

# C.reinhardtii Handpick

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CAI Analyzer: 12.03.2012

## Reference set:



petA(cytochrome f)  
2898~3851 Length:954



petD(cytochrome b6/f complex subunit IV)  
6382~6864 Length:483



psbK(photosystem II protein K)  
11842~11982 Length:141



petB(cytochrome b6)  
20654~20007 Length:648



psaA(photosystem I P700 chlorophyll a apoprotein A1)  
32737~32825 174384~174205 71506~69520 Length:2256



psbA(photosystem II protein D1)  
55413~55234 53984~53781 52368~52228 51128~50898 49077~48775 Length:1059



atpE(ATP synthase CF1 epsilon subunit)  
60380~59955 Length:426



psbM(photosystem II protein M)  
64301~64197 Length:105



psbZ(photosystem II protein Z)  
64951~64763 Length:189




ccsA(cytochrome c biogenesis protein)  
68577~67516 Length:1062





psbH(photosystem II protein H)  
77013~76747 Length:267





psbN(photosystem II protein N)  
77583~77717 Length:135


 psbT(photosystem II protein T)  
79825~79730 Length:96


 psbB(photosystem II 47 kDa protein)  
81803~80277 Length:1527


 psbE(photosystem II protein V)  
94840~94592 Length:249


 psbF(photosystem II protein VI)  
102148~102282 Length:135


 psbL(photosystem II protein L)  
102912~103028 Length:117


 petG(cytochrome b6/f complex subunit V)  
103541~103654 Length:114


 psaB(photosystem I P700 chlorophyll a apoprotein A2)  
119601~121808 Length:2208


 rbcL(ribulose-1,5-bisphosphate carboxylase/oxygenase large subunit)  
123917~122490 Length:1428


 atpA(ATP synthase CF1 alpha subunit)  
124772~126298 Length:1527

 psbI(photosystem II protein I)  
126668~126781 Length:114


 atpH(ATP synthase CF0 C subunit)  
128949~129197 Length:249


 atpF(ATP synthase CF0 B subunit)  
131169~131696 Length:528


 atpB(ATP synthase CF1 beta subunit)  
161640~160165 Length:1476


 psaJ(photosystem I subunit IX)


170581~170456 Length:126


 atpI(ATP synthase CF0 A subunit)  
171633~170917 Length:717

 psbJ(photosystem II reaction center protein J)  
172467~172315 Length:153

 psbD(photosystem II protein D2)  
175632~174574 Length:1059

 psbC(photosystem II 44 kDa protein)  
187025~188410 Length:1386

 psaC(photosystem I subunit VII)  
189462~189707 Length:246

 petL(cytochrome b6/f complex subunit VI)  
190348~190446 Length:99

## Codon frequency of reference set:

[petA\(cytochrome f\)](#)

Gene analysis...

Sequence length: 954    Number of protein genes: 1    Total codons: 318

Amino acid   Codon   Number   Frequency per thousand																
Phe	UUU	7	22.0	Ser	UCU	4	12.6	Tyr	UAU	3	9.4	Cys	UGU	2	6.3	
	UUC	5	15.7		UCC	0	0.0		UAC	9	28.3		UGC	0	0.0	
Leu	UUA	23	72.3		UCA	3	9.4	STOP	UAA	1	3.1	STOP	UGA	0	0.0	
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0		Trp	UGG	0	0.0
Leu	CUU	5	15.7	Pro	CCU	8	25.2	His	CAU	0	0.0	Arg	CGU	5	15.7	
	CUC	0	0.0		CCC	0	0.0		CAC	1	3.1		CGC	2	6.3	
	CUA	0	0.0		CCA	15	47.2	Gln	CAA	19	59.7		CGA	0	0.0	
	CUG	0	0.0		CCG	1	3.1		CAG	1	3.1		CGG	0	0.0	
ile	AUU	14	44.0	Thr	ACU	7	22.0	Asn	AAU	5	15.7	Ser	AGU	4	12.6	
	AUC	3	9.4		ACC	0	0.0		AAC	16	50.3		AGC	0	0.0	
	AUA	0	0.0		ACA	3	9.4	Lys	AAA	24	75.5	Arg	AGA	0	0.0	
Met	AUG	5	15.7		ACG	0	0.0		AAG	1	3.1		AGG	0	0.0	
Val	GUU	24	75.5	Ala	GCU	14	44.0	Asp	GAU	7	22.0	Gly	GGU	25	78.6	
	GUC	0	0.0		GCC	0	0.0		GAC	2	6.3		GGC	1	3.1	
	GUA	13	40.9		GCA	15	47.2	Glu	GAA	18	56.6		GGA	0	0.0	
	GUG	0	0.0		GCG	1	3.1		GAG	2	6.3		GGG	0	0.0	

0 unidentified codons.

