

	1	10	20	30	40	50
104z	...MYLIYLLRVFCCAL	LT	GCGDNNSKFDSATDLPVEQEQEQEPE	ESSE	QDLVVE	E
<i>Agaribacterium</i>	.....MNKHSLACLT	AL	SVL.....	SFS	SPTAL	VNAA
<i>Shewanella</i>	MKGKYMKHHLNLVCATA	LL	STS.....	V	LSSS	..IYA
<i>Shewanella</i>	....MKP SMNVIYATT	LMATS	.....	ALT	TTV.	CIA
<i>Pseudoalteromonas</i>	....MNKTTLFIGCL	..	.....	LTT	TN..	LFA
<i>Colwellia</i>	....MKKT SVLLTG	..	.....	I	IFT	SFIGHT
<i>Catenovulum</i>	....MKKLA LLAI S	..	.....	S	VFS	ST. SGIA
<i>Gayadomonas</i>	....MKHLSA LITG	..	.....	L	LLTT	TAHS
<i>Alteromonas</i>	....MKNLSI LLAG	..	.....	I	ITST	.VAHC
<i>Aliagarivorans</i>	....MFNVQRVLI SAVS	..	.....	L	SVCS.	AVQA
<i>Agarivorans</i>	....MLPRHYKNLL LTQG	..	.....	L	LSL SFASLAA	
<i>Agarivorans</i>	....MKGFTKHP LLLACG	..	.....	L	G LSL.	STY A
<i>Vibrio</i>	....M KLP I L SLL	..	.....	T	IAIN	.PAFA
<i>Vas1_1339</i>	....MKSIIKTLT L LP IF	..	.....	L	T S TT	.LMA
<i>Vibrio</i>	....MKSTIKSLP L LP FFF	..	.....	L	MSTS.	LMA

<i>1o4z</i>	η_1	β_1	T T	T T	α_1	β_2	β_3
	6 0	7 0		8 0	9 0	1 0 0	1 1 0
<i>1o4z</i>	WDWKD	IPVPA	DAGPNMKW	EWFQE	ISDNEF	YEAPADN	KGSBE
Agaribacterium	YDWDN	VAVPA	YAGDGK	RQWLQPO	YSDFE	NYSG	HNAWA
<i>Shewanella</i>	ADWDN	IPVPA	VGNGLW	WLNDQY	SDSEF	NYNG	GPGLT
<i>Shewanella</i>	ADWDN	IPVPA	PDGPNGL	WLNDQY	SDSEF	NYNG	Y
Pseudoalteromonas	NDWDS	IPVTP	GDGKVW	WQLQETY	SDSEF	NYFG	KPAAE
<i>Catellawia</i>	ADWDN	IPVPA	AAAGAGKS	WELQSSY	SDSEF	NYFG	TSKWNNDTY
<i>Catenovulum</i>	ADWDG	IPVPA	SAGAKT	WQLQETY	SDSEF	NYFG	TSKWNNDTY
<i>Gayadomonas</i>	EDWDW	VPIPAS	SPAGAK	WQLQETY	SDSEF	NYFG	FPNSW
<i>Alteromonas</i>	EDWDN	IPVPA	SPAGAK	WQLQETY	SDSEF	NYFG	TSGPGLT
<i>Aliagiarivorans</i>	EDWDN	IPVPA	TSPCG	GCKVW	SDSEF	NYFG	KPNQE
<i>Agarivorans</i>	NDWDG	IPVPA	DPGGYW	WELQEA	SDSEF	NYFG	TSKWNDSY
<i>Agarivorans</i>	NDWDG	IPVPA	PANP	GTYW	SDSEF	NYFG	FNNWS
<i>Agarivorans</i>	ADWDN	IPVPA	ELDDG	QSWELQEA	SDSEF	NYFG	TGPGLT
<i>Vibrio</i>	NDWDS	IPVPA	ELDDG	QSWELQEA	SDSEF	NYFG	KNTTE
<i>Vas1_1339</i>	EDWRE	IPVPA	ELDDG	QSWELQEA	SDSEF	NYFG	TSKWNNDTY
<i>Vibrio</i>	NDWDG	IPVPA	LDDG	QSWELQEA	SDSEF	NYFG	KGDSR

