggt cogcogo	tggco ttgct caggo ccaggo caaga tgtag gccao tgccao tagto tccto	gaacta tgataa caacta agaaaa agctaa gcacco ggcgc cgctt cctgto ggcct gaacga	acttacto aatotggatga toattttt agatcaaa coaactot gootacat agoggtog coggttto cocgaagg coggttto ttgotgg accgagog	tagette geoggtg acgaaat aatttaa ggatett tttteog acetege ggetgaa gagaaag gecaeet eettttg cagegag	agegea ageget agacag aaggat cttgag tetggggg geggag ctgact ctcaca	yaatga aacaat yggtct jatcgc cctagg jatcct gatcct gatcc ygttcg caggta ctgagc atgttc gagcga	agccat taatag cgcggt tgagat tttttt cttcag tgttac tgcaca tccggt gtcgat tttcct ggaagc	accaaa actgga aggtgc tccttt ctgcgc cagagc cagtgg cagccg aagcgg ttttgt gcgtta ggaaga	cgacga tggagga ctcact ttgata gtaatc gcagat ctgctg agcttg caggt gatgct tcccct gcgcct	igegt iegga ietgg ietget ieget iegga iegga iegga iegga iegga iegga	gacaco ggccag aagcat catgao gcttg gcttg gactg agacgg acagga acagga acaggg ctgtgg ccggtal	cacgat ttgcag jatggt ttggta ccaaac caaaca tgtcct ataagt acctac agagcg ggcgga gataac ttttct	gacca aagoo actgt tccct aaaaa tctag cgtgt accga gccta cgtat cctta	gc ac cc tc tt aa gt tc aa ag at tt ac
750 agcaatgg 857 ttctgoge 964 toccqtat 1071 agaccaag 1178 aacgtgag 1285 caccqct 1392 gtagccgt 1499 ttaccggg 1606 ctgagata 1713 ggagcttc 1820 ggaaaaac 1927 accgcctt 2034 gcacttgt	caacaacgt toggcottt ogtagttat tttactcat ttttcgtto accagoggt agttaggco cagggggaa gccagogggaa gccagoaco gcgggattd	catggg tgegget tacac catatatac cactga ggtttg accact agacga tgaget tgaget tgaget tgaget tgaget	aacta ggctg gacgo ttttag tttgo tttgo ttagt atgag ggta ttttt cgcto gcaa	catgta attaac ggttta ggagg cagacc coggat gaacto taccgg gaaago tottta tacggt cogcogo togtgo	tggco ttgct caggo caaga tgtag gataag gataag cgccao tagco tagco actot	gaacta tgataa caacta agaaaa agctaa gcacco ggcgc cgctto cctgto gaacga tcagta	acttacto aatctgga tggatga ccattttt gccactct gcctacat agcggtcg ccgagg ccgaggttc ttgcctgg accgacg accatctg	tagette geoggtg acgaaat aatttaa ggatett tttteeg ggetgaa gagaaag gecaeet cettteg cagegag	agogto aggoto aaggat ottgag aaggta ctctgot cggggg goggag otgactgact actgact actgact actgact actgact actgact	yaatga accaat yggtet yatege cetagg jateet actgg caatee ygtteg caggta ctgage atgtte yagega atgtte	agccat taatag cgcggt tgagat tttttt cttcag tgttac tgcaca tccggt gtcgat tttcct ggaagc aagcca	accaaa actgga atcatt ctgcgc cagagc cagtgg cagccg aagcgg tttttgt gcgtta ggaaga gtatac	cgacga tggagg gcagca ctcact ttgata gtaatc gcagat ctgctg cagggt gatgct tcccct gcgcct	agegt agegt actgg att tget acca geca gage cgga cggat gatt gatg	gacaco ggccao aagcat catgao gcttg gcttg gatg gaacg acagg acagg acagg ctgtg cggtal cgctao	cacgat ttgcag gatggt ttggta ccaaaa caaaca tgtcct ataagt acctac agagcgg ggcgga ggcgga ggcagac ttttct	gacca aaggo actgt tccct aaaaa cctag cgtgt accga gccta cgtat cctta cctta	gc ac cc tc tt aa gt tc aa ag at tt ac tc
750 agcaatgg 857 ttctcgge 964 tegetat 1071 aggceaag 1285 ceaeggt 1392 gtagcegt 1499 ttaceggg 1606 ctgagata 1713 ggagette 1820 ggaaaae 1927 acegett 2034 geatetgt 2141 atggetge 2248 gtgteaga	caacaacgt tccgccctt; cgtagttat tttactcat ttttcgttc accagcggt cagtggca cagggga gccagcaac tgagtgagc gccgtattt gccccgaca gggttttcac	catggg tgogca cogget stacac atatac ggtttg accact agacga ggttg ggggcc tgatac cgatac cgatac cgatac ccacegec cccegec	aacta ggct ggcgc tttag tttag tttagt tttt ggta ttttt ggta ttttt ggcaa accace	catgta attaac ggttta ggagt gattga ccggat gaactc taccgg gaaagc tcttta tacggt cgctgg tcggtgc cccgct gaaacg	ttggc ttggc tttg caggo tttaa ccgta ccgta caaga gccao tgtag gccao tccto cagco cactot gacgo gacgo	gaacta tgataa aaacti agaaaa agctao ggcacco ggcgc cctgtc ggcctt gaacga tcagta cgccct	acttacto atggatga atggatga atggatcaaa ccaatttt gcctacat gccgacgg cgggttto ttgctgg accaatctg accaatctg gaccgagcg gcactco	tagette geoggtg acgaat aatttaa ggatett tttteog acctege ggetgaa ggecacet cetttg cagegag ectetgat ttgtetg atecega	ccggca agogto agacao aaggat cttgao aaggta ctgao ccgao ctgao ctgao ctcao ctcao ccgcco gccgca ccccco ccccco ccccco ccccco cccccco ccccco ccccco cccccc	paatga accaat ggtet gatege cotagg gatect gatege ggtteg ggteg acggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta cagga caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggta caggt	agecat taatag cgoggt tgagat tttttt cttcag tgcaca tccggt tttcct ggaagc aagcca gactca	accaaa actgga atcatt ctgcttt ctgcgc cagtgg cagcgg cagcgg ttttgt gcgtta ggaaga gtatac cagaca cagaca	cgacga tggagga ctcact ttgata gtaatc gcagat ctgctg caggtt gatgct gcgcct actcccg actccg actccg gcgct	igogt igogga ictgg igatt igatc iccaga igago icgga icgga icgga icgatt igatg igato icgac icaca	gacaco taaagg aggccac aaggat catgac gottgo gataco ggaacg aggggg ctgtgo ctgtgo ctgtgo ccggta cggta ggctcco gtctco acggti	cacgat ttgcag jatggt ttggta caaaa caaaca tgtcct acctac agagcg ggcgga ggcgga gataac ttttc cggga ttccct	gacca aagco actgt tccct cgtgt ccgtgt cccta cccta cccta tgggt cctca cctag	gc ac cc tc tt aa gt tc aa gt tc aa ag at tt ac tc aa gt
750 agcaatgg 857 ttetgoge 964 toccqtat 1071 agaccaag 1178 aacgtgag 1285 caccget 1392 gtagccgt 1499 ttaccggg 1606 ctgagata 1713 ggagette 1820 ggaacage 1927 accgeett 2034 geatetgt 2141 atggetge 2248 gtgtcaga 2355 ceggetee	caacaacgt tcggcocttk cgtagttat tttactoat ttttactoat ttttacgtco agttaggcc ttgggcacca ccagggga cagggga cagggga ttggtgagc gccgtattt gcccgcaca ggtttcac	catggg cgcgca ccggct ctacac atatac catatac ggtttg accact agacga cgagct acgcct cgacac ccacac ccccgcc ccccgcc ccatatg	aacta ggctg ggcgg tttag tttag tttgg tcaag ggta ttttt cgcta cgcaal cacco ggaat	catgta attaac ggttta ggagt caggat gactc ccggat faccgg gaactc taccgg gaaac ccgc ccgc ccgc		gaacta tgataa caacta agaaaa agctaa ggcacco ggcgct cctgtc ggcctt cctgtc ggcct aggcact aggcact	acttacto aatctgga atggatga ccattttt gcctacat gcctacat gcctacat agoggtcg ccgaagg ccgaggtcg accaactct gcccgaagg gaccaatctg gaccaggg ggatctcg gatatttt	tagette geograg acgaaat aatttaa ggatett tttteog acctogo ggcgaag gggaaag ggcacct cetttg cagegag etetgat ttgteog atceeg atceeg gtttaac	coggoa agogto agacao cottgao cottgao cotgao cotgao cotgao cotgao cotgao cotgao googca cotcaca googca cotcaca googca cotcaca	yaatga accaat ygtct gatcgc cctagg yatcct gatcg ygtcg adgtcg ygtga tgagca tgagcatc ggcatc ggcatc ggcatc ggcatc	agecat taatag cgeggt tgagat tttttt cttcag tgttac tgcaca tccggt gtcgat tttcct ggaagc aageca agecta gacta gatata	accaaa actgga atcatt tccttt cctgcgc cagtgg cagccg cagcgc aagcgc aagcgt aagcgtta ggaaga gtatac cagaag gtatac cagaag gtatac	cgacga tggagg gcagca ctcact ttgata gtaatc gcaggt caggtg gatgct gactccg gcgcct actcccg agctgt gagctg agctgt gagccg	igegt igegt igetga igatt igate igate igage igage igatg igatg igatg igatg igatg igatg igatg igatg	gacaco taaagt ggccac aagcat catgac gcttg ggttg gacgg acaggg acaggg ctgtg cgctac gtctcc gtctcc accgtta	cacgat ttgcag gatggt ttggta ccaaaa tgtcct accac agagcg ggcgga gataac ttttct cgtgac cgggag ttccct	gacca aagoo actgt tccct aaaaa cctao cgtgt accga gccta cctta cctta ctgggt ctgca ctgggt	gc ac cc tc tc tc tt aa gt tc aa gt tc aa gt tc aa gt tc aa gt tc tc tc tc tc tc tc tc tc tc tc tc tc
750 agcaatgg 857 ttctgoge 964 toccgtat 1071 agaccaag 1178 aacgtgag 1285 ccaccgt 1392 gtagccgt 1399 ttaccggg 1606 ctgagat 1713 ggagcttc 1820 ggaaaac 1927 accgcctt 2034 gcatctgt 2141 atggtg 2248 gtgtcaga 2355 ccggctc 2462 agcaagg	caacaacgt tccgcoctt cgtaqttat tttactcat ttttactcat dccagcggt adttagcc ttggactca ccaggggaa gccagcaac tgagtgagc gccgtattt gccccgaca gggtgatttcac c cgaggagct	catggg cgcgca ccggct ctacac atatac cattac ggtttg accact acgcct gcggcc cgatac cccgcc ccccgcc ccccgcc ccccgcc cctaattg gttcac	aacta ggct gacgo tttag tttag tttag ttttg ggta tttt gggta tttt gcaca ggta tttt gcaca cacco gaatt	catgta attaac ggttta ggttga cagacc ccggat gaactc taccgg taccgg tactta tacggt ccgccgc tggtgc cccgct gaaacg gaaacg gaaacg	ttggco ttggco ttggto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto ccgto cc	gaacta tgata tgata aaacta agata agcta ggcacc ggcct cctgt cctgt cctgt ccgcct cctgt ccgcct cctgt ccgcct cctgt ccgcct cctgt ccgcct cctgt ccgcct cctgt cccgc tcagta ccgc tcagta ccgcct ccgcct tcagta ccgcct tcagta ccgcct tcagta ccgcct tcagta ccgcct tcagta ccgcct tcagta ccgcct tcagta ccgcct tcagta ccgcct tcagta ccgcct tcagta ccgcct tcagta ccgct tcagta ccgct tcagta ccgct tcagta ccgct tcagta ccgct tcagta ccgct tcagta ccgct tcagta ccgct tcagta ccgct tcagta ccgct tcagta ccgct tcagta ccgct tcagta ccgct tcagta ccgct tcagta ccgcct tcagta ccgc tcagta ccgct tcagta ccgct tcagta ccgct tcagta ccgct tcagta ccgct tcagta ccgct tcagta ccgct tcagta ccgct tcagta ccgct tcagta ccgct tcagta ccgct tcagta ccgc tcagta ccgct tcagta ccgct tcagta ccgct tcagta ccgc tcagta ccgct tcagta ccgc tcagta ccgct tcagta ccgc tcagta ccgc tcagta ccagta tcagta ccagta tcagta ccagta tcagta ccagta tcagta ccagta tcagta ccagta tcagta ccagta tcagta ccagta ccagta tcagta ccagta ccagta tcagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccagta ccag	acttacto aatctgga atggatga coattttt agatcaaa coactot goctacat aggogtcg gggtttc cogagg cogggtttc cogagg cacgagg gaccgagg gaccatctg gaccggg ggattccg adatttt trogagt	tagette geeggtg acgaaat aggatott tttteog acctoge ggetgaa ggetgaa ggetgaa ggetgaa cacegg ctettg ttgtetg atceog ggttaac	coggoa agogto aggoto aaggato cotga cotga cotgac cotgac cotgac tocas cotgac tocas cotgac tocas cotgac tocas cotgac tocas cotgac tocas cotgac tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas tocas toca	Jaatga Jaccat Jggtot Jatogo Jatogt Jgtogt Jgtogg Jgtogg Jggtogg Jgggga Jgggga Jgggato Jaggga Jaagga Jaagga	agccat taatag cgcggt tgaaga tttttt cttcag tgtcgat ttcct ggcaga gacca aagcca cgctta gactca gactca gactaa	accaaa actgga atcatt ctgcgc cagagc cagtgg cagccg tttttgt gcgtta ggaaga gtatac cagaca cagaca catag ggttcag	cgacga ttggagg gcagca ttggata ttgata cgcagat ctgctg agctgt gatgct tcccct gcagctgt gcagctgt gcagac ggagac ggagac gctcat	igegti jegga igatt actgg igate iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae iegae i i i i i i i i i i i i i i i i i i i	gacaco taaagd ggccao aagcat catgac ggttg ggacgg gacgg acaggg ctgtg cggta cggta cggta cggta cggta cggta ggccaco ggccaco ggcaco ggcaco ggggg gggggggggg	cacgat ttgeag gatggt ttggta caaaca tgtcct acctac agagcg ggcgga ggcggag ttttct cgtgac cgggag ttccct cgggag ttccct	gacca aagoo actgt tccct aaaaa cctao cgtgt accga cacga cacga cacga cacga cctta cctta ctggt cctaa ctggt cctaa cctaa cctaa	gc ac cc tc tc tc tc tc aa gt tc aa gt tc aa gt tc aa gt tc aa gt tc tc tc tc tc tc tc tc tc tc tc tc tc
750 agcaatgg 857 ttctgoge 964 tocgtat 1071 agaccaag 1178 aacgtgag 1285 ccaccgt 1392 gtagccgt 1499 ttaccggg 1606 ctgagata 1713 ggagctc 1927 accgctt 2034 gcatctgt 2141 atggtgc 2248 gtgtcaga 2355 ccgggtcc 2462 agcaaggg 2569 cacctacg	caacaacgt tcggcocti cgtagttat tttactcat ttttogtco accagcggt ttggactca cctacagcg gcagcagca tcggtggaa gccagcagca gcgtattt ccggagagctc cgaggagctga	catggg cgcgca ccggct ctacac actga cgactga cgactga cgacga cgacga cgacac ccccgcc ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca ccccgca cccccgca cccccgca cccccgca cccccgca cccccgca cccccgca cccccgca cccccgca cccccgca cccccgca cccccgca ccccccc cccccgca cccccccc	aacta ggct gacgo tttag tttag tttag ttttg ggta tttt gggta tttt gcaat ccacco gaat ccacco gaat	catgta attaac ggttta ggttga cagacc ccggat gaactc taccgg tottta cgccgc tcgtgc cccgct gaaacg gaaacg acgctgc cccgct gaaacg gaaacg		gaacta tgata caacta agata agcta agcta ggcacc ggcctt cctgtc cctgtc cctgt cctgt ccgcct cctgt ccgcct cctgt ccgcct cctgt ccgcct cctgt ccgcct cctgt cccc cctgt ccgcct cctgt ccgcct cctgt ccgcct ccc cctgt ccgcct ccgcct ccc ccc	acttacto atttyga ttggatua cattttt agatcaaa ccaactct gcctacat aggggttc ccgaagg ccgaagg accaactg ggactgag ggatctog ggatctog ggatctog gtacagct acaacttt ggacggag	tagette geoggtg acgaat ggatett tttteog geogaa ggcgaa ggcgaa gccacet ectttg ttgtetg atceogg gtttaac ggtttaac ggtttaac	coggoa agogto aggoto aaggato cottgag cottgag cotgago cotgact cotgact cotgact cotgacat cotgacat cotcaca cotgacat cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcaca cotcac	Jaatga Jacaat Jaccaat Jatege Jatege Jatege Jatege Jactga Jactga Jactga Jagega Atgtte Jagega Jaggga Jaagga Jaagga Jaacgga	agccat taatag cgcggt tgagat tgagat tttttt tttttt tttcag tgtcac tgcaca tccggt gtcgat tttcct ggaagcca agcca agcca gatata gatata tccgtga	accaaa actgga atcatt tocttt tocttt cagagc cagagc cagagc cagccg adcgg ttttgt ggatac cagaca ctatag aatag gtatac cagaca	cgacga tggagg gcagca ttggata ttgata gtaatc gcagat ctgctg agctgd gatgct tcccct gcagctgt ggagc agctgt ggagac gcagctgt ggagac gctgat	igogt igogt igot igot igot igot igot igo	gacaco taaagi ggccag aagcal catga gcttg gaacgo gaacgo cggcta cgctaco gtctc cgctaco gtctcaco gtctcaco gtctcaco gtctcaco gagggg cgagggc	cacgat ttgcag gatggt ttggta ccaaaca tgtccta acctac agagcgg ggcgga gatacc cgggag tttcct cgggag ttccct cgggag ttccct cgggag ttccct	gacca aage actgt tccct aaaaa ccgtgt accga gccta ccgtat ccgtat ctgggt ctgga ctagt ATGgt ccgato	gc ac cc tc tc tc aa gt tc aa gt tc aa ag at tc aa ag at tc aa gc cc cc cc cc cc cc cc cc cc cc cc cc
