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 M M D EVVFAS FVVFYS TLLI LKMYI IAAVITGQ』RLRKKAFAN LMESDVF QAYATYATVVLLKMLLDGPLTGYFRVTRKAFSN MID S E VF LDAFATYAT VILKMMMFMAPLTGYFRMTRKAFAN $\square \mathrm{V}$ I K M Y A V A V I T MENEAFASFLFFGTLLVLKMYAVAV I
 MMENEI FASFLDFFATLLI LKMYATAI LT
 MMENKVFLLSFAFYSTVLIVKMYVVAIITGMGVRVTKKAFAN TMDNEVFQAFVTHAAVVTLKMMLMGPVTGYRRFRNKAFAN
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 DDPVFASFATHATVVLLKMMLMGP DDPVFASFATHATVVLLKMMLMGPITGFYRVFSRKACVN
 MMENEVFASSFTLLY S TI LI LI K T YVVVA I I T

 FDNPVFRTYAFYVGVLALKMLAMSLLTGRDRFKKLVFSS M
 LI DSEVVFAYYATYTTVVLLKMMLMSVITALYRRGAKKVGSN

 $L D N E V T L A F V R Y G L I V I G K M M L M S T I T$

SPADPAVPTCHTQLVIKMYVVA I ITGQVRDWKKAFAN $F N N P V F S Q F A F Y S G V V L C K T L I M G P A T S F F R M K N E T E S N$



 $M L R N S V F S C F V F Y G V L L V L K M Y V I A V I T G Q M R L R K K A F A N$ LTKNEVLMAFSSYAPLVLSKMMFMSFATAFYRLTRKAFAN LD D P V F R D F A F Y A T A S V A K M I D M S F L T V Y R R L T R GV F A N
 TLENPVFRDFAYHGTIVLLKMGAMSFGTADKRFSTGAFVN L D N DVVF R S Y L A A C G TV I I V K M M A L S S L F T T Y Y R R F K Y K A F S N



SNSVFCCYLFWSSLLILLKMLCMSLLTARQRQTKNRAFAN
 $L L D H E V T M A F L K Y G T \| L I V G M M L M S S I T A F F R M R K K A F V N$
$N P V L R D Y A Y Y S A L L G L K L A M G P G T A R Q R F A K K V F L N$ $\square$ NPE ILLKVF GFWGS ILVLAKMLAMDPLTARQRFRKQVFAN

Q VR LRKKAFAN
NDLLPAYAVCVLVLCLKMFA DS CYQ G

NEAFA GGVEFGGGLCLAKTTAMMSTVTAVVRTAKGSEPS


 $L S D P A V Q S Y I L Y S A B L A L K V L V M A V L T G R V R Y A K K V F A N$







QUERY
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SVA Y SVA QLPCFSMALQULFAVVTH SVSYTLAQLPCVSMALQULWEAARHL
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AL SFAV SQLSTAYMAYHVLLYAS
LLAF LVTVFVT $\quad$ YYMA
LLS F MVCALAT TYMAFQVIL


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SLA YVVAQIPCVSMALLILAAVAAY
TLA Y GVGVACLFGLGARIV
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FLS FAAMLLANGYMAASCVF Y Y
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GLAFFVGFGVTLSMAYSLL
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UniRet90 R7TKA7 UniRef90-L5K6DO UniRef90-B3RNC8 UniRef90-V6UZ44 UniRef90-UPIO00258DB9B UniRet90_K1Q4LO UniRef90-B3RNC7 UniRef90-10XP96 UniRef90_UPI00029A356D UniRet90_V9UKZO UniRef90-A7RIJ8 UniRef90-UPI0000D5686D UniRef90 UPIOOOO1CBA011 UniRef90-14DPT8 UniRef90-DONL92 UniRef90-E5KBT6 UniRef90-G4VQ47