<i>lo4z</i>	η2	β4	TT	β5	TT	β6	TT	β7	TT	β8	TT	β9	TT	β10
120	122	130	130	140	140	150	150	160	160	170	170			
1o4z	WKRDRS	SYVAD	GELKMW	ATRKPG	NSGDK	INMGC	TSKTRVVY	PVYIE	EARAKV	MNSTL	ASDVWL			
Agaribacterium	WKKDH	HSNVAGG	ALVLR	ASRH.	GSDR	VGT	GVI	TSKTKVTY	PIFME	EARIKV	SNL	SNSFWL		
Shewanella	WSGSQ	SWVS	SDGN	LIISASRK.	APDLVNA	GVI	TSKTKV	KVYPI	LEANIKV	SNL	LSSNFWL			
Shewanella	WSQNE	SWVS	SDGN	LIISASRK.	APNLVNA	GVI	TSKTKV	KVYPI	LEANIKV	SNL	LSSNFWL			
Pseudoalteromonas	WQDDE	SWVS	SDGN	LIISASRR	AGTDKVNA	GVI	TSKTKV	SFPPI	LEANIKV	SNL	LSSNFWL			
Colwellia	WQKNS	SWVS	SDGN	LIISASRK	AGTNVNA	GVI	TSKTKV	KVFPPI	LEANIKV	SNL	LSSNFWL			
Catenovulum	WSSSE	SWVS	SDGN	LIISASRR	AGTNVNA	GVI	TSKTKV	KVYPI	LEANIKV	SNL	LSSNFWL			
Gayadomonas	WSSNE	SWVAD	GNL	IIISASRR	AGTNVNA	GVI	TSKTKV	KVYPI	LEANIKV	SNL	LSSNFWL			
Alteromonas	WSSSE	SWVANG	GNL	IIISASRR	AGTNVNA	GVI	TSKTKV	KVYPI	LEANIKV	SNL	LSSNFWL			
Aliagiravorans	WGSDE	SWVS	SDGN	LIISASRR	AGTNVNA	GVI	TSKTKV	KVYPI	LEANIKV	SNL	LSSNFWL			
Agarivorans	WDSSD	SWVADGN	LIIVSASRR	AGTNVNA	GVI	TSKTKV	KVYPI	LEANIKV	SNL	LSSNFWL				
Agarivorans	WSSDE	SWVS	SDGN	LIISASRR	AGTNVNA	GVI	TSKTKV	KVYPI	LEANIKV	SNL	LSSNFWL			
Vibrio	WQSNE	SWVS	SDGN	LIISASRR	AGTNVNA	GVV	TSKTKV	KVYPI	LEANIKV	SNL	LSSNFWL			
Vasi1_1339	WQSDE	SWVDDGN	LIISASRR	AGTNVNA	GVV	TSKTKV	KVYPI	LEANIKV	SGL	ELSSNFWL				
Vibrio	WORDE	SWVDDGN	LIISASRR	AGTNVNA	GVV	TSKTKV	KVYPI	LEANIKV	SGL	ELSSNFWL				