750 agcaatgg 857 ttetgoge 964 toccqtat 1071 agaccaag 1178 aacgtgag 1285 caccget 1392 gtagccgt 1392 gtagccgt 1392 gtagccgt 1392 gtagcagta 1392 gtagcagta 1392 gtagcagta 1992 accgett 2034 gcatctgt 2141 atggetge 2248 gtgtcaga 2355 ccggetecc 2462 agcaaggg 2569 cacctagg	caacaacgt ttoggoottk cgtagttat tttactoat ttttactoat ttttactoat catagggt agttaggcc ttgggtag cagggga cagggga ttggtgagca gccgatattt gccgacaac ggatagctc cgaggggtt gcagacta	catggg cgcgca ccggct ctactga ggtttg accactg agacga ccactga ggtttg ggtcc cgacact gcggcc cgatac ccacacc ccccgc cgtcat caattg ggtca ccccg ccctga aagcag ccctga aagcag	aacta ggcto gacgo ttttag tttgo ttagto aatgag ttttt aacaa caacaa caacaa caacaa caacaa caacaa	catgta attaac ggtatga ggatga cagactc coggat taccgg taccgg taccgg taccgg taccgg taccgg taccgg taccgg taccgct gaaacg taccgg taccgg taccgct gaaacg taccgct gaaacg taccgct gaaacg taccgct gaaacg taccgct gaaacg taccgct gaaacg taccgct gaaacg taccgct gaaacg taccgt taccgg taccgct gaaacg taccgct gaaacg taccgct gaaacg taccgct gaaacg taccgct gaaacg taccg taccg taccg taccg taccg taccg taccg taccg taccg taccg taccg taccg taccg taccg taccg taccg taccg taccg taccg taccg taccg taccg taccg taccg taccg taccg taccg taccg tacc tacc		yaacta tgataa caacta aaacta aagaaa agcaaa ggcacco ggcgct coctgto ggcctt coctgto ggcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgt cogcct tagtacgg cogc tagtacgg cogc tagtacgg cogc tagtacgg cogc tagtacgg cogc tagtacgg cogc tagtacgg cogc tagtacgg cogc tagtacgg cogc tagtacgg cogc tagtacgg cogc tagtacgg cogc tagtacgg cogg taccgg cogc tagtacgg cogc tagtacgg cogg taccgg cogc tagtacgg cogg taccgg cogc tagtacgg coggg taccgg cogc tagtacgg coggg taccgg coggg taccgg coggg taccgg coggg taccgg coggg taccgg coggg taccggg coggg taccggg cogggg taccggg cogggg taccggggggggggggggggggggggggggggggg	actactor attorgan tiggator coattitt gottan gottan gottan gogtog coastor goggtog goggtog goggtog goggtog goastor goasgog ggatotog gatotog gatotog caastot goasgog ggatotog caastot goasgog ggatotog caastot goasgog ggatotog caastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot gcaastot	tagette geografi acgaaat aatttaa ggatett tttteog acctogo ggetgaa ggcacact cagegag ecetttg ttgtetg atecog gtttaac ggatgag gettaac ggatgag geogggetgag ggttaac	coggoa aggot aggot aggot caggot aggot aggt cttgat ctgat ctgat ctgat ctgat ctgat ctgat ctcat gcgaa gcgcaa gcaa	jaatga accaat ggtet jatecge coragg jatect actgg jatect actgg cactgg cagga atgtte ggcate gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaatac gaata	agccat taatag cgcggt tgaaga ttttttt cttcag tgttac tgcaga tgcaca tccggt tttcct ggaagc aagcca gactca gactca gatata ccacaa tcggtac	accaaa actgga atcatt cottt cagtggc cagtgg cagcgc agcgta ggatta ggataa ggataa gtatac cagagg atatac cagagg agtaa ggataa cagaga actatag actatag actatag	cgacga tggagg gcagca ttggata ttggata ttggata ctgcagat ctgctg gagcttg gatgct gatgct gagctgt ggagac gctcal cgtgac tgacct	igegti igegti igetgi igatt iatet igetgi igage icgga icgga icgga icgatgi icate icate icate icate icate icate icate	gacac ggccac aagca catgac ggctga aatac tggcga agggg cggta cggta cggta acaggg gtctca acggta acaggta acaggta acaggta acaggta acaggta acaggta acaggta acaggta acaggta acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acagga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga acaga ac ac ac ac ac ac ac ac ac ac ac ac ac	cacgat ttgcag jatggta ttggtagt ccaaaca tgtcott accag accacaca accacaca ttttct ccgggag ttccct ccgggag ttccct ccgggag ttccct ccgggag ttccct	gacca aactgt tccct aaaaa tcccta cgtgt cgtgt cccta cgtat cctggt ctgca ctggt ctgca cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca cac cac caca caca cac cac caca caca cac cac cac caca cac cac caca cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac caca caca cac caca caca caca cac caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca caca cac caca caca caca caca caca caca caca caca caca caca cac caca cac cac cac cac caca cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac cac ca c c cac c ca	gc ac cc ttt aa gt tc aa gt tc aa ag ttc aa ag ttc aa ag t tc aa ag t tc aa ag t tc aa ag t tc aa ag t tc aa a c c c c c c c c c c c c c c c
750 agcaatgg 857 ttctgoge 964 tocctat 1071 agaccaag 1178 aacgtgag 1285 ccaccgot 1392 gtagccgt 1499 ttaccggg 1606 ctgagata 1713 ggagettc 1820 ggaaaac 1927 accgott 2034 gcatctgt 2141 atggctgc 2248 gtgtcaga 2355 ccggetcc 2462 ag caaggg 2569 cacctacg 2676 gctacccc 2783 cggcgcga	caacaacgt tccgcacttat tttactcat ttttactcat ttttactcat accagcggt agttagcc tcggagta gccacacaca gccgtatttcac gggggatttcac ggagggct gcaacag ggacaccatg gacacatga gaccacatga	catggg tgegea cegget tatatac catgaget agacga tagaget cacgaget cacgec tgagec cacacc cecege catac catgaget tacgaget cacgaggg catac cacgec catac cacgaget catgaget cacgec catac cacgaget catac cacgaget catgaget cacgec catac cacgaget catac cacgaget catac cacgaget catac cacgaget catac cacgaget catac cacgaget catac cacgaget cacgaget cacgec cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget cacgaget ca	aacta ggett gggtt gegtt tttag ttttag ttttg tggtt ttttt eggta ttttt eggeta ttttt eggeta ttttt eggeta ttttt eggeta ttttt eggeta ttttt eggeta ttttt eggeta ttttt eggeta ttttt eggeta ttttt eggeta ttttt eggeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta tegeta t	catgta attaac ggttta gggattga cagacto ccggat gaacto taccgg gaaago tcttta tacggt ccccgct gaaacg gaaacg tactggtgo ccccgct gaaacg gaacto gaaacg gaaacg gaacto cccgct ccccgct gaaacg cactctg gaacto ccccgct	ttggc ttggc ttgta ccgta ccaga ttgta gcaa gccaa ttgta gccaa ttgta gccaa tagcca ttgta gccaa gccaa tagcca ttgta gccaa tagcaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa gccaa ttgta gccaa gccaa ttgta gccaa gccaa ttgta gccaa gccaa ttgta gccaa gccaa ttgta gccaa gccaa ttgta gccaa gccaa ttgta gccaa gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta gccaa ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgta ttgt	yaacta tgataa caacta aaacta aggaaa aggcaac ggcgcc ggcgct tcctgtc ggcct tcagta cgccct aggcaa tcagta accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accgg accg accgg accg accg accg accg accg accg accg accg accg accg accg accg accg accg accg a	actactor attragator togator cattitt gatcaa coattitt gatcaa coattit gocactor goctacat tigotagag gaggttt cucgagg gacgggg gacgggg gacgggg gacgggg gacgggg coaatotg gacgggc gacgggc caagtit tigoggg coagggc gacgggc gacgggc gacgggc gacgggc gacgggc gacgggc gacgggc gacgggc gacgggc gacgggc gacgggc gacgggc gacgggc gacgggc gacgggc gacgggc gacgggc gacgggc gacgggc gacgggc gacgggc gacgggc gacgggc gacgggc gacgggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacgacg gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gacggc gac ga	tagette geogate acgaate aatttaa ggatett tttteog acetege ggegatgaa ggagaag gcacet ecttttg cagegag gctetaa ttgtetg atceege ggttaac ggaegge gaaggee gaaggee	coggoa agogt agogt aggogt aggogt agggg gogga ctgat ctgat ctgat ctgat ctcac tcagt gocga at ttta gocga at ttta gocga at ttta ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gacgt ac gac gac gac gac gac gac gac gac gac	jaatga iacaat jggtet jatege ictagg jateet gateet ggteg jagga atgtte jagga atgtte jagga atgtte jagga aatgtte jaagga iaagga iaagga iaacgg icaace icagga jaagga iaacgg icaace icagga jaagga icaace icagga jaagga icaace icagga icaace icagga icaace icagga icaace icagga icaace icagga icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaace icaaco	agccat taatag cgcggt tgaaga tttttt cttcag tgttac tgttac tccggt tttcct agcca agcca agcca cacaa ccacaa ccgcacca	accaaa actgga atcatt aggtgc tcottt ctgogc cagtgg cagtgg gogtta ggaaga gtatac cagcac cagaca ctatag gttcag gttcag gttcag ccaccc aatctc	cgacga tggagg ctoact ttgata gtaatc gcaggt cagggt cagggt cagggt cagggt cagggt cagggt cagggt cagggt cagggc cat ggagac ggagac cgtgt ctgat ctoact cgtgt caggt caggt caggt caggt caggt caggt caggt caggt caggt caggt caggt caggt caggt caggt caggt caggt caggt caggt caggt caggt caggt caggt caggt caggt caggt caggt caggt caggt caggt caggt caggt caggt cagt ca	igogt igogt igtt igtt igtt igtt igtcag igage igat igat igac igat igac igac igac igac igac igac igac igac	gacacc taaagi ggccac aagcat catgac ggctgg gaacga gaacga cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta accatc gaggg cggta accatc accatc accatc accatc accatc accatc accatc cgcta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta c	cacgat ttgcag ttggt ttggt ccaaaa caaaca tgtcct ataagt acctac agagcg ggcgga gataac ttttct tttcct ttccct agaggg gataac cgggag ttttcct ttccct accaaa cgggag actac agaggg agtgct acctac cggggg gataac tttcctt ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttcc ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttccct ttcc ttccct ttccct ttccct ttcc ttcc ttcc ttcc ttccct ttcc ttcc ttcc ttccct ttccct ttcc ttcc ttcc ttcc ttcc ttcc ttcc ttcc ttcc ttcc	gacca aactgt cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta cocta	gc ac tc tc tt taa at tt ac tc tc tc tc tc tc tc tc tc tc tc tc tc
750 agcaatgg 857 ttctgoge 964 tocgtat 1071 agaccaag 1178 aacgtgag 1285 ccaccgt 1392 gtagccgt 1499 ttaccggg 1606 ctgagata 1713 ggagctc 1927 accgctt 2034 gcatctgt 2141 atggtgc 2248 gtgtcaga 2355 ccgggtcc 2462 agcaaggg 2569 cacctacg	caacaacgt tcggcocti cgtagttat tttactoata ttttegttoc accagcggt ttggactca ccagggggaa gccagcaac tgagtggga gccggtattt ggccggaagtt ggcagcaca ggttttcac ggaggggt ggcaacatg ggcaacatg ggcaacatg ggccacacatg ggccaacatg ggccaacatg	catggg cgcgca ccggct catatac cactga ggtttg accact acgcca cgaggc ccactga gcgac ccactga gcgac ccactga gttcac ccccgca cccctga aagccag ccattg gttcac	aacta ggett gggtt gggtt tttag gggtt tttag gggta tttt atgag ggta ttttt agegta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta cgeta c	catgta attaac gggttga ggatga cagacc ceggat caegg gaacto tacegg gaaagc tettta taeggt ceceget gaaacg tegetge ceceget gaaacg tegetge caecteg caecteg caecteg gacttet	tggc ttggc ttggt cogg cogg cogg cogg cog	yaacta caacta aaacta agctad ggcacco ggccco cotgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coctgt coccgc coctgt coccgc coctgt coccgc coctgt coccgc coctgt coccgc coccgc coccgc coccgc coccgc coccgc coccccc coccgc cocccccccc	acttactor attragation topaton cattiti agatcaaa coattiti ggatcaaa ggggtti ggggtti ggggtti ggggtti ggggtti ggggtti ggacggac ggatctor ggacggac caagetgo caagetgo caagetgo caagetgo caagetgo caagetgo caagetgo caagetgo caagetgo caagetgo caagetgo	tagette geogde acgaaat aatttaa ggatst tttteog ggetgaa ggacacet cetttg ctocga tttgtetg atceogo gtttaac ggacgoc ggacgoc ggacgoc gatgaa gacocg gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gacgoc gac gacoc gac so so so so so so so so so so so so so	coggaa agacat agacat aaggat cttgac cttgac ctgac ctgac ctgac ctgac ctgac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcac ctcact	jaatga iacaat jggtot jatoge ictagg jatoct iactgg jatogta iggtog jaggga jaggga jagga jagga jagga jagga jagga jagga jaagga jaagga jaagga jaagga jaagga	agccat taatag cgcggt tgaaga tttttt cstcag tgttac tgttac tgcaca tccggt tgttac tgcaca agcca agcca agcca agcca agcca cgcta gatata tccgtga tccaca gagaga tccgca	accaaa actgga atcattc teettt ctgege cagagge cagege gages ggataa ctatag gtatac ccagaca ctatag gtatac ccagaca ctatag gtatac ccagaca ctatag	cgacga tggagg ctoact ttgata gtaatc gcagat ctgctg agcttg caggt caggt caggt caggt caggag cagctgt ggagac ggagac cgtgtc ctgacct ttcacag catcct ttccaag	gggti gggt ggtt aatcttgg ggggg ggggg ggt ggt accgg ggt ggt accgg ggt ggt accgg gggg gg	gacac ggccag aagcal catga gcttgg gacg gacgg acagga acagga cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cggta cacagga cacag gacgga cggta cacag gacgga cggta cacag cacaga	cacgat ttgcag ttggt ttggta ccaaaca caaaca tgtcct ataagt acctac agagcg ggcgga ggcgga gttcct cgtgac ccgggag ttccct ccgggag acctac cgggag ttccct cgggag acctac cgggag ttcct ttcct cgggag acctac cgggag ttccct cgggag ttccct cgggag ttccct cgggag acctac cgggag ttccct cgggag ttccct cgggag ttccct cgggag acctac cgggag ttccct cgggag ttccct cgggag acctac cgggag ttccct cgggag acctac cgggag ttccct cgggag acctac cgggag ttccct cgggag acctac cgggag ttccct cgggag ccgggag ttccct cgggag ccggag ccg cgggag acctac ccg cgggag ttccct ccg cgggag ccg ccg cgggag ccg cc	gacca aagco actgt tctag cgtgt accga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacaga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga cacga	gac cctcttaa gtcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa agt tcaa a a a a a a t t a a t t a a a a a