1 LLKDQVFMAFTTHAATVTLKLLLMGPLTGGYFRTTRGSFVN ${ }^{20}$ vMKDVBA
 FSNPTFAAYATYGTLLVKMLLLLI MTSYTRTTRKVYSN FNNPVFASYAAYAGLASMKMMGMTLVTVYHRLTKGVFMN SNPVFCCYLVWSTVLIIKMLLMTLLTARQRFKTKAVAN INPEVLKVFGFWGSULVLKVMAMAPLTARQRFRKRVFAN AFAN
MTSNPVFECYAFYGS LILKMTMMSFDTA DQRFRKKVF FENEIFCLFATYTSIVIIKMLAVGIWTSKYRFQNKVFAN ØDSTVFRSYCFWCAVLVIVMLVMSVLTGMKRHAKKAFAN TNDDLWASFCFYGA TNTAKMIVMSDLTGRKASKKVFAN TIDPAIFRSYDFWCSVLGLKMLVMSPLTGRKRMSKKIFAN D D PVFASFSFYAALLGAKTLLMALLTARQRFRKMVFAN VIVE
 INEDVYKAYVFWSTVLVVKMLLMSILTGMQRFRKKAFVN
 LD

SERLQVYALCVLVLCLKMFAISCYQGFFRIMARAFIN
$N P I F R M Y M G Y F L V I I K T M A M S F V T A Y R I T M K V Y A N$
FDNPVFK VYALCVVVLFTKMLADSCYQGYFRDRHLAFDN GNPEVKAYLFYGVILVLKVLLMAPLTGRYRFAKGIIFAS ITPEVLKVFGFWSSI LVLKMLAMVPLTARQRFRKHVLAS NGLLQLYGGTVVVLFLKMFAVVLVQGYERYKHRGFDN
NGLLQLYGLCVLALFLKMLVISCYQGYFRLRYRAFAN VEPAVFQAYAFWAAVLGLKMLLMSVLTGLKRGSKKVFSN LDNDVFKTVALTTGLLGAKLILNSEMTVLNRIQRKVFST LSNPLFGVYAFYCSGLVLKMMFLDSGTGMTRMKTKAYAN LSNPVVQSYIVYSAILALKLISVSTMTAIARMTRGVFAN LSNPTVQTYILYSAlLALKLLAMGTLTSLLRDGRGSFAN VYALCVLVLFLKMLAMSCYQGFFRLRFRAFTN FSNPVFNAYAFYAVIIVLKVLTMAVNTGRGRQKNTAFSN MDN LLYVYALCSVLLFIKMFVISCYQGFYRGKNKAFKN LH WY SLCVVALFLKMFALSAYQGFYRISRREFVN TTSNPVFKAYLLHVAVLGLKMLLMSPLTARQRFKNKVFAS

TLENEVLTAYLFWSAVLVLKMLFMSLLTGLMRFRTQTFAN
NSTFSVYALCVVVLCVKMLAVS SYQGFYRTRSGAFTN VNPELLRTYAF WSVLVAKMLLMSLFTTMTRIRKMAFIN MLENDVFTCFDFYSVLLIGKMYIDADITGQVRLRKKVFAN LDPDLFRTYAFWSTVLVLKMFAVALQTSRMRFKKKAFDN

SNALNVYALCMVVLFLKMYAVAVITGQMRLRXXAFAN VNAELLKVFGFWGSVLVLKMLAMVPLTARQRFQKKIFAN FENEVFAKFAFYAGVVLLKTVIMSGWTARYRDPRGVFDS SEEALKYFATYAGLVTVKMMMLGPLTGFYRTRDSAYAN LANPVFKSFAFWVGVLVIKMLAMSLLTGLQRFKTKTFAN LSDPVFATYVLCVVILTVKMLVVSFNVTRLRLSLKAFKY NNLLHTYAFCVVLLFFKMLVISCYQGFYRIKNKAFKN WQVYAVTAVLLFFKLLSNA VQGLFR $\frac{1}{F} K T K T F R H A N$
LLHTYALCTTALETKMFATSCYQGYFRTKNKAFKN NDLLHLYSLCVLALFLKMLAISCYQGYFRLRYRAFAN


