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DHPPKVEYFDLRDHTNTDPKGFVRHVDHYRVEPWGLYMAR HRPKIE Y F N V V E CTNTDPKGFVRPVVDYRLEPWGLYMAR $\square$ HPPK HETFDLLAAHTNTDPKGDVRAV DVYTVQPWGLYMAR L H P VK Q E TF DTSGRVNTDPKGFLREVDTFTVTDFGLYMAR LHPVKRETFNTADFTNTDPKGYLRQVDTYTETEFGLYMAR L H R P K V E Y F D L A E S T N T D P K G F V R P V E T F H V E P W GLL Y M A R
 L H P I K Q E T F D TA E A V N V D P K G H L R E V D T Y K V T D F GLLYMAR

 | $V$ | $H$ | $K$ | $P$ | $K$ | $V$ | $E$ | $H$ | $F$ | $N$ | $I$ | $K$ | $E$ | $W$ | $T$ | $N$ | $I$ | $D$ | $P$ | $K$ | $G$ | $F$ | $V$ | $R$ | $P$ | $V$ | $E$ | $K$ | $Y$ | $L$ |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| $L$ | $R$ | $K$ | $P$ | $W$ | $G$ | $L$ | $Y$ | $M$ | $G$ | $R$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| $H$ | $P$ | $V$ | $K$ | $E$ | $E$ | $T$ | $F$ | $N$ | $L$ | $K$ | $A$ | $N$ | $T$ | $N$ | $I$ | $D$ | $P$ | $K$ | $G$ | $F$ | $L$ | $R$ | $R$ | $V$ | $D$ | $T$ | $Y$ | $R$ | $E$ | I HR PKVVTFDDIARTNVDPKGFVRPVEHYREEPWGLYMAR L H P VK K E T F N TTE HVNV D P K GY L R EVVDTY K ITT D F GLLYMAR

 HAPKVERFDLSDRTNTDPKGFVRPVDHY HVEPWGLYMGR VHPPKVEYFDVVGLTNTDPKGFVRPVDEYRVEPWGLYMAR
 L H P VKEELFDTATYTNTDPKGFLREVDVYKDTDFGLYMAR
 LHPVKKETFDPSSMTNDDPKGFQRRVDDFHSTDFGLYMAR MHP PK E E T F D L R GYTNTDPK GVVR DV DVV TVVHPWGL Y LA R L H R P K V E Y F D V V A E L T T N TADP K G H V


 ARTNTDPKG IVVRAVVDV TVVE WGLYMAR
 $V$ HPPKHERFDVVAMTNTDPKGTVRAVQEYRVEPFGGYLAR L H P P K VE $\square$ F DPA A R A N DD P K G I L R EV E EF R E E P F G L Y L A R V H R P K V E Y F NVAE L T N T D P K GFVVR PVESYRVEPWGLYMAR

 H P P K $\square E T$ F D L A G R $\quad$ N T D P K G $\square$ D R VV E E Y RVVEP F GL Y M A R
 VHPPKTE $\square F D L A A R T N T D P K Q \square V R D V D F Y R V E P F G L Y L A R$
 I H A PKVESFDTEAMTNTDPKGHIMRVDRYE ETRSGGLYAR L H HVVKVETEDVVAHTNVDPKGVVREVEVYRVERWGLYMAR I HPPKI E Y F DLDDAKSNTDPKGYLRGVDEYRLTQHGLYMFR
 LHPVKKSETF LVVPERDNDDPKGFKRAVDTYTETDFGGYMAR
 HPDVKE $\square F D V A T M N N V D P K G F N R P V D S Y R T T D F G L Y M A R$ VHP P K V E L F DLLK A M T N T D P K R Q V V H P P K V EVVFDLVAGTNTDSKGVVRPVDEFRRERFGLYMAR V H P P K V EVV F L A A R T N T D S K GRVVRTVDEYRLES F GL Y MA R
 LHPPKRETFDVPAMTNTDNKGFVRPVERYEVTDFGLYMSR L H P P K REVVFDVPAMTNTDNKGFLREVERYEVTDYGLYMSR
 V H R P K VEHFDVANLTNTDPKGFVRAVERYHVEPWGLYMAR IHAPK I E LF DTRTMTNTDPKGFRRTVDEYRREEFGLY LARR
 HPPKREDFDVPAMTNTDNKGFLRPVDEYRQLPYGLYMSR MHPPKTGTFDVDAAVNTDTKGGVREVHKYREEPFGGLMSR V H P P K H E V F