<i>lo4z</i>	TT	β11	β12	β13	α2	β14	β15
	180	190	200	210	220		
<i>lo4z</i>	L S A D D T O E I D I L E A Y G A D Y S E S A	G K D H S Y F S K V H I S H	H V F I R D . . .	P F O D Y . . .	O P K D		
Agaribacterium	L S D N D Q R E I D I L E V Y G	G A R D S W F A K N M S T N F	H V F F R N S D N S	I K S D Y N D .	O T H N		
Shewanella	L S E N D E R E I D I L E V Y G	G A R E T W F A Q N M S T N F	H V F L R N G D N S	I S C D F N D O	O T H N		
Shewanella	L S E N D E R E I D I L E V Y G	G S R E T W F T Q N M S T N F	H V F L R N S D N S	I R S D F N D O	O T H N		
Pseudoalteromonas	L S D N D E R E I D V L E V Y G	G A R D D W F A K N M S T N F	H V F I R D Q Q S N Q I I	S P D Y N D .	O T H N		
Colwellia	L S E N D E R E I D V L E V Y G	G A R E T W F A K N M S T N F	H V F V R D E Q S N E I I	S D F N D O	O T H N		
Catenovulum	L S E N D E R E I D I L E V Y G	G A S D T W F A K N M S T N F	H V F F R N N Q T N A I I	S D F N D O	O T H N		
Gayadomonas	L S E N D E R E I D I L E V Y G	G A S D T W F A K N M S T N F	H V F F R D Q Q T N A I I	S D F N D O	O T H N		
Alteromonas	L S Q N D E R E I D I L E V Y G	G A A D T W F A K N M S T N F	H V F L R D Q Q T N I I	S D F N D O	O T H N		
Aliagirvorans	L S E N D E R E I D I L E V Y G	G A E D E W F A K N M S T N F	H V F F R D G G N N .	I I S D F N D O	O T H N		
Agarivorans	L S E N D E R E I D I L E V Y G	G A A D T W Y A K N M S T N F	H V F I R D A A S N Q I I	S D F N D O	O T H N		
Agarivorans	L S E N D E R E I D V L E V Y G	G A R Q D W F A K N M S T N F	H V F F R N N D N S .	I S S D F N D O	O T H N		
Vibrio	L S E N D E R E I D I L E V Y G	G A K D T W F A K N M S T N F	H V F L R N S D T N I	I K S D F N D O	O T H N		
Vas1_1339	L S E N D E R E I D V L E V Y G	G A E D E W F A K N M S T N F	H V F F R N E D S N S .	I R S D F N D O	O T H N		
Vibrio	L S E N D E R E I D I L E V Y G	G A E D E W F A K N M S T N F	H V F F P N D N S T .	I P S D F N D O	O T H N		

<i>1c4z</i>	$\eta_3 \beta 16$	η_4	$\beta 17$	$\beta 18$	$\beta 19$	$\alpha 3$	TT	TT
	2 3 0	2 4 0	2 5 0	2 6 0	2 7 0	2 8 0		
<i>1c4z</i>	A G S W F E D	G T V W N K E F H R F	G V Y W R D P W H L E Y Y I D	G V L V R T V S G K D	I I . D P K H F T	N T T D P G N		
<i>Agaribacterium</i>	Q S N . . .	. G Y W R D G Y H R F	G A Y W K S P S D V T F C K K	T P D G S W A Q A E M F D K D Y T	R T			
<i>Shewanella</i>	T P V W . . .	G N T W R E G F H R F	G A Y W K S P T D V T F Y I D	G Q E T P N G S W D E V V M K D K D Y T				
<i>Shewanella</i>	T P T W . . .	G N Y W R E G F H R F	G A Y W K S P T D V T F Y I D	T P Q G S W A E V V M K D K D Y T				
<i>Pseudoalteromonas</i>	T P S W . . .	G T Y W R E G F H R F	G V Y W K S P T E V T F Y I D	T P D G S W A Q V V M K D K D Y T				
<i>Colwellia</i>	T P T W . . .	G T H W R D G F H R F	G V Y W K S P T E V T F Y I D	G Q O T P D G S W A Q V V M K D K D Y T				
<i>Catenovulum</i>	T P P W . . .	G T Y W R D G F H R F	G A Y W K S P T E V T F Y I D	T S D G S W A Q A V M K D K D Y T				
<i>Gayadomonas</i>	E P A T . . .	G T Y W R E Q F H R F	G A Y W K S P T D V T F Y I D	T P D G S W A Q V V M K D K D Y T				
<i>Alteromonas</i>	I P S T . . .	G T Y W R D Q F H R F	G A Y W K S P T E V T F Y I D	G Q O T P D G S W A Q V V M K D K D Y T				
<i>Aliagarivorans</i>	T P S W . . .	G T Y W R D G F H R F	A A Y W K S P T D V T F Y I D	T P E G S W A Q V V M K D K D Y T				
<i>Agarivorans</i>	E P S T . . .	G T Y W R D G F H R F	H R F A A Y W K S P T E V T F Y I D	G Q O T P D G S W A Q V V M K D K D Y T				
<i>Agarivorans</i>	T P T W . . .	G N Y W R E G F H R F	G V Y W K S P T E V T F Y I D	G Q O T T K G A W S Q V V M K D K D Y T				
<i>Vibrio</i>	E P S W . . .	G T Y W R D G F H R F	A A Y W K S P T E V T F Y I D	G V K T P K G S W E Q V L M K D K D Y T				
<i>Vasi_1339</i>	E P Q W . . .	G T Y W R D G F H R F	A Y W K S P T E V T F Y I D	G V K T P K G S W E D V V M K D K D Y T				
<i>Vibrio</i>	E P O W . . .	G T Y W R D G F H R F	A Y W K S P T E V T F Y I D	G V K T P K G S W E D V V M K D K D Y T				

