



	250	260	270	280	290	300																																										
francensis	VP	TR	AF	LQ	LT	VG	WL	QK	EP	NL	AL	VQ	T	P	H	F	F	Y	S	P	D	P	I	Q	R	N	V	P	G	G	S	E	L	P	G	D	N	E	L	F	Y	G	T	V	Q	R	G	N
ATTC10988	VP	TR	AF	LQ	LT	VG	WL	QK	EP	NL	AL	VQ	T	P	H	F	F	Y	S	P	D	P	I	Q	R	N	V	P	G	G	S	E	L	P	G	D	N	E	L	F	Y	G	T	V	Q	R	G	N
CUI	VP	TR	AF	LQ	LT	VG	WL	QK	EP	NL	AL	VQ	T	P	H	F	F	Y	S	P	D	P	I	Q	R	N	V	P	G	G	S	E	L	P	G	D	N	E	L	F	Y	G	T	V	Q	R	G	N
CUIrif2	VP	TR	AF	LQ	LT	VG	WL	QK	EP	NL	AL	VQ	T	P	H	F	F	Y	S	P	D	P	I	Q	R	N	V	P	G	G	S	E	L	P	G	D	N	E	L	F	Y	G	T	V	Q	R	G	N
uvs51	VP	TR	AF	LQ	LT	VG	WL	QK	EP	NL	AL	VQ	T	P	H	F	F	Y	S	P	D	P	I	Q	R	N	V	P	G	G	S	E	L	P	G	D	N	E	L	F	Y	G	T	V	Q	R	G	N
B23394	VP	TR	AF	LQ	LT	VG	WL	QK	EP	NL	AL	VQ	T	P	H	F	F	Y	S	P	D	P	I	Q	R	N	V	P	G	G	S	E	L	P	G	D	N	E	L	F	Y	G	T	V	Q	R	G	N
Z6	VP	TR	AF	LQ	LT	VG	WL	QK	EP	NL	AL	VQ	T	P	H	F	F	Y	S	P	D	P	I	Q	R	N	V	P	G	G	S	E	L	P	G	D	N	E	L	F	Y	G	T	V	Q	R	G	N
B4492	VP	TR	AF	LQ	LT	VG	WL	QK	EP	NL	AL	VQ	T	P	H	F	F	Y	S	P	D	P	I	Q	R	N	V	P	G	G	S	E	L	P	G	D	N	E	L	F	Y	G	T	V	Q	R	G	N
PROIMIA1	VP	TR	AF	LQ	LT	VG	WL	QK	EP	NL	AL	VQ	T	P	H	F	F	Y	S	P	D	P	I	Q	R	N	V	P	G	G	S	E	L	P	G	D	N	E	L	F	Y	G	T	V	Q	R	G	N
NCIMB11163	VP	TR	AF	LQ	LT	VG	WL	QK	EP	NL	AL	VQ	T	P	H	F	F	Y	S	P	D	P	I	Q	R	N	V	P	G	G	S	E	L	P	G	D	N	E	L	F	Y	G	T	V	Q	R	G	N
CP1	VP	TR	AF	LQ	LT	VG	WL	QK	EP	NL	AL	VQ	T	P	H	F	F	Y	S	P	D	P	I	Q	R	N	V	P	G	G	S	E	L	P	G	D	N	E	L	F	Y	G	T	V	Q	R	G	N
B1960	VP	TR	AF	LQ	LT	VG	WL	QK	EP	NL	AL	VQ	T	P	H	F	F	Y	S	P	D	P	I	Q	R	N	V	P	G	G	S	E	L	P	G	D	N	E	L	F	Y	G	T	V	Q	R	G	N
ATCC31822	VP	TR	AF	LQ	LT	VG	WL	QK	EP	NL	AL	VQ	T	P	H	F	F	Y	S	P	D	P	I	Q	R	N	V	P	G	G	S	E	L	P	G	D	N	E	L	F	Y	G	T	V	Q	R	G	N
CP4	VP	TR	AF	LQ	LT	VG	WL	QK	EP	NL	AL	VQ	T	P	H	F	F	Y	S	P	D	P	I	Q	R	N	V	P	G	G	S	E	L	P	G	D	N	E	L	F	Y	G	T	V	Q	R	G	N
B12526	VP	TR	AF	LQ	LT	VG	WL	QK	EP	NL	AL	VQ	T	P	H	F	F	Y	S	P	D	P	I	Q	R	N	V	P	G	G	S	E	L	P	G	D	N	E	L	F	Y	G	T	V	Q	R	G	N
CP3	VP	TR	AF	LQ	LT	VG	WL	QK	EP	NL	AL	VQ	T	P	H	F	F	Y	S	P	D	P	I	Q	R	N	V	P	G	G	S	E	L	P	G	D	N	E	L	F	Y	G	T	V	Q	R	G	N

	310	320	330	340	350	360																																																					