• Translate the ORF

e Edit Enzymes	ORFs Features Find Next			Ctrl+	·> 👂	© =												
	Find Previous			Ctrl+	1												~	
	ORF Starts Wit	h			> art	t	Length		End	(ORF		Tm		%G	C	(c	circul
	Search Strand				->							_						
	Minimum bp				• <	1>	744<0>	31	75<0>	M>24	47*/<24	8			619	%		Dam
	Translate			Ctrl+	т		Direct	Туре					Loca					
RBS	0.05							misc_feat	ure					2423				
His6 tag (non-c	ORF map				_		>>>	CDS	a al					2454				
pOPT GFP fwc	Selection Tran	slate					>>>	primer_bi						2476 2459				
Kozak sequenc enhanced gree	Selection Trans						>>>	regulato CDS	ry					62459 63173				
	Selection Tran	slate Upper	rcase ONI	LY				003					2430					
	10 *	20	* :	30	*	40	* 50	*	60 :	* 70	*	80	*	90	*	100	*	1
857 ttctacac	tcaacctta	ccaacta	actac	ottta	ttact	tgataa	aatctogag	ccootoa	acataa	atctca	cootat	catto	cagcad	ctaaac	rccad	atggt.	aadd	cc
							aatctggag atggatgaa											
964 tcccgtat	cgtagttato	ctacacg	gacggo	ggagt	caggo	caacta	atggatgaa	cgaaata	gacagat	tcgctg	agatac	gtgcc	tcacto	gattaa	igcat	tggta	actg	tc
964 tcccgtate 071 agaccaag	cgtagttato tttactcata	ctacaco atatact	acggo ttaga	ggagt attga	caggo tttaa	caacta aaacti	atggatgaa tcattttta	cgaaata atttaaa	gacaga aggatc	tegetg taggtg	agatac aagato	gtgcc ctttt	tcacto tgataa	gattaa atc <mark>tca</mark>	igcat itgac	tgg <mark>ta</mark> caaaa	actgi tccci	tc tt
964 tcccgtat 071 agaccaag 178 <mark>aacgtgag</mark>	cgtagttato tttactcata <mark>ttttcgttco</mark>	ctacacg atatact cactgag	gacggo ttaga g <mark>cgtca</mark>	ggagt attga <mark>agacc</mark>	caggo tttaa <mark>ccgta</mark>	caacta aaacti agaaaa	atggatgaa tcattttta <mark>agatcaaag</mark>	cgaaata atttaaa gatcttc	gacagai aggatci ttgagai	tcgctg taggtg tccttt	agatac aagato <mark>ttttct</mark>	gtgcc ctttt gcgcg	tcacto tgataa <mark>taatc</mark> t	gattaa atc <mark>tca</mark> tgctgc	agcat atgac cttgc	tggta caaaa aaaca	actgi tccci aaaaa	tc tt aa
964 tcccgtate 071 agaccaag 178 aacgtgag 285 ccaccgct	cgtagttato tttactcata ttttcgttco accagcggto	ctacacg atatact cactgag ggtttgt	gacggo ttaga gcgtca ttgco	ggagt attga agacco cggat	caggo tttaa ccgta caaga	caacta aaacti agaaaa agctad	atggatgaa tcattttta agatcaaag ccaactctt	cgaaata atttaaa gatcttc tttccga	gacagai aggatc ttgagai aggtaa	tegetg taggtg teettt ctgget	agatac aagato ttttct tcagca	gtgcc ctttt gcgcg gagcg	tcacto tgataa taatct cagata	gattaa atc <mark>tca</mark> tgctgc accaaa	agcat atgac cttgc atact	tggta caaaa aaaca gtcct	actgi tccci aaaaa tctaq	tc tt aa gt
964 tcccgtat 071 agaccaag 178 <mark>aacgtgag</mark> 285 ccaccgct 392 gtagccgt	cgtagttato tttactcata ttttcgttco accagcggto agttaggcca	ctacacg atatact cactgag ggtttgt accactt	jacggo ttaga jcgtca ttgco caaga	ggagt attga agacco cggat aactc	caggo tttaa ccgta caaga tgtag	caacta aaacta agaaaa agctao gcacco	atggatgaa tcattttta agatcaaag ccaactctt gcctacata	cgaaata atttaaa gatette ttteega eeteget	gacagai aggatci ttgagai aggtaac ctgctaa	togotg taggtg toottt ctggot atootg	agatag aagato ttttct tcagca ttacca	gtgcc ctttt gcgcg gagcg gggggcg	tcacto tgataa taatco cagata tgctgo	gattaa atc <mark>tca</mark> tgctgc accaaa ccagtg	agcat atgac cttgc atact ggcga	tggta caaaa aaaca gtcct taagt	actgi tccci aaaaa tctaq cgtgi	tc tt aa gt tc
964 tcccgtate 071 agaccaag 178 aacgtgag 285 ccaccgct 392 gtagccgt 499 ttaccggg	cgtagttato tttactcata ttttcgttco accagcggto agttaggcoa ttggactcaa	ctacacg atatact cactgag ggtttgt accactt agacgat	jacggo sttaga gogtca sttgoo scaaga sagtta	ggagt attga agacc cggat aactc accgg	caggo tttaa ccgta caaga tgtag ataag	caacta aaacti agaaaa agctac gcacco ggcgca	atggatgaa tcattttta agatcaaag ccaactctt gcctacata agcggtcgg	cgaaata atttaaa gatcttc tttccga cctcgct gctgaac	gacagai aggatci ttgagai aggtaa ctgctaa ggggggg	togotg taggtg toottt ctggot atootg ttogtg	agatag aagato ttttct tcagca ttacca cacaca	gtgcc ctttt gcgcg gagcg gtggc agtggc	tcacto tgataa taatco cagata tgctgo gcttgo	gattaa atc <mark>tca</mark> tgctgc accaaa ccagtg gagcga	agcat atgac atgac atact ggcga aacga	tggta caaaa aaaca gtcct taagt cctac	actgi tccci aaaaa tctaq cgtgi accga	tc aa gt tc aa
964 teccgtate 071 agaccaag 178 aacgtgag 285 ccaccgt 392 gtagccgt 499 ttaccggg 606 ctgagata	cgtagttato tttactcata ttttcgttco accagcggto agttaggcca ttggactcaa cctacagcgt	stacacg atatact cactgag ggtttgt accactt agacgat cgagcta	Jacggo Ittaga Jogtoa Ittgoo Icaaga Lagtta Atgaga	ggagt attga agacco cggato accggo accggo aaagco	caggo tttaa cogta caaga tgtaq ataaq gccao	caacta agaaaa agctac gcacco ggcgca cgctto	atggatgaa tcattttta agatcaaag ccaactctt gcctacata agcggtcgg cccgaaggg	cgaaata atttaaa gatcttc tttccga cctcgct gctgaac agaaagg	gacaga aggatc ttgaga aggtaa ctgctaa ggggggg cggaca	togotg taggtg toottt otggot atootg ttogtg ggtato	agatag aagato ttttct tcagca ttacca cacaca cggtaa	gtgcc ctttt gcgcg gagcg agtggc agccca agcggc	tcacto tgata taatot cagata tgotgo gottgo agggto	yattaa atc <mark>tca</mark> tgctgc accaaa ccagtg gagcga cggaac	agcat atgac sttgc atact ggcga acga cagga	tggta caaaa aaaca gtcct taagt cctac gagcg	actgi tccci aaaaa tctaq cgtgi accga cacga	tc aa gt tc aa ag
964 tecceptate 071 agaccaag 178 aacgtgag 285 ccaccgct 392 gtagccgt 499 ttaccggg 606 ctgagata 713 ggagctte	cgtagttato ttttactcata ttttcgttco accagcggto agttaggco ttggactca cctacagcgt cagggggaaa	ctacacg atatact cactgag ggtttgt accactt agacgat cgagcta acgcctg	Jacggo Sttaga Jogtca Sttgco Ccaaga Lagtta Atgaga Jgtato	ggagt attga agacco cggat aactc accgg aaagco cttta	caggo tttaa cogta caaga tgtag ataag gccao tagto	caacta agaaata agctao gcacco ggcgca cgctto cctgto	atggatgaa tcattttta agatcaaag ccaactctt gcctacata agcggtcgg cccgaaggg cgggtttcg	cgaaata atttaaa gatette ttteega eeteget getgaae agaaagg eeacete	gacagai aggatci aggtaad ctgctaa ggggggg cggacag tgactt	togotg. taggtg. toottt otggot atcotg ttogtg. ggtato ggtato	agatag aagato ttttct tcagca ttacca cacaca cggtaa cgattt	gtgcc ctttt gcgcg ggagcg ggccca gcggc ttgtg	tcacto tgataa taatot cagata tgotgo gottgo agggto atgoto	gattaa atctca tgctgo accaaa ccagto gagcga cggaac cgtcag	agcat atgac atgc atact ggcga acga agga ggggg	tggta caaaa aaaca gtcct taagt cctac gagcg gcgga	actgi tccci tctac tctac cgtgi accga cacga gccta	tc aa gt tc aa ag at
964 tecceptat 964 agaccaag 178 aacgtgag 285 ccaccgct 392 gtagccgt 499 ttaccggg 606 ctgagata 713 ggagcttc 820 ggaaaaac	cgtagttato ttttactcata ttttcgttco accagcggto agttaggco ttggactca cctacagcgt cagggggaaa gccagcaaco	ctacacg atatact cactgag ggtttgt accactt agacgat cgagcta acgcctg gcggcct	jacggo ttaga jogtoa ttgoo caaga aggta ggtato	ggagt attgat agacco cggat aactco accgg aaagco cttta acggt	caggo tttaa ccgta caaga tgtag ataag gccao tagto tccto	caacta agaaaa agctao gcacco ggcgca cgctto cctgto ggcctt	atggatgaa tcattttta agatcaaag ccaactctt gcctacata agcggtcgg cccgaaggg cgggtttcg tttgctggc	cgaaata atttaaa gatette ttteega ecteget getgaae agaaagg ccaeete ettttge	gacaga aggato ttgaga aggtaa ctgctaa gggggg cggaca tgactto tcacato	togetg. taggtg. tcettt etgget atcetg ttegtg. ggtate gagegt. gagegt.	agatag aagato ttttct tcagca ttacca cacaca cggtaa cgattt tcctgo	gtgcc cctttt gcgcg ggagcg ggtggc agcggc ttgtg cgttat	tcacto tgataa taatct cagata tgctgo gcttgo agggto atgcto ccccto	gattaa tgotgo accaas ccagtg gagoga cggaac cgtcag gattot	agcat atgac atgac atact ggcga acga agga ggggg ggggg	tggta caaaa gtcct taagt cctac gagcg gcgga ataac	actgi tccci aaaaa tctag cgtgi accga cacga cacga cacga cacga	tc aa gt tc aa ag at
964 tecegtat 071 agaccaagg 178 aacgtaga 285 ccaccgct 392 gtagccgt 499 ttaccggg 606 ctgagata 713 ggagettc 820 ggaaaacc 927 accgcct	cgtagttato tttactcata ttttcgttc accagcggto agttaggcca ttggactca cctacagcgt gccaggggaaa gccagcacco tgagtgagci	ctacacg atatact ggtttgt accactt agacgat ggggcta acgcctg ggggcc tgatacc	acggo cttaga cttgco ccaaga aggta aggtato ctttta	ggagt attgat agacco cggat aactco accggo ctttat acggt gccgco	caggo tttaa ccgta caaga tgtag ataag gccao tagto tccto agcco	caacta agaaaa agctao gcacco ggcgca cgctto cctgto ggcctt ggcctt	atggatgaa tcattttta agatcaaag ccaactctt gcctacata agcggtcag cccgaaggg cgggtttcg tttgctggc accgagcgc	cgaaata atttaaa gatcttc tttccga cctcgct gctgaac agaaagg ccacctc cttttgc agcgagt	gacaga aggatc aggtaa ctgctaa gggggg cggaca tgactt tcacat cagtga	togotg taggtg toottt otggot atcotg ttogtg ggtato gagogt gttott gcgagg	agatag aagato ttttct tcagca ttacca cacaca cggtaa cggttt tcctgo aagcgo	gtgcc cctttt cgcgcg agagcg agtggc agccca agcggc ttgtg cgttat gaagag	tcacto tgataa taatct cagata tgctgo gcttgo agggto atgcto ccccto cgccto	gattaa tgctgo accaaa ccagto gagcga cggaao cgtcao gattct gatgcg	agcat atgac ttgc atact gcga acga acga ggggg ggggg ggtgg	tggta caaaa gtcct taagt cctac gagcg gcgga ataac tttct	actgi aaaaa totag cgtgi accga cacga cacga cacga cacga cacga cacga	tc tt aa gt tc aa ag at tt ac
964 tecegtat 071 agaccaagg 178 aacgtaga 285 ccaccgct 392 gtagccgt 499 ttaccggg 606 ctgagata 713 ggagettc 820 ggaaaacc 927 accgcct	cgtagttato tttactcata ttttcgttc accagcggto agttaggcca ttggactca cctacagcgt gccaggggaaa gccagcacco tgagtgagci	ctacacg atatact ggtttgt accactt agacgat ggggcta acgcctg ggggcc tgatacc	acggo cttaga cttgco ccaaga aggta aggtato ctttta	ggagt attgat agacco cggat aactco accggo ctttat acggt gccgco	caggo tttaa ccgta caaga tgtag ataag gccao tagto tccto agcco	caacta agaaaa agctao gcacco ggcgca cgctto cctgto ggcctt ggcctt	atggatgaa tcattttta agatcaaag ccaactctt gcctacata agcggtcag cccgaaggg cgggtttcg tttgctggc accgagcgc	cgaaata atttaaa gatcttc tttccga cctcgct gctgaac agaaagg ccacctc cttttgc agcgagt	gacaga aggatc aggtaa ctgctaa gggggg cggaca tgactt tcacat cagtga	togotg taggtg toottt otggot atcotg ttogtg ggtato gagogt gttott gcgagg	agatag aagato ttttct tcagca ttacca cacaca cggtaa cggttt tcctgo aagcgo	gtgcc cctttt cgcgcg agagcg agtggc agccca agcggc ttgtg cgttat gaagag	tcacto tgataa taatct cagata tgctgo gcttgo agggto atgcto ccccto cgccto	gattaa tgctgo accaaa ccagto gagcga cggaao cgtcao gattct gatgcg	agcat atgac ttgc atact gcga acga acga ggggg ggggg ggtgg	tggta caaaa gtcct taagt cctac gagcg gcgga ataac tttct	actgi aaaaa totag cgtgi accga cacga cacga cacga cacga cacga cacga	tc tt aa gt tc aa ag at tt ac
964 tocogtat. 071 agaccaag 178 aacgtgag 285 ccaccgct. 392 gtagccgt. 499 ttaccggg 606 ctgagata 713 ggagettc 820 ggaaaaac 927 accgcctt 034 gcatctgtu	egtagttato tttactcata ttttcgttcg accagcggtg accagcggtg agttaggactca cctacagcgt cagggggaaa gccagcaacc tgagtgagct gcggtattto	atatace atatact ggtttgt accactt agacgat aggcta acgcctg gcggcc tcgatacc cacaccg	acggg tttaga gogtoa ttgoo caaga aggtato ggtato cgctoo gcaato	ggagt attga cggat accggat accgg aaagc cttta acggt gccgc ggtgc	caggo ccgta caaga tgtag ataag gccao tagto tccto agcco actcl	caacta aaacta agcaac gcacco ggcgca cgctto cctgto ggccta ggccta gaacga	atggatgaa toattttta agatcaaag coaactott gootacata agoggtogg cogggtttog cttgoctggo tttgoctggo accgagogc	cgaaata atttaaa gatcttc tttccga cctcgct gctgaac agaaagg ccacctc cttttgc agcgagt tctgatg	gacaga aggato ttgaga aggtaa ctgctaa gggggg cggaca tgactto tcacato cagtga ccgcata	togotg toottt ctggot atcotg ggtato ggtato gagogt gttott gcgagg agttaa	agatag aagata ttttct tcagca cacaca cggtaa cggtaa cgattt tcctgo aagcgo gccagt	gtgcc cetttt gegeg gageg ggtggc agccca agcggc tttgtg cgttat gaagag cataca	tcacto tgataa taatot cagata tgotgo gcttgo agggto atgoto ccccto ccccto ccccto	yattaa atctca tgctgo accaag cagcga cggaac cgtcag gattct gatgcg ctatcg	agcat atgac atgac atact ggcga acga aggg gggg g	tggta caaaa gtcct taagt cctac gagcg gcgga ataac tttct gtgac	actgi aaaaa totaq cgtgi accga goota goota cgtai cotta	tc aa gt tc aa ag at tt ac tc
964 toccgtat 071 agaccaag 178 aacgtag 285 ccaccgct 392 gtagccgt 499 ttaccggg 606 ctgagata 713 ggagcttc 820 ggaaaaac 927 accgcctt 141 atgcttgc	ogfagttato tttactcat ttttcgttoc accagcggtg accagcggtg caggtagcca ctacagcgg cagggggaa gccagcagca tgagtgagct ggcgtatttc gccccgacac	atatace atatact ggtttgt accactt agacgat aggcta acgcctg gcggcc tcgatacc cccgcca	yacggg tttaga tttgc ccaaga cagtta atgaga ggtatc ggtatc cgctcg aacaco	ggagt attga agacc cggat aactc accgg cttta accggt gccgc ggtgc ccgct	caggo ccgta cagga tgtag ataag gccao tagto tagto agcco agcco agcco gacco	caacta aaacta agcaac gcacco ggcgca cgctto cctgto ggccta ggccta gaacga tcagta	atggatgaa tcattttta agatcaaag ccaactctt gcctacata agcggtcgg ccggattcg ccggattcg accgagcgc accactgc tgacgggct	cgaaata atttaaa gatottc tttccga cctcgct gctgaac cacctc ccacctc agcgagt tctgatg tgtctgc	gacaga aggatc aggtaa ctgctaa gggggg cggaca tgactt tcacat cagtga ccgcat tcccgg	togetg taggtg teettt etgget atcetg gtacetg ggtate ggtate ggtatett gegagg agttaa cateeg	agatag aagata ttttct tcagca cacaca cggtaa cggttt tcctgo aagegg gccagt cttaca	gtgec cetttt gegeg ggggeg ggtgge cgecea ggegge cettgtg gatat gaagag cataca	toacto tgataa taatot cagata tgotgo gottgo agggto atgoto coccto coccto coccto coccto coccto coccto coccto coccto coccto coccto coccto	yattaa atctca tgctgo accaaa ccagtg gagcga cggaac cgtcag gattet gattet gatgc gattet	agcat atgac ttgc atact ggcga acga ggggg ggtat gctac gctac ctcc	tggta caaaa gtcct taagt cctac gagcg gcgga ataac tttct gtgac gggag	actgf aaaaa tctag cgtgf accga cacga cacga cacga cacga cgtaf cctta tgggf ctgca	tc aa gt tc aa ag at tt ac tc at
964 tcocqtat 071 agaccaag 178 aacqtag 285 ccaccqt 392 gtagcqt 499 ttaccqgg 606 ctgagata 713 ggagettc 820 ggaaaac 927 accqcctt 034 gcatctgt 141 atggtcgc	ogfagttat tttactcatz ttttegttc agcageggt agttaggcca ttggactcaa cctacagegg gcagcaaca tgagtgagc gcggtatttc gcgccacaaca gcccgcaaca	atatace cactgag ggtttgt accactt agacgat acgcctg gcggcct cgatace cccgcca cccgcca	yacggo tttaga tttgo ttgo ccaaga cagtta atgaga tttta cgcto gcaato acacoga	ggagt attga cggat aactc accgg cttta accgg cttta gccgc ggtgc ccgct aaacg	caggo tttaa cagga tgtaq ataaq gccaq tagto tccto agcco actct gacgo cgcga	caacta aaacta agaaaa gcacco ggcgca cgctto cctgto ggccta ggccta gaacga tcagta cgcco aggcaq	atggatgaa tcattttta agatcaaagg cccaactett geetacata ageggtegg cccgaggtegg tttgetgge accatetge accaggege acaatetge ggatetega	cgaaata atttaaa gatette ttteega eeteget getgaae ceaete egegagt tetgatg tgtetge	gacaga aggatci ttgaga ctgctaa ctgctaa cgggggg tgactto ccgcacato ccgcata tccccggo aaat <mark>taa</mark>	Legetg taggtg teetttt etggett ateetg ggtateetg ggtateet gggagg agttaa cateega	agatac aagatac ttttct tcagca cacaca cggtaa cggtta cggttt tcctgc aagcgg gccagt cttaca cttaca	gtgec ectttt gegegeg agtgge ageege ettgtg gettat gaagag eataca agacaa	tcacto tgata taatot cagata tgotgo gottgo agggto cocoto cocoto cocoto cocoto gotgto gagaco	gattaa atctca tgctgc accaaa ccagtg gagcga cggaag cggaag cggaag cggaag cggaag cggaag cggaag cggaag cggaag cgtcag gattet gaccgt cacaag	agcat atgac ttgc atact gcga acga agga ggggg ggtat gctac ctcc cggtt	tggta caaaa gtcct taagt cctac gagcg gogga ataac tttct gtgac gggag tccct	actgf tcccf cgtgf accga cacga cacga cacga cacga cacga cctta cctta ctgca ctgca	tt aa gt tc aa ag at tt ac tc at tc
964 tecegtat 071 lagaccaag 178 aacgtgag 285 ccaccgct. 392 gtagccgt. 499 ttaccggg 606 ctgagata 713 ggagcttc 820 ggaaaaac 927 laccgcctt 034 gcatctgt 141 latggctgc 248 gtgtcaga	ogfagttato tttactcata accageggtg agttaggeca ttggactcaa cctacageggt gccagcaaco tgagtgaget gcggtatttc gccceccaaco ggttttcaco gggaggeco	atatace cactgag ggtttgt accactt agacgat acgcctg gcggcct cgatace cccgcca cccgcca	yacggo tttaga tttgo ttgo ccaaga cagtta atgaga tttta cgcto gcaato acacoga	ggagt attga cggat aactc accgg cttta accgg cttta gccgc ggtgc ccgct aaacg	caggo tttaa cagga tgtaq ataaq gccaq tagto tccto agcco actct gacgo cgcga	caacta aaacta agaaaa gcacco ggcgca cgctto cctgto ggccta ggccta gaacga tcagta cgcco aggcaq	atggatgaa tcattttta agatcaaagg cccaactett geetacata ageggtegg cccgaggtegg tttgetgge accatetge accaggege acaatetge ggatetega	cgaaata atttaaa gatette ttteega eeteget getgaae ceaete egegagt tetgaeg tgtetge	gacaga aggatci ttgaga ctgctaa ctgctaa cgggggg tgactto ccgcacato ccgcata tccccggo aaat <mark>taa</mark>	Legetg taggtg teetttt etgget ateetg ggtateetg ggtateet gggagg agttaa cateega	agatac aagatac ttttct tcagca cacaca cggtaa cggtta cggttt tcctgc aagcgg gccagt cttaca cttaca	gtgec ectttt gegegeg agtgge ageege ettgtg gettat gaagag eataca agacaa	tcacto tgata taatot cagata tgotgo gottgo agggto cocoto cocoto cocoto cocoto gotgto gagaco	gattaa atctca tgctgc accaaa ccagtg gagcga cggaag cggaag cggaag cggaag cggaag cggaag cggaag cggaag cggaag cgtcag gattet gaccgt cacaag	agcat atgac ttgc atact gcga acga agga ggggg ggtat gctac ctcc cggtt	tggta caaaa gtcct taagt cctac gagcg gogga ataac tttct gtgac gggag tccct	actgf tcccf tctag cgtgf accga cacga cacga cacga cctta cctta ctgca ctgca	tt aa gt tc aa ag at tt ac tc at tc