1o4z

TT → β_{20} → α4 → TT → η_5 → α5 → η_6 → β21

290 300 310 320 330 340

1o4z TEIDT RTGLNKEMDIINTEDQTWRS SPASGLQSNTYTP TDNE LSNIE NNTFG VDWIRIY

Agaribacterium YLDDKS FYNMNQSMFMIILD MEDHEWRS RAG N VASDADLADNSK N KMYVDWIRVY

Shewanella I M NKS QYTMD EEMFI ILDTEDHSWRS SEAG N IATNADLADAS K N KMYVDWIRVY

Shewanella I M DKN QYTMD EEMFI ILDTEDHSWRS SEAG N VATDA DLADQSK N KMYVDWIRVY

Pseudoalteromonas T L NKN THNMD QSAYIIIDTEDHDWRS EAG N IATDADLADGSK N KMYVDWIRVY

Colwellia I LDKS QSNMDEEAF I ILDTEDHSWRS NQG H VATDADLADNGSK N KMYVDWIRVY

Catenovulum I LDKS QYNMDEEMFI ILDTEDHSWRS NQG I VASDADLADNSK N KMYVDWIRVY

Gayadomonas I LDKS QYNMDEEMFI ILDTEDHSWRS NQG I VASDADLADNSK N KMYVDWIRVY

Alteromonas T LDKS QYNMDEEMFI ILDTEDHSWRS NQG I VASDADLADNSK N KMYVDWIRVY

Aliagarivorans I LDKS QYNMDEEMFI ILDTEDHSWRS NQG I VASDADLADNSK N KMYVDWIRVY

Agarivorans V LDKS VYNLNQEAIFI IDTEDHSWRS EMG I IASDADLADNSK N KMYVDWIRVY

Agarivorans I LDKS QYNMDEEMFI ILDTEDHSWRS EAG H IATDADLADGD K N KMYVDWIRVY

Vibrio T LDKS QFNMDEEMFI ILDTEDHSWRS EAG I VASDADLADSSK N KMYVDWIRVY

Vasl_1339 I LDKS TYNMD QEMFI ILDTEDHSWRS EAG I IAKDEDLADDSK N KMYVDWIRVY

Vibrio I LDKS TYNMD EEMFI ILDTEDHSWRS EAG I VAKDEDLADN SK N KMYVDWIRVY

1o4z

350 →

1o4z KEV EK

Agaribacterium KEVASGD GGP SGG

Shewanella QPV SDG SGG NTGG

Shewanella QPV SNG GSG GDNGG NDGSIE

Pseudoalteromonas QPV NAS NT NS VS NG

Colwellia QPV SNNS NN

Catenovulum QPV AT GG

Gayadomonas QPV AT VPSGF

Alteromonas QPV DG VV TGN TNL

Aliagarivorans QPV AED GGG SGG DG

Agarivorans QPV T DSSG GENG

Agarivorans QPV TGG STT PPTG

Vibrio QPV RDND NN

Vasl_1339 QPV VGG DD NG

Vibrio QPV GG DD NG

1o4z

350 →

1o4z

Agaribacterium QAE KFTS VGG GGY YT IKS RVSNL CML D

Shewanella QKF SFT ELS N G F Y S I KAKV SNL C L D L

Shewanella QKF TLN QL LS N G F Y T I KS NVSNL C L D L

Pseudoalteromonas QKF NL VE L S N N E Y A I S S Q L S G L C M Q I

Colwellia QKF T F T H L G N S E Y A I T S N K S G L C V E L