francensis	DL	W	D	A	T	F	F	C	G	S	C	A	I	L	R	R	E	A	L	E	E	N	D	G	F	S	G	E	T	V	T	E	D	A	H	T	A	L	K	L	O	R	R	G	W	D	T	A	Y	I	N	I	R	L	S	A	G	L	A
ATTC10988	DL	W	D	A	T	F	F	C	G	S	C	A	I	L	R	R	E	A	L	E	E	N	D	G	F	S	G	E	T	V	T	E	D	A	H	T	A	L	K	L	O	R	R	G	W	D	T	A	Y	I	N	I	R	L	S	A	G	L	A
CUI	DL	W	D	A	T	F	F	C	G	S	C	A	I	L	R	R	E	A	L	E	E	N	D	G	F	S	G	E	T	V	T	E	D	A	H	T	A	L	K	L	O	R	R	G	W	D	T	A	Y	I	N	I	R	L	S	A	G	L	A
CUIrif2	DL	W	D	A	T	F	F	C	G	S	C	A	I	L	R	R	E	A	L	E	E	N	D	G	F	S	G	E	T	V	T	E	D	A	H	T	A	L	K	L	O	R	R	G	W	D	T	A	Y	I	N	I	R	L	S	A	G	L	A
uvs51	DL	W	D	A	T	F	F	C	G	S	C	A	I	L	R	R	E	A	L	E	E	N	D	G	F	S	G	E	T	V	T	E	D	A	H	T	A	L	K	L	O	R	R	G	W	D	T	A	Y	I	N	I	R	L	S	A	G	L	A
B23394	DL	W	D	A	T	F	F	C	G	S	C	A	I	L	R	R	E	A	L	E	E	N	D	G	F	S	G	E	T	V	T	E	D	A	H	T	A	L	K	L	O	R	R	G	W	D	T	A	Y	I	N	I	R	L	S	A	G	L	A
Z6	DL	W	D	A	T	F	F	C	G	S	C	A	I	L	R	R	E	A	L	E	E	N	D	G	F	S	G	E	T	V	T	E	D	A	H	T	A	L	K	L	O	R	R	G	W	D	T	A	Y	I	N	I	R	L	S	A	G	L	A
B4492	DL	W	D	A	T	F	F	C	G	S	C	A	I	L	R	R	E	A	L	E	E	N	D	G	F	S	G	E	T	V	T	E	D	A	H	T	A	L	K	L	O	R	R	G	W	D	T	A	Y	I	N	I	R	L	S	A	G	L	A
PROIMIA1	DL	W	D	A	T	F	F	C	G	S	C	A	I	L	R	R	E	A	L	E	E	N	D	G	F	S	G	E	T	V	T	E	D	A	H	T	A	L	K	L	O	R	R	G	W	D	T	A	Y	I	N	I	R	L	S	A	G	L	A
NCIMB11163	DL	W	D	A	T	F	F	C	G	S	C	A	I	L	R	R	E	A	L	E	E	N	D	G	F	S	G	E	T	V	T	E	D	A	H	T	A	L	K	L	O	R	R	G	W	D	T	A	Y	I	N	I	R	L	S	A	G	L	A
CP1	DL	W	D	A	T	F	F	C	G	S	C	A	I	L	R	R	E	A	L	E	E	N	D	G	F	S	G	E	T	V	T	E	D	A	H	T	A	L	K	L	O	R	R	G	W	D	T	A	Y	I	N	I	R	L	S	A	G	L	A
B1960	DL	W	D	A	T	F	F	C	G	S	C	A	I	L	R	R	E	A	L	E	E	N	D	G	F	S	G	E	T	V	T	E	D	A	H	T	A	L	K	L	O	R	R	G	W	D	T	A	Y	I	N	I	R	L	S	A	G	L	A
ATCC31822	DL	W	D	A	T	F	F	C	G	S	C	A	I	L	R	R	E	A	L	E	E	N	D	G	F	S	G	E	T	V	T	E	D	A	H	T	A	L	K	L	O	R	R	G	W	D	T	A	Y	I	N	I	R	L	S	A	G	L	A
CP4	DL	W	D	A	T	F	F	C	G	S	C	A	I	L	R	R	E	A	L	E	E	N	D	G	F	S	G	E	T	V	T	E	D	A	H	T	A	L	K	L	O	R	R	G	W	D	T	A	Y	I	N	I	R	L	S	A	G	L	A
B12526	DL	W	D	A	T	F	F	C	G	S	C	A	I	L	R	R	E	A	L	E	E	N	D	G	F	S	G	E	T	V	T	E	D	A	H	T	A	L	K	L	O	R	R	G	W	D	T	A	Y	I	N	I	R	L	S	A	G	L	A
CP3	DL	W	D	A	T	F	F	C	G	S	C	A	I	L	R	R	E	A	L	E	E	N	D	G	F	S	G	E	T	V	T	E	D	A	H	T	A	L	K	L	O	R	R	G	W	D	T	A	Y	I	N	I	R	L	S	A	G	L	A