964 tecegtat 071 agaccaag 178 aacgtagag 285 ccaccgct. 392 gtagcegt. 499 ttaccggg 606 ctgagata 713 ggagettc 820 ggaaaaac 927 accgcett 034 gcatctgt. 141 atggetgc 248 gtgtcaga 355 ccggetec. 462 agcaaggg	ogfagttato tttactcata accageggtg agttaggeca ttggactcaa cctacageggt gccagcaaco tgagtgaget gcggtatttc gccceccaaco ggttttcaco gggaggeco	atatace cactgag ggtttgt accactt agacgat acgcctg gcggcct cgatace cccgcca cccgcca	yacggo tttaga tttgo ttgo ccaaga cagtta atgaga tttta cgcto gcaato acacoga	ggagt attga cggat aactc accgg cttta accgg cttta gccgc ggtgc ccgct aaacg	caggo tttaa cagga tgtaq ataaq gccaq tagto tccto agcco actct gacgo cgcga	caacta aaacta agaaaa gcacco ggcgca cgctto cctgto ggccta ggccta gaacga tcagta cgcco aggcaq	atggatgaa tcattttta agatcaaagg cccaactett geetacata ageggtegg cccgaggtegg tttgetgge accatetge accaggege acaatetge ggatetega	cgaaata atttaaa gatette ttteega eeteget getgaae ceaete egegagt tetgaeg tgtetge	gacaga aggatci ttgaga ctgctaa ctgctaa cgggggg tgactto ccgcacato ccgcata tccccggo aaat <mark>taa</mark>	Legetg taggtg teetttt etgget ateetg ggtateetg ggtateet gggagg agttaa cateega	agatac aagatac ttttct tcagca cacaca cggtaa cggtta cggttt tcctgc aagcgg gccagt cttaca cttaca	gtgec ectttt gegegeg agtgge ageege ettgtg gettat gaagag eataca agacaa	tcacto tgata taatot cagata tgotgo gottgo agggto cocoto cocoto cocoto cocoto gotgto gagaco	gattaa atctca tgctgc accaaa ccagtg gagcga cggaag cggaag cggaag cggaag cggaag cggaag cggaag cggaag cggaag cgtcag gattet gaccgt cacaag	agcat atgac ttgc atact gcga acga agga ggggg ggtat gctac ctcc cggtt	tggta caaaa gtcct taagt cctac gagcg gogga ataac tttct gtgac gggag tccct	actgf tcccf tctag cgtgf accga cacga cacga cacga cctta cctta ctgca ctgca	tt aa gt tc aa ag at tt ac tc at tc
964 tocodat 071 agaccaag 178 aacgtag 285 ocaccgot 392 gtagcogt 499 ttaccggg 606 ctgagata 713 ggagotto 820 ggaaaac 927 accgott 034 gcatctgt 141 atggotgc 248 gttcaga 355 locggotco 462 agcaaggg	ogfagttato tttactcata accageggtg agttaggeca ttggactcaa cotacageggt gccagcaaco tgagtgaget gcggtatttc gcccecgaca ggttttcaco gggttttcaco	atatace cactgag ggtttgt accactt agacgat acgcctg gcggcct cgatace cccgcca cccgcca	yacggo tttaga tttgo ttgo ccaaga cagtta atgaga tttta cgcto gcaato acacoga	ggagt attga cggat aactc accgg cttta accgg cttta gccgc ggtgc ccgct aaacg	caggo tttaa cagga tgtaq ataaq gccaq tagto tccto agcco actct gacgo cgcga	caacta aaacta agaaaa gcacco ggcgca cgctto cctgto ggccta ggccta gaacga tcagta cgcco aggcaq	atggatgaa tcattttta agatcaaagg cccaactett geetacata ageggtegg cccgaggtegg tttgetgge accatetge accaggege acaatetge ggatetega	cgaaata atttaaa gatette ttteega eeteget getgaae ceaete egegagt tetgaeg tgtetge	gacaga aggatci ttgaga ctgctaa ctgctaa cgggggg tgactto ccgcacato ccgcata tccccggo aaat <mark>taa</mark>	Legetg taggtg teetttt etgget ateetg ggtateetg ggtateet gggagg agttaa cateega	agatac aagatac ttttct tcagca cacaca cggtaa cggtta cggttt tcctgc aagcgg gccagt cttaca cttaca	gtgec ectttt gegegeg agtgge ageege ettgtg gettat gaagag eataca agacaa	tcacto tgata taatot cagata tgotgo gottgo agggto cocoto cocoto cocoto cocoto gotgto gagaco	gattaa atctca tgctgc accaaa ccagtg gagcga cggaag cggaag cggaag cggaag cggaag cggaag cggaag cggaag cggaag cgtcag gattet gaccgt cacaag	agcat atgac ttgc atact gcga acga agga ggggg ggtat gctac ctcc cggtt	tggta caaaa gtcct taagt cctac gagcg gogga ataac tttct gtgac gggag tccct	actgf tcccf tctag cgtgf accga cacga cacga cacga cctta cctta ctgca ctgca	tt aa gt tc aa ag at tt ac tc at tc
964 Locottal 071 lagaccaag 178 aacgtag 285 ccaccget. 392 gtagccgt. 499 ttaccggg 606 ctgagata 713 ggagettc 820 ggaaaac 927 laccgcett 034 gcatctgt 141 latggetgc 482 ggcaaggg 569 coctacg 676 gotacco	ogfagttato tttactcata accageggtg agttaggeca ttggactcaa cotacageggt gccagcaaco tgagtgaget gcggtatttc gcccecgaca ggttttcaco gggttttcaco	atatace cactgag ggtttgt accactt agacgat acgcctg gcggcct cgatace cccgcca cccgcca	yacggo tttaga tttgo ttgo ccaaga cagtta atgaga tttta cgcto gcaato acacoga	ggagt attga cggat aactc accgg cttta accgg cttta gccgc ggtgc ccgct aaacg	caggo tttaa cagga tgtaq ataaq gccaq tagto tccto agcco actct gacgo cgcga	caacta aaacta agaaaa gcacco ggcgca cgctto cctgto ggccta ggccta gaacga tcagta cgcco aggcaq	atggatgaa tcattttta agatcaaagg cccaactett geetacata ageggtegg cccgaggtegg tttgetgge accatetge accaggege acaatetge ggatetega	cgaaata atttaaa gatette ttteega eeteget getgaae ceaete egegagt tetgaeg tgtetge	gacaga aggatci ttgaga ctgctaa ctgctaa cgggggg tgactto ccgcacato ccgcata tccccggo aaat <mark>taa</mark>	Legetg taggtg teetttt etgget ateetg ggtateetg ggtateet gggagg agttaa cateega	agatac aagatac ttttct tcagca cacaca cggtaa cggtta cggttt tcctgc aagcgg gccagt cttaca cttaca	gtgec ectttt gegegeg agtgge ageege ettgtg gettat gaagag eataca agacaa	tcacto tgata taatot cagata tgotgo gottgo agggto cocoto cocoto cocoto cocoto gotgto gagaco	gattaa atctca tgctgc accaaa ccagtg gagcga cggaag cggaag cggaag cggaag cggaag cggaag cggaag cggaag cggaag cgtcag gattet gaccgt cacaag	agcat atgac ttgc atact gcga acga agga ggggg ggtat gctac ctcc cggtt	tggta caaaa gtcct taagt cctac gagcg gogga ataac tttct gtgac gggag tccct	actgf tcccf tctag cgtgf accga cacga cacga cacga cctta cctta ctgca ctgca	tt aa gt tc aa ag at tt ac tc at tc
964 Locottal 071 lagaccaag 178 aacgtag 285 ccaccget. 392 gtagccgt. 499 ttaccggg 606 ctgagata 713 ggagettc 820 ggaaaac 927 laccgcett 034 gcatctgt 141 latggetgc 482 ggcaaggg 569 coctacg 676 gotacco	ogfagttato tttactcata accageggtg agttaggeca ttggactcaa cotacageggt gccagcaaco tgagtgaget gcggtatttc gcccecgaca ggttttcaco gggttttcaco	atatace cactgag ggtttgt accactt agacgat acgcctg gcggcct cgatace cccgcca cccgcca	yacggo tttaga tttgo ttgo ccaaga cagtta atgaga tttta cgcto gcaato acacoga	ggagt attga cggat aactc accgg cttta accgg cttta gccgc ggtgc ccgct aaacg	caggo tttaa cagga tgtaq ataaq gccaq tagto tccto agcco actct gacgo cgcga	caacta aaacta agaaaa gcacco ggcgca cgctto cctgto ggccta ggccta gaacga tcagta cgcco aggcaq	atggatgaa tcattttta agatcaaagg cccaactett geetacata ageggtegg cccgaggtegg tttgetgge accatetge accaggege acaatetge ggatetega	cgaaata atttaaa gatette ttteega eeteget getgaae ceaete egegagt tetgaeg tgtetge	gacaga aggatci ttgaga ctgctaa ctgctaa cgggggg tgactto ccgcacato ccgcata tccccggo aaat <mark>taa</mark>	Legetg taggtg teetttt etgget ateetg ggtateetg ggtateet gggagg agttaa cateega	agatac aagatac ttttct tcagca cacaca cggtaa cggtta cggttt tcctgc aagcgg gccagt cttaca cttaca	gtgec ectttt gegegeg agtgge ageecea ageege ettgtg gatat gaagag ataca agacaa	tcacto tgata taatot cagata tgotgo gottgo agggto cocoto cocoto cocoto cocoto gotgto gagaco	gattaa atctca tgctgc accaaa ccagtg gagcga cggaag cggaag cggaag cggaag cggaag cggaag cggaag cggaag cggaag cgtcag gattet gaccgt cacaag	agcat atgac ttgc atact gcga acga agga ggggg ggtat gctac ctcc cggtt	tggta caaaa gtcct taagt cctac gagcg gogga ataac tttct gtgac gggag tccct	actgf tcccf tctag cgtgf accga cacga cacga cacga cctta cctta ctgca ctgca	tt aa gt tc aa ag at tt ac tc at tc
964 tocogtat 071 lagaccaag 178 lacgtgag 285 ccaccgct 392 gtagccgt 499 ttaccggg 606 ctgagata 713 ggagettc 820 ggaaaaac 927 lacgcett 034 gcatctgt 141 latggetgc 248 gtgtcaga 355 ccggetcc 462 agcaaggg 569 cactagg 676 gctacce	ogfagttato tttactcata accageggtg agttaggeca ttggactcaa cotacageggt gccagcaaco tgagtgaget gcggtatttc gcccecgaca ggttttcaco gggttttcaco	atatace cactgag ggtttgt accactt agacgat acgcctg gcggcct cgatace cccgcca cccgcca	yacggo tttaga tttgo ttgo ccaaga cagtta atgaga tttta cgcto gcaato acacoga	ggagt attga cggat aactc accgg cttta accgg cttta gccgc ggtgc ccgct aaacg	caggo tttaa cagga tgtaq ataaq gccaq tagto tccto agcco actct gacgo cgcga	caacta aaacta agaaaa gcacco ggcgca cgctto cctgto ggccta ggccta gaacga tcagta cgcco aggcaq	atggatgaa tcattttta agatcaaagg cccaactett geetacata ageggtegg cccgaggtegg tttgetgge accatetge accaggege acaatetge ggatetega	cgaaata atttaaa gatette ttteega eeteget getgaae ceaete egegagt tetgaeg tgtetge	gacaga aggatci ttgaga ctgctaa ctgctaa cgggggg tgactto ccgcacato ccgcata tccccggo aaat <mark>taa</mark>	Legetg taggtg teetttt etgget ateetg ggtateetg ggtateet gggagg agttaa cateega	agatac aagatac ttttct tcagca cacaca cggtaa cggtta cggttt tcctgc aagcgg gccagt cttaca cttaca	gtgec ectttt gegegeg agtgge ageecea ageege ettgtg gatat gaagag ataca agacaa	tcacto tgata taatot cagata tgotgo gottgo agggto cocoto cocoto cocoto cocoto gotgto gagaco	gattaa atctca tgctgc accaaa ccagtg gagcga cggaag cggaag cggaag cggaag cggaag cggaag cggaag cggaag cggaag cgtcag gattet gaccgt cacaag	agcat atgac ttgc atact gcga acga agga ggggg ggtat gctac ctcc cggtt	tggta caaaa gtcct taagt cctac gagcg gogga ataac tttct gtgac gggag tccct	actgf tcccf tctag cgtgf accga cacga cacga cacga cctta cctta ctgca ctgca	tt aa gt tc aa ag at tt ac tc at tc
964 tocotat 071 agaccaag 071 agaccaag 285 ccaccgct 392 gtagccgt 409 ttaccggg 606 ctgagata 713 ggagettc 820 ggaaaac 927 accgcctt 034 gcatctgt 141 atggtcgc 248 gttcagat 355 ccggctcc 462 agcaaggg 676 gctacceg 783 gggcgaa	ogfagttato tttactcata accageggtg agttaggeca ttggactcaa cotacageggt gccagcaaco tgagtgaget gcggtatttc gcccecgaca ggttttcaco gggttttcaco	atatace cactgag ggtttgt accactt agacgat acgcctg gcggcct cgatace cccgcca cccgcca	yacggo tttaga tttgo ttgo ccaaga cagtta atgaga tttta cgcto gcaato acacoga	ggagt attga cggat aactc accgg cttta accgg cttta gccgc ggtgc ccgct aaacg	caggo tttaa cagga tgtaq ataaq gccaq tagto tccto agcco actct gacgo cgcga	caacta aaacta agaaaa gcacco ggcgca cgctto cctgto ggccta ggccta gaacga tcagta cgcco aggcaq	atggatgaa tcattttta agatcaaagg cccaactett geetacata ageggtegg cccgaggtegg tttgetgge accatetge accaggege acaatetge ggatetega	cgaaata atttaaa gatette ttteega eeteget getgaae ceaete egegagt tetgaeg tgtetge	gacaga aggatci ttgaga ctgctaa ctgctaa cgggggg tgactto ccgcacato ccgcata tccccggo aaat <mark>taa</mark>	Legetg taggtg teetttt etgget ateetg ggtateetg ggtateet gggagg agttaa cateega	agatac aagatac ttttct tcagca cacaca cggtaa cggtta cggttt tcctgc aagcgg gccagt cttaca cttaca	gtgec ectttt gegegeg agtgge ageecea ageege ettgtg gatat gaagag ataca agacaa	tcacto tgata taatot cagata tgotgo gottgo agggto cocoto cocoto cocoto cocoto gotgto gagaco	gattaa atctca tgctgc accaaa ccagtg gagcga cggaag cggaag cggaag cggaag cggaag cggaag cggaag cggaag cggaag cgtcag gattet gaccgt cacaag	agcat atgac ttgc atact gcga acga agga ggggg ggtat gctac ctcc cggtt	tggta caaaa gtcct taagt cctac gagcg gogga ataac tttct gtgac gggag tccct	actgf tcccf tctag cgtgf accga cacga cacga cacga cctta cctta ctgca ctgca	tt aa gt tc aa ag at tt ac tc at tc
964 tcccqtat. 178 accqtag. 178 accqtag. 285 ccaccqtt. 392 gtagccgt. 499 ttaccqgg 606 ctgagata. 713 ggagsttc. 820 ggaaaac. 927 accgctt. 1034 gcatctgt. 1141 atggctgg. 248 gtgtcaga. 355 ccggctcc. 462 agcaaggg 2669 caccco. 783 ccgccga. 890 ctacaaca. 890 ctacaaca.	ogfagttato tttactcata accageggtg agttaggeca ttggactcaa cotacageggt gccagcaaco tgagtgaget gcggtatttc gcccecgaca ggttttcaco gggttttcaco	atatace cactgag ggtttgt accactt agacgat acgcctg gcggcct cgatace cccgcca cccgcca	yacggo tttaga tttgo ttgo ccaaga cagtta atgaga tttta cgcto gcaato acacoga	ggagt attga cggat aactc accgg cttta accgg cttta gccgc ggtgc ccgct aaacg	caggo tttaa cagga tgtaq ataaq gccaq tagto tccto agcco actct gacgo cgcga	caacta aaacta agaaaa gcacco ggcgca cgctto cctgto ggccta ggccta gaacga tcagta cgcco aggcaq	atggalgaa tcattttta agatcaaag ccaactett gcctacata ageggtegg ccggalgg gcggtttegg accaactge ttggagget tggacgget tgacggget tgacggget tgacggget tgacggget tgacggget tgacggegge ataattttg	ogaata atttaaa gatotto tttooga cctogot gotgaac gagaagg ccacotc ottttgo aggagt ttoogag tttaact aggaggt tttaact aggoog aggota aaggota aaggota	acaga aggatc ttgagta aggtaa ctgcta gggggg cggaca tcactg cagtga ccgcat tcccgga aaat ttaaga agtaa tggcta agtaa tggcta cgcat tcccgga aaat cgcat cgcat tcactga ccgcat tcccgat aaat cgcat cgcat cgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat tcactga ccgcat ccgcat ccactga ccgcat ccactga ccgcat ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga ccactga cc	Logata taggtg toottt ctggcttt ggtatct ggtatct gttctt gttctt gcgagg agttaa catccga aggaga acceto yagegt too yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto yagegt acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acceto acce	agata aagata ttacaga ttacaga cacaca cacaca cgattt tcctgo aagcga ccagt ctcata acaagt gtgaccat acaagt gtgacc cacacat acaagt gtgaccat acaagt gtgaccat acaagt gtgaccat acaagt	gtgc cctttt ggggcg gggcg ggcca gccca gccca gccca gccca gccca gcaca gataga ataca gataca gataca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gccca gcaca gccca gcaca gccca gcaca gccca gcaca gccca gcaca gccca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcaca gcac gcac gcac gca gca	t cacto tgata taatot cagata tgctgg gottgg gottgg ccccto ccccto gotgctgg gagaco otcato gacta gagaco otcato gacta gacta gacta gagaco otcato gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta ccccta gacta gacta gacta gacta gacta gacta gacta gacta gacta gacta ccccta gacta gacta ccccta gacta gacta ccccta gacta gacta ccccta gacta gacta ccccta gacta gacta ccccta gacta ccccta gacta ccccta gacta ccccta gacta ccccta gacta ccccta gacta ccccta gacta ccccta ccccta gacta ccccta ccccta ccccta ccccta ccccta ccccta ccccta ccccta ccccta ccccta ccccta ccca cccta ccc ccc	yatta atctca tgctga accaaa ccagto gagoga cgtcao gattot cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaa cacaaaaa cacaaaa cacaaaa cacaaaaaa	igcat itgac itgac itgac igcga igggg igggg igggg igtat igggg igtat iggg iggtat iggga iggg igga iggg igga iggg igga igggg igga igggg igga igggg igga igggg igga igggg igga igggg igga igggg igga igggg igga igggg igga igggg igga igggg igga igggg igga igggg igga igggg igga igggg igga igggg igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga igga i i i i	tggta caaaa aaaca gtcctt cotac ggcgt ggggg gcgga tttcct gggag tccct accaT gaggg gtgct actaC ctgga gcaga	actgi tccct aaaaa cccta caccga caccga caccga cctta cctta ctgggi ctgca cctta ctgggi ccta ccta ccta ccta ccta ccta ccta cct	tc ttt aa gt tc aa gt tc aa gt tc aa ttt ac ttt ac c c c c c aa c g gc
964 tcocqtat 178 aacgtag 285 ccaccgt 392 gtagccgt 409 ttaccggg 606 ctgagata 713 ggagettc 820 ggaaaac 927 accgctt 034 gcatctgt 141 atggtgcaga 355 ccggetcc 2462 agcaaggg 569 octacgg 676 getaccee 783 ogcgoga	cglagttat tttactcata accagoggto agttaggcco cctacagogto cagggggaa gccagogagco gcggtattto gcgccocgaca gggttttcac cggagggc ggaggcco cgaggag gcagca ggggagtt gcagca gccacago gccacaca ggto gccacaca ggto gccacagag gdto ggdagtto	stada og stada og sattag ggtttg acaatt agacgat aggetag cgastac gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatac gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gatacc gac	acgo cttaga cttgo ccaaga cagtta aggatta cgo cgo cgo cgo cgo cgo cgo cgo cgo cgo	ggagt attga agact cggat accgg accgg cttta acggt gccgc cgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgcta ccgca ccgcta ccgca ccgca ccgca ccgca ccgca ccgca ccgca ccgca ccgca ccgca ccgca ccgca ccgca ccgca ccgca ccgca ccgca	cagge tttaa ccgta caga tgtag gccae tagto tacto gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae gccae g	caact aaact agaaa agctac ggcacc ggcgct ccctt ccctt ggcct cagtc ccct aggcact cccct aggcact ccct aggcact ccct aggcac ccct aggcac ccct aggcac ccct ccct	atggalgaa tcattttta agatcaaag ccaactett gctacata ageggtegg cgggttteg tttgetgge accageget ggatetega ataatttg fogagetg atagttge acageget tegagetge atggagetg atggagetg atggagetg accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged accaged	ogaata atttaaa gatotto tttooga cotogot gotgaac gotgaac gotgaac cacoto ctttbg aggagg tgtotgc ttoogog tttaact gaoggog oligooc aaggota aaggta aaggcag	acaga aggato ttgagta aggtaa ctgcta gggggg ccggaca tgacttt tcacato ccgcato tcccgga aat tcccgga aat tcccgga aat tcccgga aat taaga gatgt	Legetg taggtg tccttt stggcttt stggcttc ggtatc ggtatc gtctt gtctt gcgagg agttaa catccg aagttaa aggag acatccg aagtag aggag acatcg gaggag acatcg gaggag acatcg gaggag acatcg gaggag acatcg gaggag acatcg gaggag acatcg gaggag acatcg gaggag acatcg gaggag acatcg gaggag acatcg gaggag acatcg gaggag acatcg gaggag acatcg gaggag acatcg gaggag acatcg gaggag acatcg acatcg gaggag acatcg acatcg gaggag acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg acatcg	agatac aagatac ttacacac cacacac coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggtaa coggta	gtgec ctttt gggggg ggggg ggggg ggtggc ggtgt gaagag ataagg ataagg ataagg cttgg cacaa cctttt ggaac ataagg cacaa cctttt ggaac cctttt gaagaga cataagg cataag cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagg cataagga cataagga cataagga cataagga cataagga cataagga cataagga cataagga cataagga cataagga cataagga cataagga cataagga cataagga cataagga cataagga cataagga cataagga cataagga cataagga cataagga cataagga cataagga cataagga cataagga cataagga cataagga cataagga cataagga cataagga cataagga cat	toact tgata tgata tgatg tgatg gcttg cgctg cccct cccct cccct gctg dgacct gctg cccct gctg cccct gctg cccct gctg cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct ccccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccct cccccc	gatta atctca accage gaccage ccggaac cggaac cggaac cgtta gatta gatta gaccat cacaac catcage acggo acggo acggo acggo acggo acggo acggo gacga	igeat itgac itgac itact igega igega igega igggg igtac igggca ictec igggca icea igggca icea igggca icea igggca icea igggca icea igggca icea icea igggca icea icea icea icea icea icea icea ic	tggta caaaa gtcct cctac ggcgga ataac ttact gtgac gggga ataac tttct gtgac gggag tccct gggag gtgct actac gaggg gaggg actac acgag gaggc gaggg actac	actgf tcccttag ccgtgf accgccta cccctaf ccctaf ccctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag cctag c	tc tt aagt tc aagt tc aag tc aag tc cc cc cc aa cc cc cc cc cc cc cc cc