Catenovulum QKF KLV NR G N N E Y T I Q S E R S G L C L E

Gayadomonas QKF K F I A L G N N E Y Q I Q S Q Q S N L C L E L

Alteromonas QSF K F I S A G N N E Y L I Q S T Q S N L C V E L

Aliagarivorans QRF TL SS L LG N G E Y A L Q S K V S Q L C M E L

Agarivorans QRF QF SAL LG N G Q Y I S S E V S Q L C L E

Agarivorans QRF QFT A L G N N E Y S I S A K V S Q L C M E L

Vibrio QRF T F T P V S N S E Y L I Q S D N S Q L C V E L

Vasl_1339 QRF GFEE VAT G E Y L I K S K R S Q L C L E L

Vibrio QRF E F D E V S S G E Y L I K S K R S Q L C L E L

1o4z

350 →

1o4z

Agaribacterium AW FEL RSR KAN K C L D V A G K S T K N G A D Y V H W A C Y N G H N Q Q F R F H .

Shewanella DY YEIRNK T S N K C I D V A G K L T T N G A N I T Q W S C Y D G D N Q R F K L N .

Shewanella GY YEIIISK V S N K C L D I A G K S T N D G A S L T Q W S C Y N G T N Q Q F K V E .

Pseudoalteromonas GY F E L K S S L S N K C V D I A G K L Q T D G A D I V Q W Q C Y N G D N Q R F Q F I E .

Colwellia GY YEIRSK V S N K C L D V A G Q Q T N N G A A F N Q W N C F N G N N Q R F T F I N .

Catenovulum DY F E I H N K V S G K C V D V A G Q S T D N G A N I V Q W N C F N G N N Q R F K F L Q .

Gayadomonas QH F E I R N K I T G K C I D V A G K S T T N G A N I V Q W S C Y N G Q N Q R F K F L Q .

Alteromonas QH F E I R S K V T G K C I D V A G K A T T N G A N I V Q W S C Y N G Q N Q R F K F L Q .

Aliagarivorans NT F E I R N K A S G K C L D I A G A S M S N G G K L Q Q W A C T G A N N Q R F R F V Q .

Agarivorans ST F E I R N K V S G K C L E I A N A S S N N G A P L Q Q W S C D G G N N Q R F K F L .

Agarivorans NT F E I R N K Q S G K C L E I A N N S G A N G A D L R Q W S C D G G T N Q R F K F Q .

Vibrio NT F E L R N K T G K C L E V A N S Q A T N G G S I I Q A S C D G E N N Q R I K F K .

Vasl_1339 QT F E I R N K A T G K C L E L A D N Q G S N G G T V Q Q W S C D G G N N Q R L K F I Q .

Vibrio QT F E I R N K A T G K C L E L A D N Q G S N G G T V Q Q W S C D G G N N Q R L K F I Q .