	370	380	390	400	410	420																																																						
francensis	T	D	T	L	L	A	H	I	K	O	R	A	R	W	A	R	G	M	T	O	I	L	R	V	D	N	P	L	W	G	R	G	L	T	I	A	O	R	L	C	Y	M	N	A	L	L	H	Y	O	F	A	L	P	R	V	I	F	L	I	S
ATTC10988	T	D	T	L	L	A	H	I	K	O	R	A	R	W	A	R	G	M	T	O	I	L	R	V	D	N	P	L	W	G	R	G	L	T	I	A	O	R	L	C	Y	M	N	A	L	L	H	Y	O	F	A	L	P	R	V	I	F	L	I	S
CUI	T	D	T	L	L	A	H	I	K	O	R	A	R	W	A	R	G	M	T	O	I	L	R	V	D	N	P	L	W	G	R	G	L	T	I	A	O	R	L	C	Y	M	N	A	L	L	H	Y	O	F	A	L	P	R	V	I	F	L	I	S
CUIrif2	T	D	T	L	L	A	H	I	K	O	R	A	R	W	A	R	G	M	T	O	I	L	R	V	D	N	P	L	W	G	R	G	L	T	I	A	O	R	L	C	Y	M	N	A	L	L	H	Y	O	F	A	L	P	R	V	I	F	L	I	S
uvs51	T	D	T	L	L	A	H	I	K	O	R	A	R	W	A	R	G	M	T	O	I	L	R	V	D	N	P	L	W	G	R	G	L	T	I	A	O	R	L	C	Y	M	N	A	L	L	H	Y	O	F	A	L	P	R	V	I	F	L	I	S
B23394	T	D	T	L	L	A	H	I	K	O	R	A	R	W	A	R	G	M	T	O	I	L	R	V	D	N	P	L	W	G	R	G	L	T	I	A	O	R	L	C	Y	M	N	A	L	L	H	Y	O	F	A	L	P	R	V	I	F	L	I	S
Z6	T	D	T	L	L	A	H	I	K	O	R	A	R	W	A	R	G	M	T	O	I	L	R	V	D	N	P	L	W	G	R	G	L	T	I	A	O	R	L	C	Y	M	N	A	L	L	H	Y	O	F	A	L	P	R	V	I	F	L	I	S
B4492	T	D	T	L	L	A	H	I	K	O	R	A	R	W	A	R	G	M	T	O	I	L	R	V	D	N	P	L	W	G	R	G	L	T	I	A	O	R	L	C	Y	M	N	A	L	L	H	Y	O	F	A	L	P	R	V	I	F	L	I	

490 500 510 520 530 540  
francensis PTLITIFLNPKKGSFNVTDKGERMEDDYFDIRSVRPHLITAGFLFLGLVVGIVKLIYSSYF  
ATTC10988 PTLITIFLNPKKGSFNVTDKGERMEDDYFDIQSARPHLITAGFLFLGLVVGIVKLIYSSYF  
CU1 PTLITIFLNPKKGSFNVTDKGERMEDDYFDIQSARPHLITAGFLFLGLVVGIVKLIYSSYF  
CU1rif2 PTLITIFLNPKKGSFNVTDKGERMEDDYFDIQSARPHLITAGFLFLGLVVGIVKLIYSSYF  
uvs51 PTLITIFLNPKKGSFNVTDKGERMEDDYFDIRSVRPHLITAGFLFLGLVVGIVKLIYSSYF  
B23394 PTLITIFLNPKKGSFNVTDKGERMEDDYFDIRSVRPHLITAGFLFLGLVVGIVKLIYSSYF  
Z6 PTLITIFLNPKKGSFNVTDKGERMEDDYFDIRSVRPHLITAGFLFLGLVVGIVKLIYSSYF  
B4492 PTLITIFLNPKKGSFNVTDKGERMEDDYFDIRSVRPHLITAGFLFLGLVVGIVKLIYSSYF  
PROIMIA1 PTLITIFLNPKKGSFNVTDKGERMEDDYFDIRSVRPHLITAGFLFLGLVVGIVKLIYSSYF  
NCIMB11163 PTLITIFLNPKKGSFNVTDKGERMEDDYFDIRSVRPHLITAGFLFLGLVVGIVKLIYSSYF  
CP1 PTLITIFLNPKKGSFNVTDKGERMEDDYFDIRSVRPHLITAGFLFLGLVVGIVKLIYSSYF  
B1960 PTLITIFLNPKKGSFNVTDKGERMEDDYFDIRSVRPHLITAGFLFLGLVVGIVKLIYSSYF  
ATCC31822 PTLITIFLNPKKGSFNVTDKGERMEDDYFDIRSVRPHLITAGFLFLGLVVGIVKLIYSSYF  