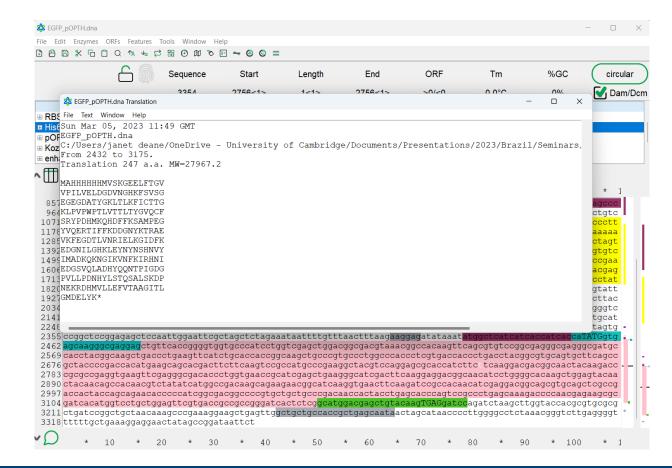


• Translate as 1-letter code

E Sequen	nce	Start	Length	End	ORF	Tm	%GC	(circula
🗱 Translate	×	2432<1>	744<0>	3175<0>	M>247*/<248		61%	🗹 Dam/
Translate: Selection			Direct	Туре		Location	Ļ	
		-	>>>	misc_feature CDS		24182423 24322454		
Code: 🔘 1 Letter 🔘 3 Letter			>>>	primer_bind		24532476		
Codon Spacing Reverse Complem	ment		>>>	regulatory		24562459		
ine Width: 20			>>>	CDS		24563173	3	
.ine Numbers: \bigcirc None \bigcirc Left \bigcirc Right								
	,	* 40	* 50	* 60	* 70 *	80 * 90	* 10	0 * 1
None 🔾 Above 📿	Below							
Conv Highlight			aaatotyyau			attgcagcactggg	gecagatg	graageee
				acgaaatagacaga	itcactaaaataaa	tgcctcactgatta	agcattgg	taactgtc
\frown		caggcaac	tatggatgaa			tgcctcactgatta tttttgataatc <mark>tc</mark>		
		caggcaac tttaaaac ccgtagaa	tatggatgaa ttcattttta <mark>aagatcaaag</mark>	aatttaaaaggatc <mark>ggatcttcttgaga</mark>	taggtgaagatcc tcctttttttctg	tttttgataatc <mark>tc</mark> cgcgtaatctgctg	atgaccaa cttgcaaa	aatccctt caaaaaaa
ОК		caggcaac tttaaaac ccgtagaa caagagct	tatggatgaa ttcattttta <mark>aagatcaaag</mark> accaactctt	aatttaaaaggatc <mark>ggatcttcttgaga</mark> ttttccgaaggtaa	taggtgaagatcc tcctttttttctg ctggcttcagcaga	tttttgataatc <mark>tc</mark> cgcgtaatctgctg agcgcagataccaa	atgaccaa cttgcaaa atactgtc	aatccctt caaaaaaa cttctagt
OK 1392 gtagcógtagttággócaáccacttca	aagaactc	caggcaac tttaaaac ccgtagaa caagagct tgtagcac	tatggatgaa ttcattttta aagatcaaag accaactctt cgcctacata	aatttaaaaggatc ggatettettgaga tttteegaaggtaa acetegetetgeta	taggtgaagatcc tcctttttttctg ctggcttcagcag atcctgttaccag	tttttgataatc <mark>tc</mark> cgcgtaatctgctg agcgcagataccaa tggctgctgccagt	atgaccaa cttgcaaa atactgtc ggcgataa	aatccctt caaaaaaa cttctagt gtcgtgtc
OK 1392 gtagcógtagttaggócaccacttoa 1499 ttaccgggttggactcaagacgatag	aagaactc gttaccgg	caggcaac tttaaaac ccgtagaa caagagct tgtagcac ataaggcg	tatggatga ttcattttta aagatcaaag accaactctt cgcctacata cagcggtcgg	aatttaaaaggatc ggatcttcttgaga ttttccgaaggtaa acctcgctctgcta ggctgaacgggggg	taggtgaagatco tcctttttttctg ctggcttcagcag atcctgttaccag yttcgtgcacacag	tttttgataatctc cgcgtaatctgctg agcgcagataccaa tggctgctgccagt cccagcttggagcg	atgaccaa cttgcaaa atactgtc ggcgataa aacgacct	aatccctt caaaaaaa cttctagt gtcgtgtc acaccgaa
OK 1392 gtagccgtagttaggccaccacttca 1499 ttaccgggtggactcaagacgatag 1606 ctgagatacctacagcgtgggctatg 1713 ggagcttccagggggaaacgcctggt	aagaactc gttaccgg gagaaagc tatcttta	caggcaac tttaaaac ccgtagaa caagagct tgtagcac ataaggcg gccacgct tagtcctg	tatggatgaa attcatttta aagatcaaag accaactett egectacata cageggtegg teeegaaggg teegggtttee	aatttaaaaggato ggatottottgaga ttttoogaaggtaa acotogototgota ggotgaacggggg gagaaaggoggaca gcoacototgaott	taggtgaagatcc tccttttttctg tcggcttcagcag tccggtgtaccag ttcgtgcacacag tggtatccggtaag ggagcgtcgatttt	tttttgataatc <mark>tc cgcgtaatctgctg agcgcagataccaa tggctgctgctgccagt cccagcttggagcg cggcaggtcggaa tgtgatgctcgtca</mark>	atgaccaa cttgcaaa atactgtc ggcgataa aacgacct caggagag ggggggcg	aatccctt caaaaaaa cttctagt gtcgtgtc acaccgaa cgcacgag gagcctat
OK 1392 gtagccgtagttaggccaccacttca 1499 ttaccgggttggactcaagacgatag 1606 ctgagatacctacagcgtgagctatg 1713 ggagcttccagggggaaacgcctggt 1820 ggaaaaacgccagcaacgcgccttg	aagaacto gttaccgg gagaaago tatcttta tttacggt	caggcaac tttaaaac ccgtagaa caagagct tgtagcac ataaggcg gccacgct tagtcctg tcctggcc	tatggatgaa ttcatttta aagatcaaag accaactctt cgcctacata cagcggtcgg tccggatggg tccggtttcg ttttgctggc	aatttaaaaggatc ggatettettgaga tttteegaaggtaa acetegetetgeta ggetgaaeggggg gagaaaggeggaea gccaeetetgaett cettttgeteaeat	taggtgaagatec tectttttttetg teggetteageag tatectgttaceag gttegtgeaeaeag tggtatecggtaag gagegtegatttt tgttettteetgeg	tttttgataatc <mark>tc cgcgtaatctgctg</mark> agcgcagataccaa tggctgctgccgcg cccagcttggagcg cgccaggttcggaa tgtgatgctcgtca ttatcccctgattc	atgaccaa atactgtc ggcgataa aacgacct caggagag gggggggcg tgtggata	aatccctt caaaaaaa gtcgtgtc acaccgaa cgcacgag gagcctat accgtatt
OK 1392 gtagcogtagttaggocaccacttoa 1499 ttaccgggttggactcaagacgatag 1606 ctgagatacctacagcgtgagctatg 1713 ggagcttocagggggaaacgoctggt 1820 ggaaaacgcoggcagcettt 1820 ggaaaacgccgcagcacgcggccttt 1927 accgcctttgagtgagctgataccgo	aagaacto gttaccgg gagaaago tatcttta tttacggt ctcgccgc	caggcaac tttaaaac caagagct ttgtagcac ataaggcg gccacgct tagtcctg tcctggcc agccgaac	tatggatgaa attcatttta aagatcaaag accaactctt cagcctacata cagcggtcgg tccggaggg tccgggtttcg ttttgctggc gaccgagcgg	aatttaaaaggatc ggatcttcttgaga ttttccgaaggtaa acctcgctctgsta ggctgaacggggg gagaaaggcggaca gccacctctgctactt ccttttgctcacat cagcgagtcagtga	taggtgaagatco tecttttttctg totggettcagcag tatcetgttaccag gttegtgcacacag ggtaccggtaag gagegtcgatttt ggteettectge ggcaggaagcgg	tttttgataatcto cocogtaatctgotg agcgcagataccaa tggctgctgctgcagg cccagottggagg cggcagggtcggaa tgtgatgctcgtca ttatcccctgattc agagcgcctgatgc	atgaccaa cttgcaaa atactgtc ggcgataa acgacgacct caggagag gggggggcg tgtgggata ggtatttt	aatcoott caaaaaaa ottotagt gtogtgto acacogaa ogcacogag gagcotat accogtatt otcottac
OK 1392 gtagccgtagttaggccaccacttca 1499 ttaccgggttggactcaagacgatag 1606 ctgagatacctacagcgtgggctatg 1713 ggagcttccagggggaaacgcctggt 1920 ggaaaaacgccagcaacgcggccttt 1927 accgcctttgagtgggctgatacccgc 2034 gcactctgtgcggtatttcaccaccgca	aagaacto gttaccgg gagaaago tatottta tttacggt ctcgccgc aatggtgc	caggcaac tttaaaac caagagct tgtagcac gccacgct tagtagcac gccacgct t.agtcctg t.cctggcc agccgaac agccgaac	tatggatga atcatttta aggatcaag cgctacata cagcggtcgg tccggatgg ttttgctgg tttttgctgg tacaagggttcg ttttgctgg tttttgctgg tacaactga	aatttaaaaggatc ggatcttcttgaga ttttccgaaggtaa acotogctctgcta ggotgaacgggggg gagaaaggcggaca gccacctctgactt cottttgctcacat cagcgagtcagtga ctctgatgccgcat	taggtgaagatco tectttttttttg tetggettcaggag tatectgftaccag ggtatceggtaag gggegtegatttt ggtetttetteetgeg tgegaggaggeggag ggegagagggag tgegaggaggega	tttttgataatc <mark>to cgcgtaatctgotg agcgcagataccaa tggetgetgetgecagt cccagettggageg cggcaggtegga tgtgatgetegtea tataccectgatte agagegectgatge tacactecgetate</mark>	atgaccaa atactgtc aggogataa aacgacct caggagag ggggggggg tgtgggata aggtatttt agctacgtg	aatcoott caaaaaaa ottotagt gtogtgto acaccgaa gggoctat accgtatt accgtatt accgtatt
OK 1392 gtagccgtagttaggccaccacttoa 1499 ttaccgggttggactcaagacgatag 1606 ctgagatacctacagogtgagctatg 1713 ggggcttccaggggaacgccgcg 1820 ggaaaacgccggcaccagcaacgcgggc 1927 accgcctttgagtgagctgataccgca 2034 gcatctgtgcggtatttcacaccgca 2141 atggctgcgccccgacaccgccacc	aagaacto gttacogg gagaaago tatottta tttacggt ctogoogo aatggtgo caccogot	caggoaac tttaaaac caggagot ttgtagcac ataaggog gocacgot tagtoctg tcctggoc agcogaac agcogaac agcogaac gacgcgcc	tatggatga ttcatttta agatcaactott cogoctacata caqoggtogg tccggattco gaccgagcg ggaccgagcgo tacaatctgo ctggacggott	aatttaaaaggato ggatcttottgaga ttttocgaaggtaa acctogototgota ggotgaacgggggg gagaaaggoggaca gcoacototgactt cottttgotoacat cagogagtcagtga ctotgatgocgot ttgtotgotcocag	taggtgaagatco tectttttttctg tectggttcagcag tatoctgttaccag gtatocggtag gggatcoggtag ggggggagagcgga togttcagccagta ggtcagcagta ggccagtag coatcogcttacag	tttttgataatcto cgcgtaatctgctg agcgcagataccaa tggctgctgcagat ccagcttggagog cggcagggtcggaa tgtgatgctcgtca ttatcccctgattc agagogcctgatgc tacactcgctatc acaagctgtgaccg	atgaccaa ottgcaaa atactgtc ggcgataa aacgacct caggagag ggggggggg tgggggggg tggggagg tggtatttt ggctacgtg tctccggg	aatcoott caaaaaaa cottotagt gtogtgto acaccogaa ogcaccgag gagcotat accgtatt ctcottac accgggto accggcat
OK 1392 gtagccgtagttaggccaccacttoa 1499 ttaccgggttggactcaagacgatag 1606 ctgagatacctacagcgtgagctatg 1713 ggagcttccagggggaaacgcctggt 1820 ggaaaacgccagcaacgcggccttt 1927 accgcctttgagtgagctgataccgc 2034 gcatctgtgcggtatttcacaccgcaa 2141 atggctgcgccccgacacccgccaac 2248 gtgtcagaggttttcaccgtcatcac 2355 ccggctccggagagctccaattggaa	aagaacto gttacogg gagaaago tatottta tttacggt ctogcogo aatggtgo caccogot cogaaacg	caggeaac tttaaaac caagaget ttgtagcac ataaggeg gecaeget tagtectg teetggee aacteteag gaegegee egegagge	tatgqatga datatttta aagatcaaag accaactctt cgcctacata cagcggtcgg tccgaggg tccgagttcg ttttgctggc tatgacgacga tacaactgg cagacgaggct aaggattcg	aatttaaaaggatc ggatcttcttgaga ttttccgaaggtaa acctcgctctgsta ggctgaacggggg gagaaaggcggaca gccaccttgactt ccttttgctcacat cagcgagtcagtga ctcgatgccgcat ttgtctgctcccgg atcccgcgaaat	taggtgaagatco tecttttttetg tetggettcagcag tatcetgttaccag ggteggteggatte gggegteggatttt ggeggggaggagcgga tagccggtagaagcgga tagccggtagaagcgga tagcagcagtag tatacggettacag	tttttgataatcto cocottaatctocto agogcagataccaa tggctgctgctocaat cocagottggagog cggcagggtcggaa tgtgatgctcgtca ttatcccctgattc agagogcctgatgc tacaactcogctatc acaagctgtgacco tagggagaccacaa	atgaccaa cttgcaaa catactgtc cggcgataa cacgacct caggagag cgggggggcg tgtgggata cgctacgtg tctcccggg cggtttcc	aatcott caaaaaaa ottotagt gtogtgtc acacogaa gagcotat accgtatt ctoottac agctgggtc agctgcat cacggatc
OK 1392 gtagccgtagttaggccaccacttoa 1499 ttaccgggttggactcaagacgatag 1606 ctgagatacctacagcgtgggcattg 1713 ggagcttccagggggaaacgcctgtg 1820 ggaaaacgccagcaacgcggccttt 1927 accgcctttgagtgagctgataccaccg 2034 gcactcggtgcggtattcacaccgcaac 2141 atggctgcgccccgacacccgccaac 2248 gtgcaagaggtttcaacgtcaatcga 2355 ccggctccggaggagctcaattggaa	aagaacto gttacogg gagaaago tatottta tttacggt ctogcogo aatggtgo caccogot cogaaacg	caggeaac tttaaaac caagaget ttgtagcac ataaggeg gecaeget tagtectg teetggee aacteteag gaegegee egegagge	tatggatga agatcaaag accaactott cogcotacata tacggatgg tacggttcg tacggttcg gaccgaggg tacaatctgo cotgacggacg cotgacggc tacaatctgo cotgacggc tacaatctgo cotgacggc tacaatctgo cotgacggc tacaatctgo cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotg	aatttaaaaggato ggatcttottgaga ttttcogaggtag ggagaaggoggaca gccacotctgact cottttgotcacat cotttgotcacat cottgaggoggaga stotgatgocogga tcococcgagaata ttgtctgotcocgg atcococgagaata gguttaactttaga ggacgoggogagag	taggtgaagatco tectttttttetg tetggettcageag gatcetgttaccag ggtatceggtaag gggetgegattt ggtgageggagagegga ggegaggagagegga gagetgagtatcaget geatcegettacag taggagatataat aggggatataat	tttttgataate coogtaatetgotg agegaagtaceaa tggetgetgeeagt cocagettggaage cggeagggteggaa tgtgatgetegtea tagagegeetgatge acaagetgtgaceg tagageagaceaa atggeteateacaa ageggtgteegge	atgaccaa pttgcaaa atactgtc ggcgataa aacgacct caggagag ggggggcg gggggtata sgtatttt gctacgtg tcccggtg tcccggtgttccc ccatcacc	aatcott caaaaaaa ottotagt gtogtgtc acacogaa gagcotat accgtatt ctoottac agctgggtc agctgcat cacggatc