 L H P P K REVF DPPAMTNTDNKGVVRAVEEFRSTDYGLYMSR 1 HPPKVEHFDPAAMTNTDPKGFVRRVDEYRETAHGLYMSR
 HRPRLE Y F NI A DL S WT DYRGFLHPVER DHAEPFGLYVER
 MR AV DVYRVE P WGL Y MAR HPPKREVFDVAAGVNDDNKGFVRTVEAYEVTPYGLYMNR HPPKVVEIFDVPRLSNTDPKGCRRQVDRWDQRDGMLYMAR HPPKVETFDTASNVN $\square D P K G F T R P V D R W D G D S A A L Y M A R$ MRAVDTYTVE P WGLLYMAR M R A V


UniRef90_UPI0001FFE190 | $E$ | $R$ | $H$ | $V$ | $D$ | $E$ | $Y$ | $R$ | $L$ | $H$ | $D$ |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| $N$ | $A$ | $L$ | $Y$ | $M$ | $G$ | $R$ |  |  |  |  |
| $M$ | $R$ | $A$ | $V$ | $D$ | $E$ | $Y$ | $R$ | $V$ | $E$ | $P$ |
| $W$ | $W$ | $L$ | $Y$ | $M$ | $A$ | $R$ |  |  |  |  | $M R D V D V F D V R P W G L Y M A R$




QUERY
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 TTGULDPKTSERAMLNAARAIDGGIAAHGHDDDAWLTSVGM
 CAGHISADTAQHAFQRAIRVVDGUAAHGHSLEGWLASEGM
 GSGLLDAESATYAVETAMRATDGIAAHGHDFDAWTRSGGM A A HLI TADDAERAI NTTDRAVEGI T RHHDDPMEWLAKLGY
 AEGLLSREDAERAVDRAVAAVVGGLARNGYDDHRWLSSOGM TA GLLLTREQARTALERTYRTVAALAAAHGYDLDRWLADDGM



## A


 AKNLOPHRAQWALETAYGAVAGAAAHGHDVVRWLASQGV


THGVI S A A DARWA L DTCFTAATGGDA A H G D DVVMSWLA A CEA ( HHGGLSAHAA OVALEGTYRAVAGAAHHGYLVRWLASKGM RLGVLSAHDAQVALEGTYRAVAGLAAHGYDIQRWLAAEGV RAGLLDEETAQRAMYTTHTTMEALAGHEYDLAAWLRASDI QADLGAEAARAMRRACNAVDGLARHRYDLPKWLHDNGIV DAGLLGRDAAERALAMTYMAVGGIVAHGYDVQRWLAEEGV AAGYLPTAECQEAVAIATRALVGAAEHDHDVQRWLDAE AANFLTTTQCEEAVQIATRALVGAAAHGDDVQAWLDDEGE AA WLLPHDRAEAAVRUAARTMAGAAEHNHDVESWLAAQGA AAGLLSAAAAQAALEHATRADAGMAAHDYSLEGWLASEGD 0365 E9F7

$\stackrel{\rightharpoonup}{\mathrm{V}}$
 A T G V L T P A LDA E Y GMRRA YTTVVAAMAAAHGHDL GA WLA T E G $\square$ A A DLLSSAA DAE R A LDHAAVRAVAGTAAHGHSVVAWLAAEGA RTGLLDSSTVQRAMERTYRAVDG】AHSSYDVDAWLVT LG $\quad$ T




 A A GHLTTSSQCEAA ILIDAMRTMTGSAAVDG VQTWLA QVGE A A GLV DS TQAHRAFECATAAADDGLAVNDHCVVEDWLAT RGD
 RHHLLS T DD GERADTTATAAAI EGGLA QHNY QLGNWLA S LGGM GADELSAADAETAVGDATRALVGAAECGHDVQRWLEREGG SA GHLDA ATTAARALESSQRLIN GMLDEGGVVDNWLGAQQG


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| QUERY | D WR |
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VEVIDVFSSQRRRPS GSVAQLEVCHVERWGLAVEC C

HPPKVETFDTSAGINDDPKGFHRAVERWGGDATGLYMAR $\square H R P K T E S F D \square P G G T N T D P K G F V R S V D R W D S D P G A G Y M A R$ YTVHPWGLYMAR HRPRVEFFDVADFTETDARGFVHTVENYHIEPWGLYLFR VHRPSAATYDLNERVDRDRAGTVRAVDTWRVTDFGLYUAR LHPVKEETFAISEMTNDDPKGFTREVDDYRVTPRGLYMAR HPPKVETFDLREMVNTDPKGFQRKVDEFRLTPSRLYMRR MRAVDQYTLRPWGLY LAR
MTNTDNKGFVRPVEEYRVTDYGLYMSR
HP $\square$ KVERHDMAAMRHHTNTG I RPVETYRETPYGLFVGR R PRVEFFDVAELTSTDARGFIRPVDRYEVQPWGLYLAR