CP4 PTLITIFLNPKKGSFNVTDKGERMEDDYFDIRSVRPHLITAGFLFLGLVVGIVKLIYSSYF  
B12526 PTLITIFLNPKKGSFNVTDKGERMEDDYFDIRSVRPHLITAGFLFLGLVVGIVKLIYSSYF  
CP3 PTLITIFLNPKKGSFNVTDKGERMEDDYFDIRSVRPHLITAGFLFLGLVVGIVKLIYSSYF

550 560 570 580 590 600  
francensis HIQPSVLVLNVTWASFNFIILLASTAVAHESSROIRNTVRFPPRIPEITAYFEDGHVIDSVT  
ATTC10988 HIQPSVLVLNVTWASFNFIILLASTAVAHESSROIRNTVRFPPRIPEITAYFEDGHVIDSVT  
CU1 HIQPSVLVLNVTWASFNFIILLASTAVAHESSROIRNTVRFPPRIPEITAYFEDGHVIDSVT  
CU1rif2 HIQPSVLVLNVTWASFNFIILLASTAVAHESSROIRNTVRFPPRIPEITAYFEDGHVIDSVT  
uvs51 HIQPSVLVLNVTWASFNFIILLASTAVAHESSROIRNTVRFPPRIPEITAYFEDGHVIDSVT  
B23394 HIQPSVLVLNVTWASFNFIILLASTAVAHESSROIRNTVRFPPRIPEITAYFEDGHVIDSVT  
Z6 HIQPSVLVLNVTWASFNFIILLASTAVAHESSROIRNTVRFPPRIPEITAYFEDGHVIDSVT  
B4492 HIQPSVLVLNVTWASFNFIILLASTAVAHESSROIRNTVRFPPRIPEITAYFEDGHVIDSVT  
PROIMIA1 HIQPSVLVLNVTWASFNFIILLASTAVAHESSROIRNTVRFPPRIPEITAYFEDGHVIDSVT  
NCIMB11163 HIQPSVLVLNVTWASFNFIILLASTAVAHESSROIRNTVRFPPRIPEITAYFEDGHVIDSVT  
CP1 HIQPSVLVLNVTWASFNFIILLASTAVAHESSROIRNTVRFPPRIPEITAYFEDGHVIDSVT  
B1960 HIQPSVLVLNVTWASFNFIILLASTAVAHESSROIRNTVRFPPRIPEITAYFEDGHVIDSVT  
ATCC31822 HIQPSVLVLNVTWASFNFIILLASTAVAHESSROIRNTVRFPPRIPEITAYFEDGHVIDSVT  
CP4 HIQPSVLVLNVTWASFNFIILLASTAVAHESSROIRNTVRFPPRIPEITAYFEDGHVIDSVT  
B12526 HIQPSVLVLNVTWASFNFIILLASTAVAHESSROIRNTVRFPPRIPEITAYFEDGHVIDSVT  
CP3 HIQPSVLVLNVTWASFNFIILLASTAVAHESSROIRNTVRFPPRIPEITAYFEDGHVIDSVT

610 620 630 640 650 660  
francensis DNISLGGGLAFSLPKNYELADRDITSEISMKVDNRSFALPTKIVSKSGSLVRLQFEAASMPE  
ATTC10988 DNISLGGGLAFSLPKNYELADRDITSEISMKVDNRSFALPTKIVSKSGSLVRLQFEAASMPE  
CU1 DNISLGGGLAFSLPKNYELADRDITSEISMKVDNRSFALPTKIVSKSGSLVRLQFEAASMPE  
CU1rif2 DNISLGGGLAFSLPKNYELADRDITSEISMKVDNRSFALPTKIVSKSGSLVRLQFEAASMPE  
uvs51 DNISLGGGLAFSLPKNYELADRDITSEISMKVDNRSFALPTKIVSKSGSLVRLQFEAASMPE  
B23394 DNISLGGGLAFSLPKNYELADRDITSEISMKVDNRSFALPTKIVSKSGSLVRLQFEAASMPE  
Z6 DNISLGGGLAFSLPKNYELADRDITSEISMKVDNRSFALPTKIVSKSGSLVRLQFEAASMPE  
B4492 DNISLGGGLAFSLPKNYELADRDITSEISMKVDNRSFALPTKIVSKSGSLVRLQFEAASMPE  
PROIMIA1 DNISLGGGLAFSLPKNYELADRDITSEISIF .....  