OK 1392 gtagccgtagttaggccaccacttea 1499 ttaccgggttggactcaagacgatag 1606 ctgagatacctacagcgtagctatg 1713 ggagcttccagggggaaacgcctggt 1820 ggaaaaacgccagcaacgcgccttt 1927 accgcctttgagtgagctgataccgc 2034 gcatctgtgcggtattcacaccgc 2141 atggctgcgccccgacaccgccacc 2248 gtgtcagaggttttcaccgtcatcac 2248 gtgtcagaggtttcaccgtcatcac 2246 agcaagggcgaggag tgttcaccgg 2659 acctacggcaagctgatcctgaa	aagaacto gttacogg gagaaago tatottta tttacggt ctogcogo aatggtgo caccogot cogaaacg	caggeaac tttaaaac caagaget ttgtagcac ataaggeg gecaeget tagtectg teetggee aacteteag gaegegee egegagge	tatggatga agatcaaag accaactott cogcotacata tacggatgg tacggttcg tacggttcg gaccgaggg tacaatctgo cotgacggacg cotgacggc tacaatctgo cotgacggc tacaatctgo cotgacggc tacaatctgo cotgacggc tacaatctgo cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgacggc cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotgac cotg	aatttaaaaggato ggatcttottgaga ttttcogaggtag ggagaaggoggaca gccacotctgact cottttgotcacat cotttgotcacat cottgaggoggaga stotgatgocogga tcococcgagaata ttgtctgotcocgg atcococgagaata gguttaactttaga ggacgoggogagag	taggtgaagatco tectttttttetg tetggettcageag gatcetgttaccag ggtatceggtaag gggetgegattt ggtgageggagagegga ggegaggagagegga gagetgagtatcaget geatcegettacag taggagatataat aggggatataat	tttttgataatcto cocottaatctocto agogcagataccaa tggctgctgctocaat cocagottggagog cggcagggtcggaa tgtgatgctcgtca ttatcccctgattc agagogcctgatgc tacaactcogctatc acaagctgtgacco tagggagaccacaa	atgaccaa pttgcaaa atactgtc ggcgataa aacgacct caggagag ggggggcg gggggtata sgtatttt gctacgtg tcccggtg tcccggtgttccc ccatcacc	aatcott caaaaaaa ottotagt gtogtgtc acacogaa gagcotat accgtatt ctoottac agctgggtc agctgcat cacggatc
OK 1392 gtagccgtagttaggccaccacttea 1499 ttaccgggttggactcaagacgatag 1606 ctgagatacctacagcgtagctatg 1713 ggagcttccagggggaaacgccggt 1820 ggaaaacgccagcaacgcgcgcttt 1927 accgcctttgagtgagctgataccgc 2034 gcatccgtgcggtatttcacaccgcaac 2141 atggctgcgcccgacacccgccacc 2248 gtgtcagaggttttcaccgccacc 2355 ccggctccggagagctcaattggaa 2462 agcaagggcgaggag tgtcacacg 2569 acctacggaaccac tgaagcaga	aagaacto gttacogg gagaaago tatottta tttacggt ctogcogo aatggtgo caccogot cogaaacg	caggeaac tttaaaac caagaget ttgtagcac ataaggeg gecaeget tagtectg teetggee aacteteag gaegegee egegagge	tatgatga agatcaaag accaactott cgcotacata tccgaagg tccggagg tcggttgg gacgaggg tacaactotg cagagttccg agatcaactotg aggatctcg aggatctcg gg cagggtt cggcgggc tacaatctgg aggatctcg aggatctcg aggatctcg aggatctcg aggatctcg gg cagggtt cog aggatctcg aggatctcg accaactotg aggatctcg aggatctcg aggatctcg aggatctcg accaactotg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatcg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatctg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg aggatcg ag	aatttaaaaggato ggatcttcttgaga ttttccgaaggtaa acctcgctctgcta ggotgaacgggggg gagaaaggcggaca gccaccttgactt ccttttgctcacat tcaggagtcagtga cctctgatgccogat ttgtctgctcccgg atcccgcgaaat ggttaactttaag ggtcggogggagtaa ggacggogacgtaa	taggtgaagatco tecttttttetg tetggettcagcag tatcetgttaccag gttcgtgcacacag ggggtatceggtaag ggggggaggagcgga taggeggaggagcgga taagcaccagta gcatcegcttacag taaggagatataaat aggggatataagt taccecqtgacaccata	tttttgataate cocgtaatctgetg agegeagataceaa tggetgetgeeag cocagettggageg cggeagggteggaa tgtgatgetegtea tateceetgatte agagegeetgatge tacaecegetate acaagetgtgacege tagggagaceacaa atggeteateace caeggtgteegege coctgaeceaggg	atgaccaa cttgcaaa atactgtco ggcgataa aacgacct caggagag gggggggg gggggggg gggggggg gggggg	aatcott caaaaaaa ottotagt gtogtgtc acacogaa gagcotat accgtatt ctoottac agctgggtc agctgcat cacggatc
1392 gtagccgtagttaggccaccacttca 1499 ttaccgggttggactcaagacgatag 1606 ctgagatacctacagcgtgagctatg 1713 ggagcttccagggggaaacgcctggt 1820 ggaaaaacgccagcaacgcggccttt 1927 accgcctttgagtgagctgataccgc 2034 gcatctgtgcggtatttcacaccgca 2141 atggctgccccgacacccgccaac 2248 gtgtcagaggttttcaccgtcaatcga 2355 ccggctccggagagctccaattggaa 2462 agcaagggcgagggtgttcaccg 2569 macctacggcaagctgaccctgag 2676 ptacccgacacctgaag	aagaacto gttacogg gagaaago tatottta tttacggt ctogcogo aatggtgo caccogot cogaaacg	caggeaac tttaaaac caagaget ttgtagcac ataaggeg gecaeget tagtectg teetggee aacteteag gaegegee egegagge	tatgqatga agatcaaag accaactott cogcotacata tccogaggg tccogaggg tcggtttoo ttttgotggo tacaatctgo cotgacgagogg tacaatctgo cotgagatctoga aggatctoga gaagagtotoga gaagagtogo gaaggego gaaggego catogagoto	aatttaaaaggato ggatottottgaga ttttocgaaggtaa acotogototgota ggagaaggoggaca gccacototgact cottttgotcacat cottgatgocgatga tcotgatgocgata ttgtctgotocogg alcococgaaat agggagogaogtaa ggaggogaogtaa laagggoatogaot	taggtgaagatco tectttttttttg tetggettcagcag ggtatccggtag ggggtggagtag gggggggggg	tttttgataatctot cocgtaatctgotg agcgaagtaccaa tggetgetgetgecagt cccagettggageg cggeaggteggaa tgtgatgetegtaa tateccetgatte agagegeetgatge acaagetgtgaceg tacgatecaccaca atggeteatcaccaca acagetgteegge cotgaeetaeggg cotgaeetaeggg	atgaccaa cttgcaaa atactgtc cggcgataa caggagag ggggggg ggggggg tggggagag cggtatttt gctacgtg tcccggg tcccatcac aggcgag ccgcaact aggcgag	aatocott caaaaaa cttatagt gtogtgtc acaccgaa gagoctat acogtatt ctocttac actggtc agtggc amTMGgtg ggogatgc ctcagcg ggogatgc ctcagca gagagtacaa
OK 1392 gtagccgtagttaggccaccacttea 1499 ttaccgggttggactcaagacgatag 1606 ctgagatacctacagcgtagctatg 1713 ggagcttccagggggaaacgccggt 1820 ggaaaacgccagcaacgcgccttt 1927 accgcctttgagtgagctgataccgc 2034 gcatcgtgcggtatttcacaccgca 2141 atggctgcgcccgacacccgccacc 2355 ccggctccggagggtttcaccgcactgga 2462 ggcaagggggaggggggggggggggggggggggggggg	aagaacto gttacogg gagaaago tatottta tttacggt ctogcogo aatggtgo caccogot cogaaacg	caggeaac tttaaaac caagaget ttgtagcac ataaggeg gecaeget tagtectg teetggee aacteteag gaegegee egegagge	tatgqatga agatcaaag accaactott cogcotacata tccogaggg tccogaggg tcggtttoo ttttgotggo tacaatctgo cotgacgagogg tacaatctgo cotgagatctoga aggatctoga gaagagtotoga gaagagtogo gaaggego gaaggego catogagoto	aatttaaaaggato ggatottottgaga ttttocgaaggtaa acotogototgota ggagaaggoggaca gccacototgact cottttgotcacat cottgatgocgatga ttotgatgocgaat ttgttagtocgoaat agoggogaagtaa ggacgoogaagtaa ggacgoogaagtaa ggacgoogaagtaa agggoagaogaa	taggtgaagatco tectttttttttg tetggettcagcag ggtatccggtag ggggtggagtag gggggggggg	tttttgataate cocgtaatctgetg agegeagataceaa tggetgetgeeag cocagettggageg cggeagggteggaa tgtgatgetegtea tateceetgatte agagegeetgatge tacaecegetate acaagetgtgacege tagggagaceacaa atggeteateace caeggtgteegege coctgaeceaggg	atgaccaa cttgcaaa atactgtc cggcgataa caggagag ggggggg ggggggg tggggagag cggtatttt gctacgtg tcccggg tcccatcac aggcgag ccgcaact aggcgag	aatocott caaaaaa cttatagt gtogtgtc acaccgaa gagoctat acogtatt ctocttac actggtc agtggc amTMGgtg ggogatgc ctcagcg ggogatgc ctcagca gagagtacaa



• Now you have the exact sequence of your construct including tags etc





- Protparam uses a sequence to calculate:
 - molecular mass
 - isoelectric point
 - extinction coefficients

https://web.expasy.org/protparam/



Expasy³

ProtParam

ProtParam tool

ProtParam (References / Documentation) is a tool which allows the computation of various physical and chemical parameters for a give TrEMBL or for a user entered protein sequence. The computed parameters include the molecular weight, theoretical pl, amino acid com coefficient, estimated half-life, instability index, aliphatic index and grand average of hydropathicity (GRAVY) (Disclaimer).

Please note that you may only fill out one of the following fields at a time.

Enter a Swiss-Prot/TrEMBL accession number (AC) (for example P05130) or a sequence identifier (ID) (for example KPC1_DROME):

Or you can paste your own amino acid sequence (in one-letter code) in the box below:

RESET Compute parameters



Number of amino acids: 510

Molecular weight: 57364.86

Theoretical pI: 6.37

Amino acid composition:

Ala (A)	31	6.1%
Arg (R)	34	6.7%
Asn (N)		
Asp (D)	35	6.9%
Cys (C)	9	1.8%
Gln (Q)	24	4.7%
Glu (E)	27	5.3%
Gly (G)	32	6.3%
His (H)	9	1.8%
Ile (I)	23	4.5%
Leu (L)	45	8.8%
Lys (K)		4.9%
Met (M)	11	2.2%
Phe (F)	16	3.1%
Pro (P)	34	6.7%
Ser (S)	32	6.3%
Thr (T)	33	6.5%
Trp (W)	7	1.4%
Tyr (Y)	18	3.5%
Val (V)	35	6.9%



Number of amino acids: 510

Molecular weight: 57364.86



Theoretical pI: 6.37

Amino acid composition:

Ala	(A)	31	6.1%
Arg	(R)	34	6.7%
Asn	(N)	30	5.9%
Asp	(D)	35	6.9%
Cys	(C)	9	1.8%
Gln	(Q)	24	4.7%
Glu	(E)	27	5.3%
Gly	(G)	32	6.3%
His	(H)	9	1.8%
Ile	(I)	23	4.5%
Leu	(L)	45	8.8%
Lys	(K)	25	4.9%
Met	(M)	11	2.2%
Phe	(F)	16	3.1%
Pro	(P)	34	6.7%
Ser	(S)	32	6.3%
Thr	(T)	33	6.5%
Тгр	(W)	7	1.4%
Tyr	(Y)	18	3.5%
Val	(V)	35	6.9%



Number of amino acids: 510

Molecular weight: 57364.86

Theoretical pI: 6.37

Amir	no ac	id co	omposition:
Ala	(A)	31	6.1%
Arg	(R)	34	6.7%
Asn	(N)	30	5.9%
Asp	(D)	35	6.9%
Cys	(C)	9	1.8%
Gln	(Q)	24	4.7%
Glu	(E)	27	5.3%
Gly	(G)	32	6.3%
His	(H)	9	1.8%
Ile	(I)	23	4.5%
Leu	(L)	45	8.8%
Lys	(K)	25	4.9%
Met	(M)	11	2.2%
Phe	(F)	16	3.1%
Pro	(P)	34	6.7%
Ser	(S)	32	6.3%
Thr	(T)	33	6.5%
Тгр	(W)	7	1.4%
Tyr	(Y)	18	3.5%
Val	(V)	35	6.9%

pl is the pH where your protein has no charge

Your protein can be unstable at its pl

Keep your purification buffers at least 1 pH unit from the pl



Extinction coefficients for protein concentration

Extinction coefficients:

Extinction coefficients are in units of M^{-1} cm⁻¹, at 280 nm measured in water.

Ext. coefficient 65820 Abs 0.1% (=1 g/l) 1.147, assuming all pairs of Cys residues form cystines

Ext. coefficient 65320 Abs 0.1% (=1 g/l) 1.139, assuming all Cys residues are reduced



Extinction coefficients for protein concentration

Extinction coefficients:

Extinction coefficients are in units of M^{-1} cm⁻¹, at 280 nm measured in water.