MAR
HPVKTERHDTVRYEHHTNTGTRR VS DYRETPGGLYVAR HPVKTERHDTDAMTHQTNTGDRR VQTYREHAHGLFVAR HPVKVERHDTAGMQHHTNTGVREVHTYRQTPHGLIVAR MHSVKVERHDTLRRQHHTNTGIRREVDFYREHDHGLYVAR PVKTEWHDVVARQHHTNTGGRPVQTYREHPHGLFVAR
IT P QLVDVVDTVSAVRSYSS GMSRHLTTCRVESWGLRLEC
$I T P Q H V E \| V D V A S A Q R H D G S G T V Q Q L D D C H L E R W G L C M E Y$

1 TPQLVDIVDTVTAVRSYSSGMSRVLRTCQVERWGLRMEC MHPVRVETLDLAALTHTLEGGAWAQPSTFQRTPYGLGHVGR VRAVRTYEERPHGLFVAR
$\square H K \square K Q E T F D \square S R A \square N \square D P K G F E R A V D A Y E L S P N Q L Y M R R$ PRLVDVIDLFSARRSHSSGAVMGLDVCRVEPWGLSLE C R
R
$\qquad$

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#### Abstract

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 VGEYTPGPTVWRSEDHYLDLEVRTGRGVDLADVGELLDAD $V$ G S F A D D A GRRWYA E D WY L D L V
 IVEVE R GPKRWRAT D Y L L L DV A V R R GRSAT L R GA GEGL A A H $V G D Y T R D G D R W S G E D H Y L D L V L R T G H G D Q L T D V D E G L A A D$
 I A T I I S R N A A V W W E V $V$ R D H Y L




 A V R V L R D G R T WR T T D L L L G L A A AP G GTTTAR I V R S E E FA A A V



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 RHGLLTPR AGRVLVVGDADLALCCTVHQTLEELSRFRHDLSSWLAYKHV AADLI GEADLHRAVTVAHRTLSGLAHASYRLDDWLGAQGLL

RDGFTSTPELHHAVATAHHVLSGLTRARFSVSDWDAGEGV SGGQR RSGLMGPGQAARVRAA GADAVDRIKAWGAPFADGWEDWRP RAGLMSAEKAERVRAAGQQAVGVI RAWGPPFGDDWPQWRP QDGLMDASAAERVREAGRSAVDVIRAWGPPFADGWQHWRP AAGLMTPDQAAAVREAGARAVERIAAWGAPFGDGWPDWRP RAGLLDAAQAERVRAAGRRAVEAVRSWGSPFADGWEHWRP QDGLMDRAVAEQVREAGSRAVEVI RAWGPPFSEGWQHWRP QAGLLDAGQAERIRVAGQAAARVI GAWGRPFSENWASWRP RVGLMDARTARGVRDAGRAAVEVI RAWGAPFSDGWEGWRP AAGLMTAATAERVREAGRRAVDVI GAWGRPFRDGWEHWRP TGRVLRAADAELALRTVHRTLEEISEYHHDLGS WLLGLGD $T Q G F I T A A E L A H A L S V T A T V V D G L T T Y G A D I D S W L E K F N D$
$Q V G L M D R E T A A R V R E A G L A A V E V I T G W G A P F R D G W H W R P ~$ RI GLMDQDRARRVVDAGRAAVEVVKAWGAPFCDGWQDWRP RVGLDTPDTARRVREAGREAVGMI RSWGAPFRDGWEDWRP RAGLMSASRAAAVRDAGRRAVDAIAAWGPPFSAGWEDWRP $Q V G L M D R G K A G E V R A A G F A A V E R V R E W G S P Y T D G W E H W R P$
$G G G V I D R S E A D Y A L R T V H R T L D E V T R H R ~ D I N Q W L A H R G D$ TAGLMAEDQARRVRAA GLDAVALI RDWGPPYSDGWEDWRP $T A G L D D A G A A E D A D E T A L R A V D G I A A H G H D D D A W D R E R G A$
$R V G M S A A R A E E V R A A G H A A V E R ~ Q A W G A P F A S G W E H W R P ~$ RYGLLTPKTAERAVRRAVAAVEGLARHGYDDQRWDASEGM RAGLVDAAQARRIRQAGEAAVEVVRAWGAPFADGWEHWRP EAGLIGTRKAATIRAAGRAALREIEGWGWPFRDHWEDWRP ADGLLDEAAAAGVRRAGERAVSVI ERWGPPFRDGWPRWRP ADGLMSARTAAEVREAGRAAVALI ESWGAPFAEPWPAWRP $E A G R L T D E Q V E A V E A E G R A A V E A V R A W G A P F D Q G W E N W R P$
$R A G L M G R A Q R T Q V R S A L E R A R R A V A E W R P P F C D N W H R W R P ~$ RDGLLMPAALAADVRAAGRAAVEHI GAWGVPFGGGWEDWRP AAGRYTAEDAAR FEADAREVEELAAWGSPFCDGWEDWRP AAGRFTPAEAARITADGHAAVRETSWATPFAEDWPSWTA RTGYFSAEEDAGI REAGRRAEEHYARWTYPF SAGYEYFFA R $\square G Y F S P E M A E Q I$ RA WGREAERDIEAWGYPFNAGFEYFFP QQGRLSPEQAAQIERHADAALASFES
EKGLI TQAQMTACLRQLNNLI T I I YRDKFD
RFGQWDDGDAAA EAEKRLALDQMRSGHWAFDRDWTLFQP EQGLIT QEQACRSLKKMDTILQS\|YGNTFPPA
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TAGHVSDPLAEKARNVARAIERAL
DDGDIPPELAERARSVARSVNRALT
E E GLIT S SQMCTCLKQLHVLLDKLYHNG
SQGVFTPVVAAA IEADAADVLADVADWGPPFCDGWERFRP EAGLLSEELADRARQVAASLVNAL