WK $\square Y A D T T V A L F L K L L T N S \Pi \square Q G Y Y R L K T K S F T M$
SALLPFYALSVVILFLKMLG\|SCYQGYHRLSRLTEQN पKNPVFCAYLISSCFLVVKMLLLAFFTGYKRAVHKVYDS WS DYA WWSCVLVLKMMLLTWYTGRDRVREQVIHS
SNPVFGAYAFYGAIVILKMFALALMTSMKRGETGVFAN MVTGQVLPAFLLCSTLLIIKMYVVAVITGQVRLRKKAFAN TFNNPVLYY YYVSSTCILILKMLSLGLITPLIRTIKKDPGS LIDPEALAVYACCVVVLFFKMLAGSCYQGYFRLRFLTFTN VFDNPVFSMFAFHSSVLVAKMLLVTLRTSLIARVKRKVFSF WQVFA VSVLLFLKLLSTSIVQGLVRLKTKTFRW NSLLSIYALCVVVLFVKMLADSCYQGFYRISRLTFKH TFDNRVFALFAVVTAALILKMFAVVYYLGGKSRVKHQVLSS LLESPVFRAYLFYSARLVVKMMLMSPMTGMMRFRYKAFAN TVSNPVEKLFAYYSTVVLVKYLLLLPLTALIRTTRKKYSN MIVNGSVKVYVACTSVLYUKFLTATMDQGARKYATGARPP

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120
 FLYVLTKPSSDVAVWHFRAF LASRMLHTACYLGGL QPWR LAYVSCGPHPLAAKLLIRDGASARLLHTLVYAVPMPQPTR

L
 FLYMLTGPSVSLAVNLFRLVG\|SRLVHTLVYAVVVPQPA FLYMFTNPSVFVATNLFRAVALARIVHTLVYAVVMPQPAR
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 GLCVALGSSQDVTGWLFGVFTLARLAHTVTYLAGLGQPWR FLYMFTNPSVTVATNLFRLVAVVRUSHTVFHVLVPVHKFR NMYVATDPSLKEIRWICGLIFLAARFGHTLSYUALKNQPWR GFYVALNPSYSAALWHFRLFFFSRLVHFVSYQLHL QPFR A LYYTTGPSAALATLLFRVYAVCRVIHTLVYAVPLPQPAR GLCLAMETPGTATAGLFCLFTAARVMHTVMYGSGRQPWR FLYVLTDPPYDDSIYCFRIFTLARIIHSVS GLCALDNTSYEFTMWLEYLFTVARVAHTVTYGGGMPQPWR IAYVLTEASPGAAI WLFSAFTGARILHTLMYLLGLQPWR LAYLLTNPSPGAAINLFRAYTIARIGHTIVYVIPLPQPS
 GLCCVLATWSGPTVGLECLFGVARVLHTVFYGASWPQPWR LLVYTNPDPWLATQLIRAAAAGRVVHSLVYAMPVPQPAR FAYLTTNPSVFLALTLIRLFTVARLIHTLVYAVVVPQPAR
 GLADALDTAAPTVWLSIAFTLARVLHTLAYLLGV QPWR YL WLTTGPSYWMAKTLIQMFVLARIVHTFSYAVCPQQPMR
 LLFALTSPSVFYAKALLWTYTGARVLHTVFYGASVGPWR



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GLLS Y GA GLGG|VIT TS MG
140
S GAYVLA QFACVSMALDIIWEAAHHL
GLAAFGVPFLITI YMGFKVVQHYVSAM
ALCWGVNLSINLYLSVKILQQ
VIS FFVGFADTGFEALKTLMYY
GLA WVVGYLVTFSMDYKLMM
$A L S F F V G Y G V T \square$

GLA WMGAYLPTWYMAVKVLLAF $\square$
ALSFFAGLVVNVSMAVQIIVMN
GLS WMVGFFSTGYMAVKT ILA
A $\square$ AF F VGF G $\square$ T A Y QAFS T L LYY