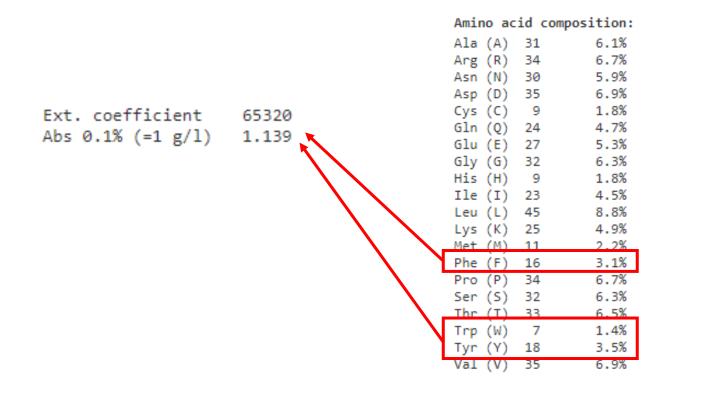
Ext. coefficient 65820 Abs 0.1% (=1 g/l) 1.147, assuming all pairs of Cys residues form cystines

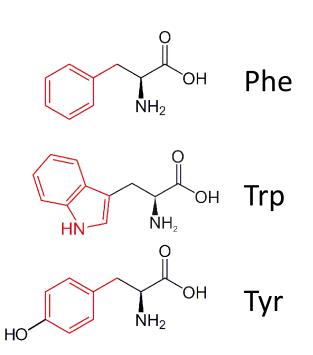
Extcoefficient65320Abs 0.1% (=1 g/l)1.139, assuming all Cys residues are reduced

$E_{0.1\%}$ in units of (mg/mL)⁻¹



What determines the E value?



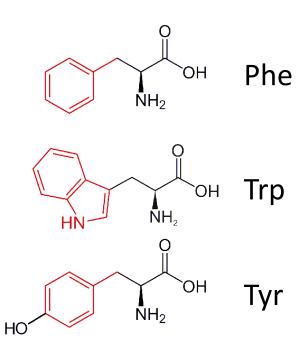




What determines the E value?

Ext. coefficient	65320
Abs 0.1% (=1 g/l)	1.139

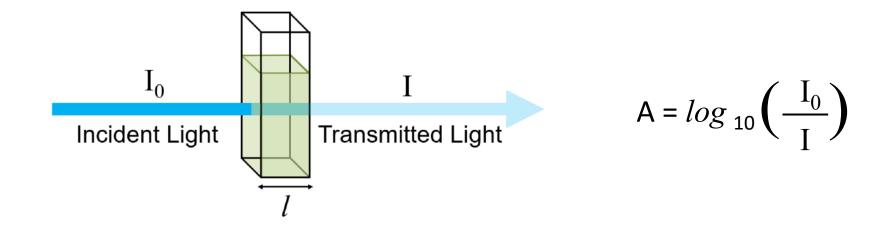
Amino ac	id cor	mposition:
Ala (A)	31	6.1%
Arg (R)	34	6.7%
Asn (N)	30	5.9%
Asp (D)	35	6.9%
Cys (C)	9	1.8%
Gln (Q)	24	4.7%
Glu (E)	27	5.3%
Gly (G)	32	6.3%
His (H)	9	1.8%
Ile (I)	23	4.5%
Leu (L)	45	8.8%
Lys (K)	25	4.9%
Met (M)	11	2.2%
Phe (F)	16	3.1%
Pro (P)	34	6.7%
Ser (S)	32	6.3%
Thr (T)	33	6.5%
Trp (W)	7	1.4%
Tyr (Y)	18	3.5%
Val (V)	35	6.9%





Calculating protein concentration

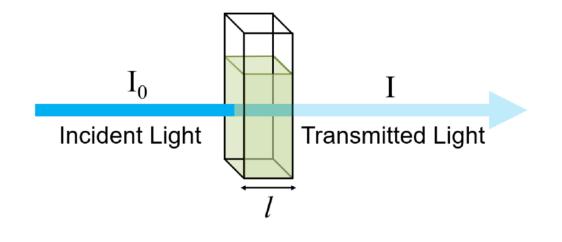
• Spectrophotometry, measure absorbance at 280 nm





Calculating protein concentration

• Beer-Lambert Law



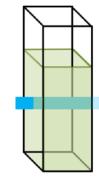
$$A = \log_{10}\left(\frac{I_0}{I}\right) = \varepsilon c l$$

 ε = extinction co-efficient c = concentration l = path length



Calculating protein concnetration

• Beer-Lambert Law and molecular extinction coefficients



$$\mathsf{A} = \varepsilon c l$$

c = A

εl

Measure the absorbance

Use the theoretical extinction co-efficient

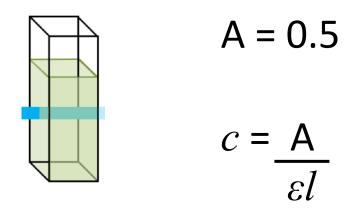
Calculate concentration



© Edinburgh Instruments

Calculating protein concentration

• Beer-Lambert Law and molecular extinction coefficients



Calculate concentration in M or mg/mL

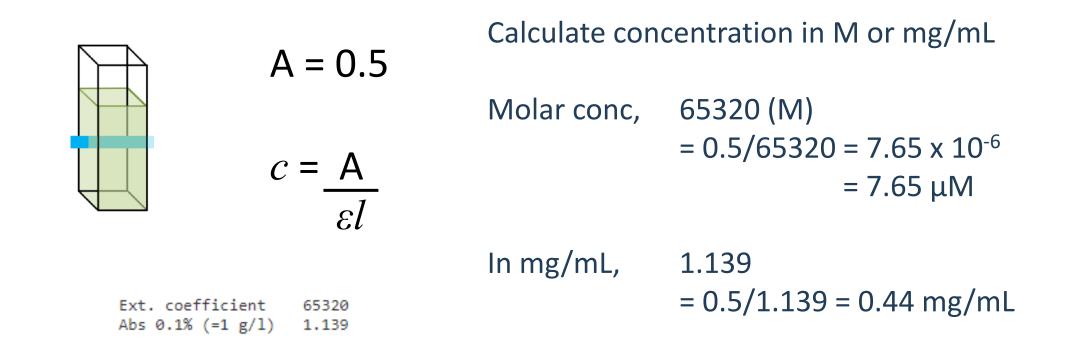
Ext. coefficient 65320 Abs 0.1% (=1 g/l) 1.139



© Edinburgh Instruments

Calculating protein concentration

Beer-Lambert Law and molecular extinction coefficients

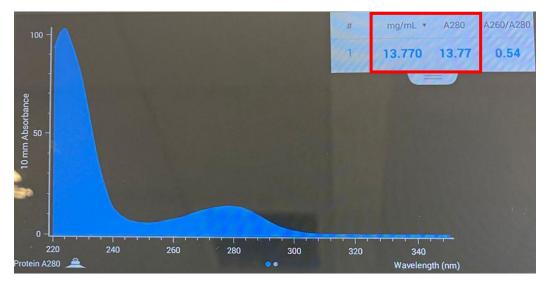




This correction is super important

- Always correct your absorbance measurements using your extinction coefficient
- Some instruments will quote concentration from absorbance but if you haven't entered an extinction coefficient it will be wrong!







Sequence alignments

- Pairwise sequence alignments
 - mouse vs human
 - Proteins from different viruses

https://www.ebi.ac.uk/Tools/ps a/emboss_needle/

EME	BOSS	Needle		
Input form	Web services	Help & Documentation	Bioinformatics Tools FAQ	🗫 Feedback
Tools > Pairw	ise Sequence Ali	gnment > EMBOSS Need	lle	

Service Announcement

The new Job Dispatcher Services website is now available at https://www.dev.ebi.ac.uk/Tools/jdispatcher. We'd love to hear your feedback about the new webpages!

Pairwise Sequence Alignment

EMBOSS Needle reads two input sequences and writes their optimal global sequence alignment to file.

PROTEIN		
sequences. Enter or paste your first pro	tein sequence in any supported format:	
Or, upload a file: Choose file No file cho	osen	Use a example sequence Clear sequence See more example in
AND		

Or, upload a file: Choose file No file chosen



Pairwise alignment

- Identity calculation
- Use similarity/homology carefully, calculated differently by programs
- Useful for comparing animal models of human diseases

⊥ Length: 685 ↓ Identity: ↓ Similarity: ↓ Gaps: ↓ Score: 3091.0 ↓ ↓	566/685 (82.6%) 615/685 (89.8%) 1/685 (0.1%)	
Human	1 MAEWLLSASWQRRAKAMTAAAGSAGRAAVPLLLCALLAPGGAYVLDDSDG	50
Mouse	1 MANSQPKASQQRQAKVMTAAAGSASRVAVPLLLCALLVPGGAYVLDDSDG	50
Human	51 LGREFDGIGAVSGGGATSRLLVNYPEPYRSQILDYLFKPNFGASLHILKV	100
Mouse	51 LGREFDGIGAVSGGGATSRLLVNYPEPYRSEILDYLFKPNFGASLHILKV	100
Human	101 EIGGDGQTTDGTEPSHMHYALDENYFRGYEWWLMKEAKKRNPNITLIGLP	150
Mouse	101 EIGGDGQTTDGTEPSHMHYELDENYFRGYEWWLMKEAKKRNPDIILMGLP	150
Human	151 WSFPGWLGKGFDWPYVNLQLTAYYVVTWIVGAKRYHDLDIDYIGIWNERS	200
Mouse	151 WSFPGWLGKGFSWPYVNLQLTAYYVVRWILGAKHYHDLDIDYIGIWNERP	200
Human	201 YNANYIKILRKMLNYQGLQRVKIIASDNLWESISASMLLDAELFKVVDVI ::///////////////////////////////////	250
Mouse	201 FDANYIKELRKMLDYQGLQRVRIIASDNLWEPISSSLLLDQELWKVVDVI	250
Human	251 GAHYPGTHSAKDAKLTGKKLWSSEDFSTLNSDMGAGCWGRILNQNYINGY	300
Mouse	251 GAHYPGTYTVWNAKMSGKKLWSSEDFSTINSNVGAGCWSRILNQNYINGN	300
Human	301 MTSTIAWNLVASYYEQLPYGRCGLMTAQEPWSGHYVVESPVWVSAHTTQF	350
Mouse	301 MTSTIAWNLVASYYEELPYGRSGLMTAQEPWSGHYVVASPIWVSAHTTQF	350
Human	351 TQPGWYYLKTVGHLEKGGSYVALTDGLGNLTIIIETMSHKHSKCIRPFLP	400
Mouse	351 TQPGWYYLKTVGHLEKGGSYVALTDGLGNLTIIIETMSHQHSMCIRPYLP	400
Human	401 YFNVSQQFATFVLKGSFSEIPELQVNYTKLGKTSERFLFKQLDSLWLLDS :	450
Mouse	481 YYNVSHQLATFTLKGSLREIQELQVWYTKLGTPQQRLHFKQLDTLWLLDG	450
Human	451 DGSFTLSLHEDELFTLTTLTTGRKGSYPLPPKSQPFPSTYKDDFNVDYPF	500
Mouse	451 SGSFTLELEEDEIFTLTTLTTGRKGSYPPPPSSKPFPTNYKDDFNVEYPL	500
Human	501 FSEAPNFADQTGVFEYFTNIEDPGEHHFTLRQVLNQRPITWAADASNTIS	550
Mouse	501 FSEAPNFADQTGVFEYYMNNED-REHRFTLRQVLNQRPITWAADASSTIS	549



You can also use UniProt to do alignments

- Search for your gene/protein of interest
- Select the ones you want to compare
- Click Align

le search ID mapping SPARQL	UniProtKB 🔹	galc Advanced List	Search	🖴 🔂 🖂 He

UniProtKB 923 results or search "galc" as a Gene Name, Protein Name, or Disease

BLAST Align Map IDs 🛨 Download 🇰 Add View: Cards 🔿 Table 🖲 🖉 Customize columns 🧠 Share 🔹 3 rows selected out of 25

■ Entry ▲	Entry Name 🔺	Protein Names 🔺	Gene Names 🔺	Organism 🔺	Length 🔺
P54803	a GALC_HUMAN	Galactocerebrosidase[]	GALC	Homo sapiens (Human)	685 AA
P54818	SALC_MOUSE	Galactocerebrosidase[]	Galc	Mus musculus (Mouse)	684 AA
O02791	a GALC_MACMU	Galactocerebrosidase[]	GALC	Macaca mulatta (Rhesus macaque)	685 AA
Q5SNX7	GALC_DANRE	Galactocerebrosidase[]	galc , galca, si:ch211- 199l3.4, zgc:92561	Danio rerio (Zebrafish) (Brachydanio rerio)	660 AA
P54804	GALC_CANLF	Galactocerebrosidase[]	GALC	Canis lupus familiaris (Dog) (Canis familiaris)	669 AA
Q88JX9	GALC_PSEPK	4-carboxy-4-hydroxy-2- oxoadipic acid aldolase[]	galC, PP_2514	Pseudomonas putida (strain ATCC 47054 / DSM 6125 / CFBP 8728 / NCIMB 11950 / KT2440)	238 AA
Q0VA39	GALC_XENTR	Galactocerebrosidase[]	galc	Xenopus tropicalis (Western clawed frog) (Silurana tropicalis)	678 AA
□ B5X3C1	SALC_SALSA	Galactocerebrosidase[]	galc	Salmo salar (Atlantic salmon)	666 AA
□ Q498K0	SALC_XENLA	Galactocerebrosidase[]	galc	Xenopus laevis (African clawed frog)	677 AA



UniProt Alignment

Align results
Overview Trees Percent Identity Matrix Text Output Input Parameters API Request
BLAST Align Map IDs 土 Download 🛍 Add 🛱 Resubmit
Highlight properties 🔻 Select annotation 🔻 View: 🔿 Overview 💿 Wrapped
SpIP54818/GALC_MOUSE MANSQPKASQQRQAKVMTAAAGSASRVAVPLLLCALLVPGGAYVLDDSDGLGREF55 SpIP54803/GALC_HUMAN MAEWLLSASWQRRAKAMTAAAGSAGRAAVPLLLCALLAPGGAYVLDDSDGLGREF55 SpIP54804/GALC_CANLF MTAAAGSAGHAAVPLLLCALLVPGGAYVLDDSDGLGREF39
P54818:Signal
Spip54818jGALC_MOUSE DGIGAVSGGGATSRLLVNYPEPYRSEILDYLFKPNFGASLHILKVEIGGDGQTTD110 Spip54803jGALC_HUMAN DGIGAVSGGGATSRLLVNYPEPYRSQILDYLFKPNFGASLHILKVEIGGDGQTTD110 Spip54804jGALC_CANLF DGVGAVSGGGATSRLLVNYPEPYRSQILDYLFKPNFGASLHILKVEIGGDGQTTD10
P54818:Signal
SpiP54818jGALC_MOUSE GTEPSHMHYELDENYFRGYEWWLMKEAKKRNPDIILMGLPWSFPGWLGKGFSWPY165 SpiP54803jGALC_HUMAN GTEPSHMHYALDENYFRGYEWWLMKEAKKRNPNITLIGLPWSFPGWLGKGFDWPY165 SpiP54804jGALC_CANLF GTEPSHMHYALDENFFRGYEWWLMKEAKKRNPNITLIGLPWSFPGWLGKGFNWPY149 P54818:Signal
^a splP54818jGALC_MOUSE VNLQLTAYYVVRWILGAKHYHDLDIDYIGIWNERPFDANYIKELRKMLDYQGLQR220 ^a splP54803jGALC_HUMAN VNLQLTAYYVVRWIVGAKRYHDLDIDYIGIWNERSYNANYIKILRKMLNYQGLQR220 ^b splP54804jGALC_CANLF VNLQLTAYYVVRWIVGAKRYHDLDIDYIGIWNERSFDINYIKVLRRMLNYQGLQR220



You can also make phylogenetic trees

- Select all genes
- Do Alignment

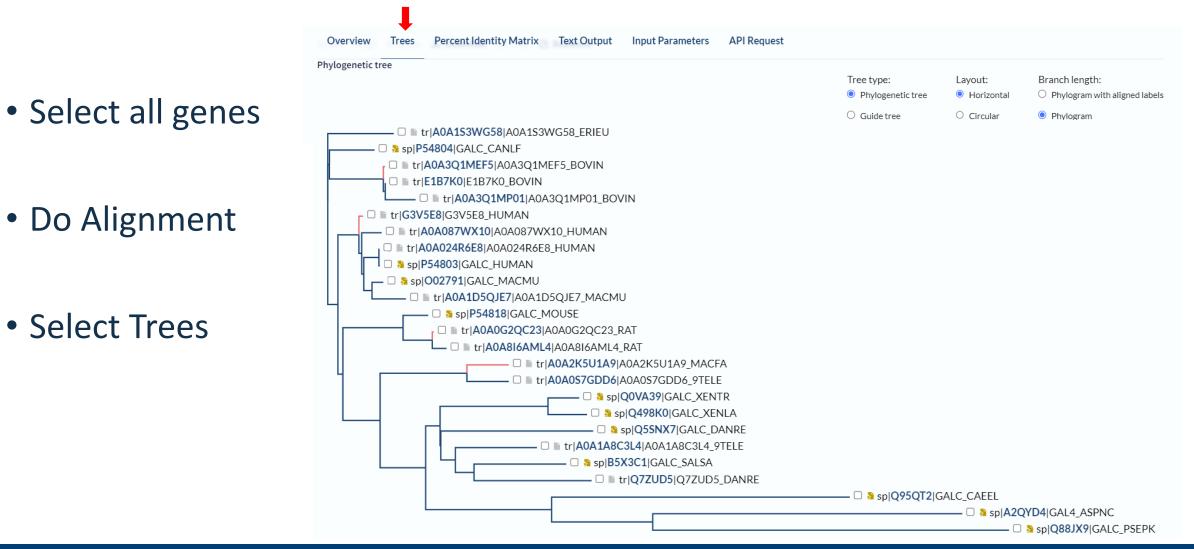
UniProtKB 923 results or search "galc" as a Gene Name, Protein Name, or Disease

BLAST Align Map IDs ± Download 🛍 Add View: Cards 🔿 Table 🖲 🗹 Customize columns 👒 Share 🔹 25 rows selected

