

## Conserved Insert in Valyl-tRNA Synthetase for $\beta$ -Proteobacteria

Gupta, R. S. (2000) FEMS Microbiol. Rev. 24, 367- 402

	551	GISLPELLEKRTGNMMQPQLADKIRKRTKQFPNGIE	618	
<b><math>\beta</math> and <math>\gamma</math>- Proteobacteria</b>	<i>E. coli</i>	KMSKSKGNVIDPLDMVD	PHGTDALRFTL	
	<i>Yersinia pestis</i>	-----E-----	-----	
	<i>Hae. influenzae</i>	-----L-I-I-	---ED-----E-A-A-R-E-AE-A	A-----
	<i>Vibrio cholerae</i>	-----L-I-I-	---D-ES-VA-----A-E-N-R-T-E---	AY---S---
	<i>Xanth. campestris</i>	-----L---II-	---IED-VA---SGL---RM-E---E-A-R-E-D-I	A-A-----I
	<i>Pse. aeruginosa</i>	-----L---I-	---D-DT-Q---SG---K---E-A-Q-RAE---E-A	SY-----
	<i>Pas. multocida</i>	-----I-----	---D-ES-----E-A-A-I-A-E-E-A	E-----
	<i>Buch. aphidicola</i>	-----I---I-	---N-I---S-LL-H-SQ---YH-I-----S	AT-----F
	<i>Shew. oneidensis</i>	-----L---I-	---D-ET-V-----A-E-S-R-E-E---	A-----
	<i>Wig. brevipalpis</i>	-----I-II-	---ED-IK---KEISNIK-IK-E-I-K-E---Q	N-A--V-LSM
	<i>Pseudomonas putida</i>	-----L---I-	---T-DA---SG---K-E-A-Q-KAE---E-A	SY-----
	<i>Coxiella burnetii</i>	-----I-II-	---DA-I---HALL-KM-KT-E-M-R-E---A	SF-----
	<i>Xylella fastidiosa</i>	-----L---II-	---T-DD-VA---TGL---K-E-A-A-R-E-E-A	---A-----I
	<i>Ral. solanacearum</i>	-----E-TL-V-LI-	---A-EP-V---TGLRR-KD-PNVE---R-E-D-P	AF-A-----F
	<i>Nei. meningitidis</i>	-----E---V-LI-	---G-EK-V---TGLRK-ET-P-VEEA-K-L-E-P	SM-A-----M
<b>Other Proteobacteria</b>	<i>Sino. meliloti</i>	-----ELI-	EY-A-----	
	<i>Ag. tumefaciens</i>	-----ELI-	EY-A-----	
	<i>Caulo. crescentus</i>	-----M---ILI-	EL-C-V----	
	<i>Bru. melitensis</i>	-----ELM-	EY-A-----	
	<i>Ri. prowazekii</i>	-----LV-EKLLLE	RY-A-VI-YWS	
	<i>Rho. palustris</i>	-----NLI-	EY-A-----	
	<i>Brucella suis</i>	-----ELM-	EY-A-----	
	<i>C. jejuni</i>	-----L-----NESIK	EYSA-I-----	
	<i>Hel. pylori</i>	-----E-IE	KY-A-S-----	
	<i>Aquifex aeolicus</i>	----TI-----IIE	RY-A-----	
<b>Other Gram-ve Bacteria</b>	<i>Chlam. trachomatis</i>	-L-----IE-IE	AY-A-V-L---	
	<i>Chl. pneumoniae</i>	-L-----E-IA	TY-----L---	
	<i>Cb. tepidium</i>	-L---L---SP---KVI-	TY-----I	
	<i>Bacteroides theta.</i>	----L---SP---ELI-	KY-A-GV-	
	<i>Treponema pallidum</i>	----LN-GV---HIIR	TY-A-----	
	<i>Bor. burgdorferi</i>	----L---G---IIN	EY-S-S-----	
	<i>Lep. interrogans</i>	-F---V-----V-M-	KY---SF--F-	
	<i>Synecho. PCC 6803</i>	----AN-G---LLIN	KY-----Y--	
	<i>Nostoc sp. PCC 7120</i>	----AN-G---LLI-	KY-----Y--	
	<i>Thermo. elongatus</i>	----AN-G---ILIE	KY-----YS-	
	<i>Cfx. aurantiacus</i>	----F---VN---IIE	QY-A---Y--	
	<i>Deino. radiodurans</i>	-----G---ELFG	QY-V--C--	
	<i>Therm. thermophilus</i>	-----E-E	RY-A-----A-	
	<i>Thermotoga maritima</i>	----L---G---EVI-	EY-A-PM----	
	<i>Fuso. nucleatum</i>	----L---SP---LIK	EY-V--I--	
<b>Actinobacteria</b>	<i>M. tuberculosis</i>	-----W-E	MF-A-----	
	<i>Str. coelicolor</i>	----F---VN---WM-	KY-S-----	
	<i>Cor. glutamicum</i>	----L---G---M-W-E	NY-A-----	
	<i>Bifido. longum</i>	-----VV-NEPIE	KF-A--V-Y	
	<i>Bac. subtilis</i>	----L---GV---M-VI-	KY-A-S--YF-	
<b>Firmicutes</b>	<i>Bac. anthracis</i>	----L---G---M-VIE	KY-A--M--F-	
	<i>Sta. aureus</i>	----L---GV---M-VI-	EY-A-S--YF-	
	<i>Clo. acetobutylicum</i>	----L---GV---VI-	TF-A----M-	
	<i>Clo. perfringens</i>	----L---G---EVI-	EY-A-----M-	
	<i>Lis. monocytogenes</i>	----L---GV---IEVI-	KY-A-S--Y--	
	<i>Ure. urealyticum</i>	----L---G---F-II-	KY-L--M-LF-	
	<i>M. pneumoniae</i>	----LN-G-N-M-LIR	DY-A--T-LF-	
	<i>Strep. pyogenes</i>	----L---G---M-VIE	KY-A-S--WF-	
<i>Strep. pneumoniae</i>	----L---G---M-VIE	KY-A---WF-		
<i>Lac. lactis</i>	----L---G---M-VIE	KY-A---WF-		

A large insert in Valyl-tRNA synthetase that is specific for  $\beta$  and  $\gamma$ -proteobacteria. Sequence information for only representative species from different groups is shown. Dashes (-) in all alignments show identity with the amino acid on the top line.