ALAFFAGYGVTLSMAYRLL
TLAYGVGVICLL
$T L A Y A V G M A C L E G L G G L V D C$
$V L S F L V G V F T T L S M A Y H V F A Q V A$
SLA YTVA QLPCASMALQI LDWEAARHL TVAYCVGVACLCGLA
A TT FAVAFGDTGYETFKTLLYY
NLSYQLGLWVTFAMAGHIVWQ
SLAYGVGLACLLVLAAM』
FYT F $\square G G C A V N G Y \square A T R L L F A$
G LS WATGFF TGGMA $\square \mathrm{Q}$
 GVAYMIPYVIK WYMGVQ\|VLHYLSA TLAYG
ALSFFAGLVVNVSMAVQ\|IM
T
F VF CMSGYMAT LSMAFRTLAA TI
$S \square A Y T L A Q R P C A S M A L Q \square$
LF S F GVT LLVTVYM VVQ
SVAYVI A QVPCVSMAMQVLAAVA
ALSWF TGYSIT Y Y MAVK SLLLYY
FLSFAACLLVTGYMAAQ
S GA YVLA QFSCFSMALQDLWEVA
T L F F Y Al GAVCLL
AI SFFVGFGTMGYEALTTLLYY
AI AFFVGFGVNISMAITVI
$A L C Y F V G \square G T N L S M A L R L L M N$
A VS Y L VHVVA QVLMLVH $\square$ GS TVLT Y L
$N \square S Y D \square G \square G S M \square A \square S F H \square Q Q S F S$ FLSFGAAYLITGYMAFKVVFH

G L S

F LAFMVGLLITDY
HLA Y DLGGAVMFADSGH V VHSVLTS $\square$


SKNYGI
TVSYGVGVICLIGLATLVIEALAS
T F S Y L A G V I I LC F M S $\square$ S VF Q
$N \square A Y D L G \square L S M L L L S G H \square I H S V$
$T V Y Y G \square G \square L C L L$

G $!$ C W I N I S I N FYMAYC I Y Q S CAK
AI A Y GI PYLI NWYMGL
SLCQGVGVVATL
A L S
$G L \frac{S}{D} F L V G Y I V N T S L A L K S I L$
$A W C W R I G V A I V T G A V N A L$

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DDNAVFRAYLFYSAVLILKMLMAPLTARWRYAKKITISS LSNPVFAAYS $\square A A T L M L K G V A M S W T V R M T A E N G G F R N$ M囵NSVSCFVFYGVLLVLKMYVIAVITGQDR【RKKAFAN
$\square H D P L F A T Y V V A A S L M I L K A V A M S W L T V V R M V R V Q G Y R S$ KVYVACTSVLYLKFLTATMI QGAKKFVTGGRPP

LKAFAVCSTTLAFKVFVTLSDQAYYRFKNKTFSN NTALKTFSVCSTTLFVKFFATVSIQGGKSFAAGA RS MENEVFRVY LGWTAVLVLK $\quad$ GFAMGILJTGVQRFKTKTFAN

WS $\square Y$ A WWS CVLVLKMMLLT WYTGR $\square R V R E Q V \square H S$



WSTYAWWSCVLVLKMMLLT WFTGQMVRAKGGYRS EAFNTLGFYVPILAFK LLIMSP■TSSARYREGSLRS $K \boxtimes Y \square A C S S V L Y \square K F L L A T G \square Q G G K K F R S G G R P$ QRFKNKAFAS $R M Y V A C S S V L Y K K F L L V T F D Q G P M A F K S G S R P P$ $M V D T N V K V Y V A C T S A L Y L K F L A T V M U Q G G K T F D S G G R P P$ TLENPVFSTYADAAALMVLKDMGQGWMTVYRMTRCNGFAS MISTPATQVLMLCTAILYVKYLAALMVQGGKKFTAGTRAP MASTELKTYVTCSAILYAKFVDATGIQATKTFDAGGRP

 NELLRVYALCVLMLCLKMLAISCYQGFFRLRARAFTN $K$ A WVASSVVLYTKCLVTTADQGGKRFAAGSRP
 $K V L I G A T G D L C D K \square Y V T D M \square Q G G K R F A A G T R A K$ $K V L V A S T A V L Y A K F L V T T T I Q G S K R F V T G T R C$
$\square$ MENEVFMAFASYTT\| I LSKMMFMSTATAFFRLTRKVFAN
NTPVLSHFLVNVGLLNLRLFLDGRDSADAKRREKTPAT KAFALSAAVLYIKFLVCTMIQGRKAFAAGTPRM KVFAVVATTLYVKFLTTTMIQQGKSFSAQSFRT LENPVFAAYLVASS LVMVLKVMGQGWMTVHRMLKGGGWAS