Z	Entry 🔺		Entry Name 🔺	Protein Names 🔺	Gene Names 🔺	Organism 🔺	Length 🔺
	P54803	P	GALC_HUMAN	Galactocerebrosidase[]	GALC	Homo sapiens (Human)	685 AA
	P54818	2	GALC_MOUSE	Galactocerebrosidase[]	Galc	Mus musculus (Mouse)	684 AA
	O02791	÷	GALC_MACMU	Galactocerebrosidase[]	GALC	Macaca mulatta (Rhesus macaque)	685 AA
	Q5SNX7	2	GALC_DANRE	Galactocerebrosidase[]	galc , galca, si:ch211- 199l3.4, zgc:92561	Danio rerio (Zebrafish) (Brachydanio rerio)	660 AA
	P54804	2	GALC_CANLF	Galactocerebrosidase[]	GALC	Canis lupus familiaris (Dog) (Canis familiaris)	669 AA
	Q88JX9	8	GALC_PSEPK	4-carboxy-4-hydroxy-2- oxoadipic acid aldolase[]	galC, PP_2514	Pseudomonas putida (strain ATCC 47054 / DSM 6125 / CFBP 8728 / NCIMB 11950 / KT2440)	238 AA
	Q0VA39	2	GALC_XENTR	Galactocerebrosidase[]	galc	Xenopus tropicalis (Western clawed frog) (Silurana tropicalis)	678 AA
	B5X3C1	.	GALC_SALSA	Galactocerebrosidase[]	galc	Salmo salar (Atlantic salmon)	666 AA
	Q498K0	÷	GALC_XENLA	Galactocerebrosidase[]	galc	Xenopus laevis (African clawed frog)	677 AA



You can also make phylogenetic trees





Sequence homology

- Identify conservation across species
- Highlight important functional regions of high conservation

BLAST [®] » blas	tp suite Home Recent Results	Saved Strategies
blastn b	Standard Protein BLAST lastp blastx tblastn tblastx	
	BLASTP programs search protein databases using a protein query. more	Reset page
Enter Over	S	Bookmark
Enter Query	Sequence number(s), gi(s), or FASTA sequence(s) ? Clear Query subrange ?	
	То	
Or, upload file	Choose file No file chosen	
Job Title		
Align two or m	Enter a descriptive title for your BLAST search 😯	
Choose Sear		
Choose Sear		
Databases	Standard databases (nr etc.): New C Experimental databases For more info see What is clustered nr?	Q
Compare	Select to compare standard and experimental database ?	-
Standard Database		
Organism	Non-redundant protein sequences (nr)	
Optional	Enter organism name or id-completions will be suggested exclude Add organism Enter organism common name, binomial, or tax id. Only 20 top taxa will be shown ?	
Exclude	Models (XM/XP) Non-redundant RefSeq proteins (WP) Uncultured/environmental sample sequences	
Optional		
Program Sel		
Algorithm	Quick BLASTP (Accelerated protein-protein BLAST) blastp (protein-protein BLAST)	
	O PSI-BLAST (Position-Specific Iterated BLAST)	
	PHI-BLAST (Pattern Hit Initiated BLAST) DELTA-BLAST (Domain Enhanced Lookup Time Accelerated BLAST)	
	Choose a BLAST algorithm 🕜	
BLAST	Search database nr using Blastp (protein-protein BLAST) Show results in a new window	



Sequence homology

Descr	riptions	Graphic Summary	Alignments	Taxonon	ıy								
Sequ	ences pro	ducing significant al	lignments			Do	wnload 🗸	S	elect c	olumn	s Y SI	how	100 🌱 🔞
🗹 se	elect all 11	sequences selected			GenP	<u>ept Graph</u>	iics <u>Distan</u>	ce tree	of resu	<u>ults M</u>	lultiple ali	<u>gnme</u>	nt MSA Viewer
		Description	1		Scientifi	: Name	Max Score	Total Score	Query Cover	E value	Per. Ident	Acc. Len	Accession
🔽 ga	alactocerebros	idase isoform a precursor [Ho	mo sapiens]	H	omo sapiens		1414	1414	100%	0.0	100.00%	685	NP 000144.2
🔽 ga	alactocerebros	idase isoform c precursor (Ho	mo sapiens]	H	omo sapiens		1355	1355	100%	0.0	96.64%	662	NP 001188330.1
🔽 ga	alactocerebros	idase isoform X1 [Homo sapie	<u>ens]</u>	H	omo sapiens		1285	1285	90%	0.0	100.00%	629	XP_011534920.1
🔽 ga	alactocerebros	idase isoform d (Homo sapien	<u>s]</u>	H	omo sapiens		1285	1285	90%	0.0	99.84%	659	NP 001188331.1
2 ga	alactocerebros	idase isoform X2 [Homo sapie	<u>ens]</u>	H	omo sapiens		1181	1181	83%	0.0	100.00%	569	XP 047287154.1
🔽 ga	alactocerebros	idase precursor (Mus musculu	<u>is]</u>	M	us musculus		1157	1157	100%	0.0	82.63%	684	NP 032105.2
🔽 ga	alactocerebros	idase isoform X1 [Mus muscul	lus]	M	us musculus		951	951	83%	0.0	81.20%	568	XP 017170449.1
🔽 ga	alactocerebros	idase precursor [Danio rerio]		D	anio rerio		856	856	95%	0.0	64.08%	660	NP 001005921.1
🔽 ga	alactocerebros	idase precursor [Danio rerio]		D	anio rerio		842	842	94%	0.0	64.96%	664	NP 998276.1
🔽 ga	alactocerebros	idase isoform X2 (Mus muscul	lus]	M	us musculus		759	759	60%	0.0	86.81%	469	XP_006515535.1
P	utative galacto	cerebrosidase [Caenorhabditi	s elegans]	<u>C</u>	aenorhabditis elegans		285	285	85%	2e-85	34.29%	645	NP 498726.3



Sequence homology

Des	scriptions	Graphic Summary	Alignments	Taxonomy									
Sec	quences pro	ducing significant a	lignments			Downl	oad ~	Se	elect c	olumn	s Y Sł	how	100 💙 🛛 🔞
	select all 11	sequences selected			<u>GenPept</u>	Graphics	Distanc	e tree	of resu	<u>ults M</u>	lultiple ali	<u>gnme</u>	nt MSA Viewer
		Description	ı		Scientific Nam	e	Max Score	Total Score	Query Cover	E value	Per. Ident	Acc. Len	Accession
	galactocerebros	sidase isoform a precursor [Ho	mo sapiens]	Hom	io sapiens		1414	1414	100%	0.0	100.00%	685	NP 000144.2
	galactocerebros	sidase isoform c precursor (Ho	mo sapiens]	Hom	io sapiens		1355	1355	100%	0.0	96.64%	662	NP 001188330.1
	galactocerebros	sidase isoform X1 (Homo sapie	ens]	Hom	io sapiens		1285	1285	90%	0.0	100.00%	629	XP 011534920.1
	galactocerebros	sidase isoform d [Homo sapien	<u>s]</u>	Hom	io sapiens		1285	1285	90%	0.0	99.84%	659	NP_001188331.1
	galactocerebros	sidase isoform X2 (Homo sapie	ens]	Hom	io sapiens		1181	1181	83%	0.0	100.00%	569	XP 047287154.1
	galactocerebros	sidase precursor (Mus musculu	<u>is]</u>	Mus	musculus		1157	1157	100%	0.0	82.63%	684	NP 032105.2
	galactocerebros	sidase isoform X1 (Mus muscu	lus]	Mus	musculus		951	951	83%	0.0	81.20%	568	XP 017170449.1
	galactocerebros	sidase precursor [Danio rerio]		Dani	io rerio		856	856	95%	0.0	64.08%	660	NP 001005921.1
	galactocerebros	sidase precursor (Danio rerio)		Dani	io rerio		842	842	94%	0.0	64.96%	664	NP 998276.1
	galactocerebros	sidase isoform X2 (Mus muscu	lus]	Mus	musculus		759	759	60%	0.0	86.81%	469	XP 006515535.1
	Putative galacto	ocerebrosidase [Caenorhabditi	s elegans]	Caer	norhabditis elegans		285	285	85%	2e-85	34.29%		498726.3



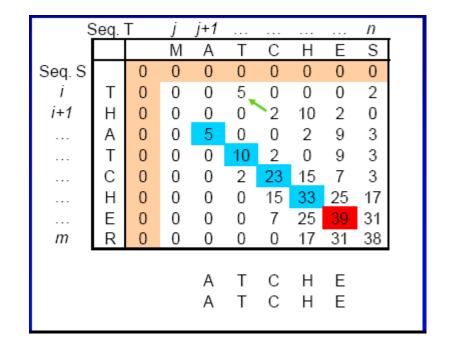
Comparing Outputs – trees and alignments





Including conservation improves search sensitivity

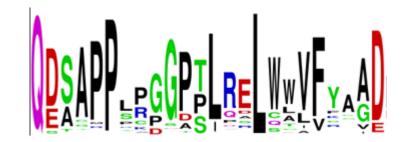
 Standard sequence alignment maximises the correspondence of residues across both proteins





Including conservation improves search sensitivity

- Standard sequence alignment maximises the correspondence of residues across both proteins
- But some residues will be *evolutionarily conserved* while others won't
 - Conserved residues more likely to be important for function
- Weighting the alignment by conservation makes it more sensitive and accurate
 - Profiles and Hidden Markov Models (HMMs)

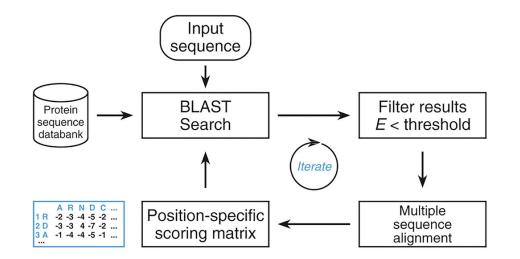


Logo Plot



Profile/HMM searching for identifying distant homologs

- Use the *query sequence* to perform an initial search of the *sequence database*
- Take all hits from initial search and build a profile or HMM
- Use this profile/HMM to perform a subsequent search of the same sequence database
 - Will be more sensitive and accurate
- Profile searching: PSI-BLAST
- HMM searching: HMMER (HMMsearch)





HMM:HMM alignments

- Can also use HMM/HMM comparisons to improve specific multiple sequence alignments
 - Upweight the alignment of regions that are evolutionarily conserved
- Clustal Omega

Clusta	al Or	nega				
Input form V	Neb services	Help & Documentation	Bioinform	natics Tools FA	a	🗣 Feedbad

Service Announcement

The new Job Dispatcher Services beta website is now available at <u>https://wwwdev.ebi.ac.uk/Tools/jdispatcher</u>. We'd love to hear your feedback about the new webpages!

Multiple Sequence Alignment

Clustal Omega is a new multiple sequence alignment program that uses seeded guide trees and HMM profile-profile techniques to generate alignments between three or more sequences. For the alignment of two sequences please instead use our <u>pairwise sequence alignment tools</u>.

Important note: This tool can align up to 4000 sequences or a maximum file size of 4 MB.

 STEP 1 - Enter your input sequences

 Enter or paste a set of

 PROTEIN

 sequences in any supported format:

 Or, upload a file: Choose File No file chosen

 Use a example sequence | Clear sequence | See more example inputs

 STEP 2 - Set your parameters

 OUTPUT FORMAT

 ClustalW with character counts

 *

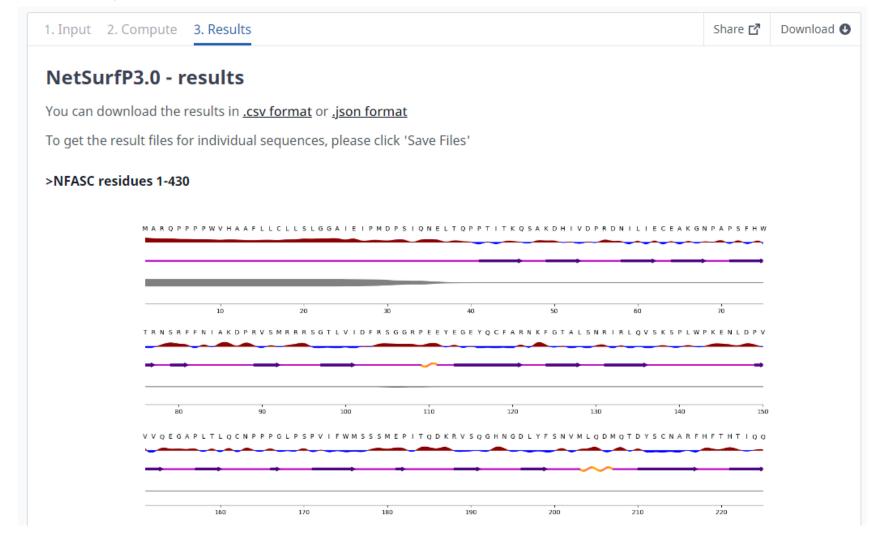


What else can we predict from sequence?

 Secondary structure prediction using NetSurfP https://dtu.biolib.com/NetSurfP-3/

equence submission: paste the sequence(s) and,	or upload a local file		
Using default file: sample.fasta		🗋 Sele	ct Fi
		💼 Clea	ir Fil
	Run 🕨		

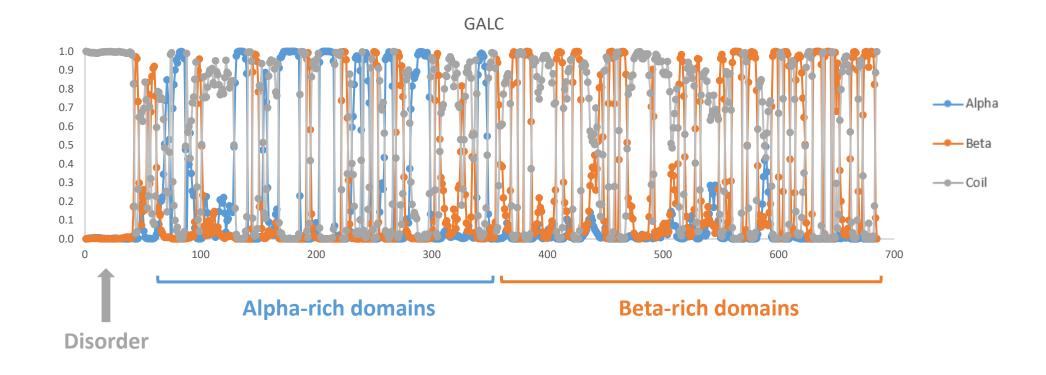




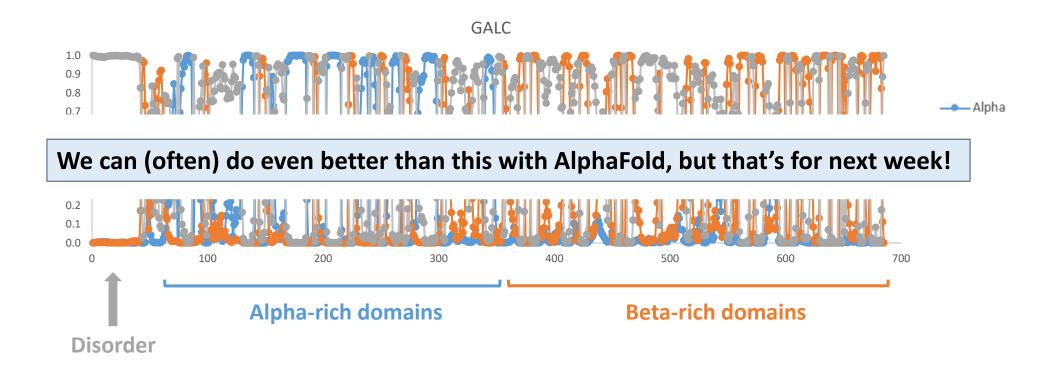


# Colu	mn 1: Class	assignment - I	B for burie	d or E for E	Exposed - T	hreshold:	25% expos	ure, but no	ot based on	
# Colu	mn 2: Amin	o acid								
# Column 3: Sequence name							Probability of			
# Colu	mn 4: Amin	o acid number	r				PIOD	apilit	y OI	
# Colu	mn 5: Relat	ive Surface Ac	cessibility	- RSA						
# Colu	mn 6: Abso	lute Surface A	ccessibilit	y		A	Ipha		Coil	
# Colu	mn 7: Not u	ised					· .		_	
# Colu	mn 8: Proba	ability for Alph	a-Helix					Beta		
# Colu	mn 9: Proba	ability for Beta	-strand				-		-	
# Colu	mn 10: Proł	bability for Coi	I							
E	М	NFASC_re	1	0.890999	199.5837	0	2.52E-05	8.46E-05	0.99989	
E	Α	NFASC_re	2	0.822632	106.1195	0	0.000178	0.000218	0.999604	
E	R	NFASC_re	3	0.789607	216.3524	0	0.000201	0.000312	0.999488	
E	Q	NFASC_re	4	0.780665	175.6495	0	5.27E-05	0.000324	0.999623	
E	Р	NFASC_re	5	0.716381	113.9045	0	2.86E-05	0.00016	0.999811	
E	Р	NFASC_re	6	0.703382	111.8378	0	3.21E-05	0.000161	0.999807	
E	Р	NFASC_re	7	0.6822	108.4698	0	7.56E-05	0.000202	0.999722	
E	Р	NFASC_re	8	0.68275	108.5572	0	0.000286	0.000226	0.999488	
E	W	NFASC_re	9	0.639935	182.3814	0	0.000634	0.000545	0.998821	
E	V	NFASC_re	10	0.579066	100.7574	0	0.000555	0.00063	0.998815	
E	н	NFASC_re	11	0.641862	143.7771	0	0.000518	0.000702	0.99878	
E	Α	NFASC_re	12	0.601697	77.61896	0	0.00058	0.000626	0.998793	
E	Α	NFASC_re	13	0.548697	70.7819	0	0.000435	0.001032	0.998533	
E	F	NFASC_re	14	0.536592	128.7821	0	0.000239	0.002572	0.99719	
E	L	NFASC_re	15	0.566734	113.9135	0	0.000126	0.003813	0.996061	
E	L	NFASC_re	16	0.573608	115.2952	0	7.97E-05	0.003012	0.996908	
E	С	NFASC_re	17	0.54777	91.47765	0	0.000106	0.003483	0.996411	
E	L	NFASC_re	18	0.644464	129.5373	0	9.82E-05	0.003267	0.996635	
E	L	NFASC_re	19	0.66675	134.0167	0	8.86E-05	0.002037	0.997875	
E	S	NFASC_re	20	0.747813	115.911	0	0.000147	0.001159	0.998693	
E	L	NFASC_re	21	0.736005	147.937	0	0.000195	0.000498	0.999306	
E	G	NFASC_re	22	0.797154	82.904	0	0.000467	0.000326	0.999207	
E	G	NFASC_re	23	0.817293	84.99846	0	0.001605	0.000448	0.997946	
E	Α	NFASC re	24	0.804079	103.7262	0	0.002641	0.0008	0.996559	











Summary

- Today you learnt how to use online resources to:
 - Predict domains
 - Identify post translational modifications
 - Calculate the molecular mass
 - Determine the isoelectric point
 - How to calculate extinction co-efficients
 - Identify distant homologs
- Try this out with your favourite protein!



Expasy 3

ProtParam tool

ApE A plasmid Editor