KYGQWDAGVAAA I RSNATVALGQWEQGAWAFTEDWSGWQE RAGRLSGQQLAKLRAEGERLI DRAEAGTFPFDGTWTQFRP RDGYFDAEAAGRIRAEGERLIKLAESGEFPFDGTLTDFRP
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RE GRWWYRS ${ }^{70}$ N GKSKGTY $V^{80}$
$P P G R \square R \square G$
RPGQPFEVWRVATPDERGAAWYVN P K L G $\square \mathrm{K}$ T S K F F F D S D G K L L Y W W N D REGRWWYRDSEGNRKGTYVN STWWF F D S A GEFLGWYVN REGRWWYKAADGTPKGTYVN
 S VWWF F EA D G GFK GWY V N

S L Y L I D K G C K $\square \mathrm{S} \mathrm{R} \square \mathrm{H}$ DAFGRFLH E WY ID
V $A G D$
 WWY PTVVYTRDTYVN S VWWF F E P D GT F R N WY V $\underset{Y}{ } \mathrm{~N}$ S VWWFFDAAGHFEGWYVN

WEF GGWYV N D D H G D VE WY I D

LKE GRWWYRGADGERKGTYVN
$Y D R E G N F K G L Y V D$
 S VWWF WDRQGREAARWYI N
$F N D E G H V V Q \quad W Y$ I
$\square A E T S L K E G R W W Y R G R D G T V R G T Y V N$ V RE GRWWYRDAD GASKGTYVN
 REGRWWYRSEEGTAKGTYVN IFWFFARGRQFRGWYVN SLVWWFRDAA GRFQNWYVN $D L G \square K D S V, ~ V Y N A$ S E E L V V Y WY C D REGRWWYKDADGAAKGTYVN $G \square K V S K \quad V Y D A E D N L V Y W Y C D$ GTRWSVWRWHD GS DWL PDWYVN GFKVSKFCLED DS L LYYWYCD

PRRDFHYSCYFL
GYSCYFL
GYRISKF LKKSD
D R GYK S S K WW IF GA D
PKKDLHHGYSCYF L KEGFKVSKFYCENG
PKAEFSHGVSYYVLKE GYKISKFYKQ DG
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 GFKVSK FY A A D N S LLGYYY C D

$W \mathrm{~L} \quad \mathrm{QHFPTNKHHFNEKGE} \mathrm{\square VQ} W Y$ I D
WHAPKS WML V
 PRRDFHYSCYFL KLGYKVSKF YREDNSLLGYWYCD

 $S V L W L F G R R Q K F R G W Y V N$
RHGDPWSVWRWHD GENWVGTWYGN

 HPKHHGWSCYFLKE GFKVSRFCREDGGSLLYWYCD S L ILEPH GARHAVWWAF D T D M GFFGWWY C D HPKFSHG $\square S Y Y L \square N D G F K V S K F Y$ K E DN S LAA Y $\square Y$ CD
 $F \operatorname{RDP}$ G D $\frac{L V M}{P Q}$
$\begin{array}{lll} \\ R Y Y & V & D \\ C & N\end{array}$
PGDRGVTHYMGDWL
$T \square H E Y Y D K S G R L L G V Y A N$ $V$ WWF FSRDGTF GGWY V N