 $M M Q G A K K F A T G G R P$ NAP LQATADAS LTLLVKH DLTVFVQGGARFGAGMRP DEAVYWYALATVLLFAKMFATSLYQGFHRDTKMTFKT KAA I I STLVLYVKY LVATLIGARKREQKQNFGS MSVVT YY HRDMKGSFPA MAYAVAAA $\square M V L K \square M G Q G W M T V V L M T R F D G L M S$ HRQKNKVF VS $K$ VFVTYAAVLY $\square K F \square A T D A V Q S R K T F C A G G R P$

 $L E N P V F E V Y A \square A A S L M V L K V M L Q G W M T V Y R M \square K A S G W A S$ $\square A A E L W A A Y A W W S C V L V L K M N A L T W F T G R \square R A T R Q V I H S$ $K F L A T T M D Q G R R S F D A G T R V P$ KMIAVGIYT GVVRSRDKVATN $\square A K E L W S ~$
K Y A C WS C V KAFA $\square S V A V L Y \square K F L V C T M \square Q G R K A F A A G T R M$ HRDKNQVFPS LD NPVF QAYSVAAS DMLLK LMMLQPWMTVVRMMKAGVFPRS KAFALSAAVLYIKFLASTMDQGRKAFAANTRMP
TMENPVFAAYAAAAALMLLKLMGQGWMTVVLMVKTDGLLN LLSTLVTCTGLLYLKHVWTLTMQGGAAUKSGNRU'
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P

## P

## E

4X6


P
E
P
P

## P

## P

 .| T |
| :--- |
| P |
| P |

## $\stackrel{+}{P}$

## E

K
P
P UniRef90_UPI0003BDAE1D UniRef90_D2W0R5 UniRef90-G4Z8C8 UniRef90-K3WC89 UniRef90_UPIO004690FAE UniRef90_V9DVN8 UniRef90_-T0Q5S2 UniRef90_K3WS41 UniRef90_G4Z7U1 UniRef90_M4C504 UniRef90_W7TYH8 UniRef90_M7BD02 UniRef90_UPI000380AE62 UniRef90_W4GBX1 UniRef90_H2Y962 UniRef90-A0A017HHY1 UniRef90_N6TAA4 UniRef90_K3WEJ4 UniRef90-T0QHP4 UniRef90_G4Z7U0 UniRef90-B7RI11 UniRef90_A0A024U8X1 UniRef90_H9K075 UniRef90_K3WC91 UniRef90_S9QCK4
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 P E D A L R H G GL L Y H R E D P Y V E R CRRA





NEDAV P E D A K F R K V $V$ K L A L L E D N S E $V$ V $P E D$
E D
$P$ E
$P$
$P E D C A G F G K K K Y L R T D D K V E R V R$
$V E D A Q L S K E Q \square D Q \square N N P N V N R T L R$ AEDSKLPQAKNAPKTDDHV
 PED $\qquad$ MR WKRII QNDLE SMPMAYVVAF
 P E DE GF R P GMK Q S F G L S S S S E R W W R R I L A N D L V E S MPMA Y V V F PEDAKRFPG IKQTYGREA EYRWKRIVMNDLENGPMGLIVF
 PE DVCFMPKKAA ERGNE DE QRWT R I V
 VED GQQSKEAT QQA ALLDERRWSRDTANDLENDIPLGLIVV



 PEDLLRKKPGPEQLDANDYVERSRRLHRNDLEN




 PEDYKKDPKPQEIKTHPDVERARRVHANDL E PEDAKKSPDNPQLEPNEYVERSRRLNDNDLE


 VG R A V R A H R N I L E E S L P V PEEASAHAKSAVAEDGQEDERRQNAHRNTTENLAVFTFAA LKTKKKDDDKSKEKLFD T EKRWQRII LDNDLENIMI GLLLL D WAMSN R DRQPEVPE WVGRA DRAQRN H L DN LAMIA SV I
 VF R S H R T F H N S L E N
A R A HA A H Q N A WE A L
LIA M F G A A
PFAQRAVWAHENSFETFMPFAAAV
WPRGNK PQDDASSLVKR LEDAHAN CMENDRVVAVEV
$G N G H S P S I G G T A P W A Q R A Q K A H A N A V E N L V I F A P L V$