NCIMB11163 DNISLGGGLAFSLPKNYELADRDITSEISMKVDNRSFALPTKIVSKSGSLVRLQFEAASMPE  
CP1 DNISLGGGLAFSLPKNYELADRDITSEISMKVDNRSFALPTKIVSKSGSLVRLQFEAASMPE  
B1960 DNISLGGGLAFSLPKNYELADRDITSEISMKVDNRSFALPTKIVSKSGSLVRLQFEAASMPE  
ATCC31822 DNISLGGGLAFSLPKNYELADRDITSEISMKVDNRSFALPTKIVSKSGSLVRLQFEAASMPE  
CP4 DNISLGGGLAFSLPKNYELADRDITSEISMKVDNRSFALPTKIVSKSGSLVRLQFEAASMPE  
B12526 DNISLGGGLAFSLPKNYELADRDITSEISMKVDNRSFALPTKIVSKSGSLVRLQFEAASMPE  
CP3 DNISLGGGLAFSLPKNYELADRDITSEISMKVDNRSFALPTKIVSKSGSLVRLQFEAASMPE

670 680 690 700 710 720  
francensis QKKLVAALMGQADAWLHYGPEEKPVSTIASMKHILKIFGLLRYRPQKRINKKAAIKNEK  
ATTC10988 QKKLVAALMGQADAWLHYGPEEKPVSTIASMKHILKIFGLLRYRPQKRINKKAAIKNEK  
CU1 QKKLVAALMGQADAWLHYGPEEKPVSTIASMKHILKIFGLLRYRPQKRINKKAAIKNEK  
CU1rif2 QKKLVAALMGQADAWLHYGPEEKPVSTIASMKHILKIFGLLRYRPQKRINKKAAIKNEK  
uvs51 QKKLVAALMGQADAWLHYGPEEKPVSTIASMKHILKIFGLLRYRPQKRINKKAAIKNEK  
B23394 QKKLVAALMGQADAWLHYGPEEKPVSTIASMKHILKIFGLLRYRPQKRINKKAAIKNEK  
Z6 QKKLVAALMGQADAWLHYGPEEKPVSTIASMKHILKIFGLLRYRPQKRINKKAAIKNEK  
B4492 QKKLVAALMGQADAWLHYGPEEKPVSTIASMKHILKIFGLLRYRPQKRINKKAAIKNEK  
PROIMIA1 .....  
NCIMB11163 QKKLVAALMGQADAWLHYGPEEKPVSTIASMKHILKIFGLLRYRPQKRINKKAAIKNEK  
CP1 QKKLVAALMGQADAWLHYGPEEKPVSTIASMKHILKIFGLLRYRPQKRINKKAAIKNEK  
B1960 QKKLVAALMGQADAWLHYGPEEKPVSTIASMKHILKIFGLLRYRPQKRINKKAAIKNEK  
ATCC31822 QKKLVAALMGQADAWLHYGPEEKPVSTIASMKHILKIFGLLRYRPQKRINKKAAIKNEK  
CP4 QKKLVAALMGQADAWLHYGPEEKPVSTIASMKHILKIFGLLRYRPQKRINKKAAIKNEK  
B12526 QKKLVAALMGQADAWLHYGPEEKPVSTIASMKHILKIFGLLRYRPQKRINKKAAIKNEK  
CP3 QKKLVAALMGQADAWLHYGPEEKPVSTIASMKHILKIFGLLRYRPQKRINKKAAIKNEK

francensis	<u>GAVQK</u>
ATTC10988	GAVKK
CU1	GAVKK
CU1rif2	GAVKK
uvs51	GAVKK
B23394	GAVKK
Z6	GAVKK
B4492	GAVKK
PROIMIA1	.....
NCIMB11163	GAVKK
CP1	GAVKK
B1960	GAVKK
ATCC31822	GAVKK
CP4	GAVKK
B12526	GAVKK
CP3	<u>GAVKK</u>