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LVPAAG RWIAAWYGPG ESETADYVD WK P P A VWF SVNAFYVPDGDGRLRNWYVN DANGNVKQWYI D
P LDVPRPTGEGTVR\|LDSGFRWVRAHPTGGGERPVQFYVD
WKPPTAWFSVNAFFVPDGDGRRRNWYVN TVUEYYDRAGRLLGVYYAN S VWWF FEPDGRFRDWYVN $1 L D H G \quad F R W V R A H \quad P A D G D A D T V Q L N A A G Q P E Q \quad L Y V D$ PPHPVPHHWERWQLHRPGDAYSVVLYWQGDRRFAGWYLN VWWFYTDAGDFAGWYVN ■EAGKWWFHRYYDRDGNDYYN

P GHAFTASWRSVLFPHAGWAAG
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VFVFWRGEKRERDWYF
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PFNAFAVFAPDGRLKGWYCN WRNRPYVWRDHDSYFN $R W Y \square T H Y \square S R D G N L K G V Y \| N$ RTGDGVLKGWYCD F N $\square$ FA $\square$ FHADGRPKGWYCN

WT DS GEF THWYVN
YHWLQ $\quad L$ PE GRNYSMTVMYDDDWNTLQYYFD
FNDQGQVVQ WY!D
SVWWFRDAQGRFLDWYVN RNWYVN
$\square E A G K W W F H R Y Y D R N G N F Y N \|$
FNPP PRTSEVYCD HRFYCN
S LF LFWDGPERFQGWYFN
NLYFWRDHKGKYLGSYFN $\square$ QRPGEAYAVWAFRPATDELSGWYVN RAGDGTLKGWYCD RAADGALKGWYCD $\square Q R P G E G Y \underset{T}{S}$ VWARREGGSRFQGWYVN

T I A Y Y WE DVWRDKGA YFN HQTYVD
RSGDGLLKGWYCD

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RLGVVSDTEHQAVELARAQVLAMLEDRAGPFADAWAAWRW LTNEINRDMYNLAQNES $\square K K Q E Q U K N N S F S \square$
SMGLVTPELAEATWAQARAVEAELHAGTY
RLGGIVSDTE HRAVEAAREVLAMLAELSGVFAQAWSSWRW SSGLLTDTLCREAERQAERAL GLLKSRYP
Y LGLLLSAEQATH L R RTDA LLEAGVLGHFPF
DAGRLTTEQLDRLREEGERVGGRAERGLFPFDGTHTDFRP RAGQVSPTLAETAWAHARLVEEGLRAGTY
GHEFWSAAEAEA TRAEG $\square$ RMI ALAEQGAYPFDGSHTTFRP AQGKYTAEQGDA RRTGKE EAMLDAGTTWWDPAWSEFAP GDRFWDAAEAAEI RAEGERVVKLIEAGAFPFDGTWCGLRP E EGIITEKLYKAVLRITQEVFE
RKMGYPPETVRQAEAGLQALLQADRERRPPFD
$S L G Y P A E L V A R V R A D A E A V L E A V R R R E A P F D G W \square G R D G$ A DFGYPADLI RRVRSDAERVLGAVRNREPPFDGATAAR AKYHYPPDVVTAAVDSAEWLLGTVRTRQAPFDDWLA
ESRY PGRVHEIQAEGDRVAKALDAGERWWDEAWEHWTP RAGHWTVEQAADI RAEGDCVTRDINAAAFPFDGTWCDFRP $\square A G R D P D A A A R A V E A D D A L E A L A R Q G S D \square R$ RTGGFTAEEAAGVRAAASRVADLVERG ECWWERWR DPAQAAAVRSEADRVAKLVEAAAFPFDGSDLDYEP VAYGYP DAEHRAVEDARAQALAMLAARAGDFA DRWARWTW A RYGYPPEVVEAARRTAGELLLEAAVGAGTGPFRGWLERVG RDGRLDEATASRAWVEARRI HAELLAGQFELLAWL EAGRLTAAELDRDRGEGERLRVLAEAGAPPFDGGWTGFRP SNELI STS LLTASLHRLNNLLSU I Y LS GELSAPVLARAMVKAQRFID

EKALHTVKNTIQE
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E E GVVPSELVNRVKE VAVAIA
D LSEDQRQGARGGLKMLLHLLHTHQEPF
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RKFEYPEEVDQQARSAAAWLDDALHTGAEPFARWLA
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K QF GYPDEVATEAYAAAHWLFGADGDGTEPFAKWLA
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