$A \square Y S M T G P S \square W V A R \square H F \square V F F \square C R V \square H S V A Y \square \square A \square Q A P R$ $A$
$G V M V M T G P S L E$
$W$

 WS A I CMGVTGGITKTLIFVYTVARVGHTVVYAQSLDP YGAATTGGNASVTVAAITTFTAARFLHTIAYANG GAGVLVEASEKVHI GAMLVFTAARLLHTYVYAYSM QPHR WSVI SVGVSSTMTVTLLLVVYTIARVGHTIVYSQSMPRAAR GA GVMAGADYDVHYGAMLAFTTARCLHTYAYAKSLGQPMR
 $V A Y V L V G A S S G L A M W L F M L F T A S R Y C H T L C Y L N S L C Q P W R$ WAS 1 LSGGDTDCUNGUSUIVFTGVR\|LHTVFYALAWSKP LLY I STNPPAATAPRYFRCF


 GGGULADSNDAVHASALIVY
WAS L L G G DT NVNG $\square$ S IVFAAMRVLHTDFYAMAWSKP PIWLNTSPLFPLARMILPAFAYVSI SYTLLHMRIVNA HR LI SIV SVGARENVNIVAVLVFTIMRIVVTI SYANKMP $L V A V L L G A P S L A L K V A L I V F T A A R V G H S I A Y L R S M Q P W R$

WSA $\square$ AVGVASSVIKKLLLDYTTARVSHTAVYSMADPR AR $F$ LAVLSGANPFWTALLTGFFAVARI LHMDLYYV $L \vee F V T T Q P P L W V A V L L F T T F V L A R L A H M Y A Y A T A$




UniRef90_G0E0J1


 VVAGQAGGSSTWI NWLADTFVVSRVLH GVLYVANLASDR

$S \nabla A Y T \square A Q\|P C V S M A V Q\| L M A V K S Y$ GLS WMVGMAVTFCMAYRVLTTA

S LT Y GVGVVATLVGLGNVVNA■
AI C
A $1 \begin{aligned} & \text { C } \\ & \text { C }\end{aligned}$
A I VFF $\square$ GYATTDYQAANTLL
AI L WS TGQLCIFAS GLLNGIIS
A 1 L WS TGQLCVLAS GLLN
A $\square$ T F F VGYATTLYQAVN L L L
MACWMS GTAC $\square$ T AAAN $\square$ AMNV
A WC WRLGVVSTLVGTVNAT

A TLLWTVGSLILVFMTGRTLLVA
$A \quad \square C$
F $\quad \square$ A F VGAMMPTAYMTLQT $\square$ L
S
A WC WR $\square \mathrm{G} \ \mathrm{~V}$ LM I ITTSGVNS $\square$

TSAWT $\square \mathrm{G} \square \mathrm{L}$ S MLTMA $\square \mathrm{N}$
A $\quad \mathrm{C}$

G

GLLWF G GVLSVF TLVGN
$G Y I W F G G V L S V V T L V G N$
S
 S I S W LLGGFLTTA

AT F Y
$M V L W \square V G D A$
SVCHGVGMMATL
G L S WA A G Y A VT $\square$ S MA YR LLT T T IS

$\square T$ GYT $\square$ GAFSLFT $\square$ A GN
LACWMAGTFCIVAAAAN
$\square L L S A D E \square C \|$ LIVMSVTCLIH

MACWMAGSFC
$T L A Y H V G \square W A T \square A Y A V Q L F$

MACWMTGTLCVVATALYVV

$S L A Y L A G L I G G L M I G W Q L \bar{F}$
SLSYFVSTAALLTIVWRLF
SI A Y FVVSLFSMLVYASQLFDA



ASFWSVQLVDCLWMA DQLLAA

lupas_21
lupas_14 lupas_28
jnet conf sol25 sol5 sol0 jhmm
jpssm



```
lupas 21
lupas_14
lupas_28
jnet
conf
sol25
sol5
sol0
jhmm
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```
jpssm
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