Nucleotide frequency: A=325 U=290 G=172 C=167 X=0

GC Content: 35.53%    1st letter GC: 56.29%    2nd letter GC: 34.59%    3rd letter GC: 15.72%

# [petD\(cytochrome b6/f complex subunit IV\)](#)

Gene analysis...

Sequence length: 483    Number of protein genes: 1    Total codons: 161

Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	2	12.4	Ser	UCU	2	12.4	Tyr	UAU	1	6.2	Cys	UGU	1	6.2
	UUC	8	49.7		UCC	0	0.0		UAC	4	24.8		UGC	0	0.0
Leu	UUA	19	118.0		UCA	2	12.4	STOP	UAA	1	6.2	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	3	18.6
Leu	CUU	4	24.8	Pro	CCU	7	43.5	His	CAU	0	0.0	Arg	CGU	3	18.6
	CUC	0	0.0		CCC	0	0.0		CAC	1	6.2		CGC	0	0.0
	CUA	1	6.2		CCA	9	55.9	Gln	CAA	2	12.4		CGA	0	0.0
	CUG	0	0.0		CCG	1	6.2		CAG	0	0.0		CGG	0	0.0
ile	AUU	9	55.9	Thr	ACU	6	37.3	Asn	AAU	0	0.0	Ser	AGU	1	6.2
	AUC	3	18.6		ACC	0	0.0		AAC	6	37.3		AGC	1	6.2
	AUA	0	0.0		ACA	2	12.4	Lys	AAA	7	43.5	Arg	AGA	0	0.0
Met	AUG	5	31.1		ACG	1	6.2		AAG	0	0.0		AGG	0	0.0
Val	GUU	9	55.9	Ala	GCU	7	43.5	Asp	GAU	4	24.8	Gly	GGU	10	62.1
	GUC	0	0.0		GCC	0	0.0		GAC	1	6.2		GGC	1	6.2
	GUA	5	31.1		GCA	6	37.3	Glu	GAA	4	24.8		GGA	1	6.2
	GUG	0	0.0		GCG	0	0.0		GAG	1	6.2		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=132 U=174 G=81 C=96 X=0

GC Content: 36.65%    1st letter GC: 47.83%    2nd letter GC: 39.75%    3rd letter GC: 22.36%

# [psbK\(photosystem II protein K\)](#)

Gene analysis...

Sequence length: 141    Number of protein genes: 1    Total codons: 47

Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	3	63.8	Ser	UCU	0	0.0	Tyr	UAU	0	0.0	Cys	UGU	0	0.0
	UUC	2	42.6		UCC	0	0.0		UAC	1	21.3		UGC	0	0.0
Leu	UUA	4	85.1		UCA	0	0.0	STOP	UAA	1	21.3	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	1	21.3
Leu	CUU	2	42.6	Pro	CCU	3	63.8	His	CAU	0	0.0	Arg	CGU	1	21.3
	CUC	0	0.0		CCC	0	0.0		CAC	0	0.0		CGC	0	0.0
	CUA	0	0.0		CCA	1	21.3	Gln	CAA	1	21.3		CGA	0	0.0
	CUG	1	21.3		CCG	1	21.3		CAG	0	0.0		CGG	0	0.0
ile	AUU	1	21.3	Thr	ACU	1	21.3	Asn	AAU	0	0.0	Ser	AGU	1	21.3
	AUC	2	42.6		ACC	0	0.0		AAC	0	0.0		AGC	0	0.0
	AUA	0	0.0		ACA	1	21.3	Lys	AAA	1	21.3	Arg	AGA	0	0.0
Met	AUG	1	21.3		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	3	63.8	Ala	GCU	2	42.6	Asp	GAU	0	0.0	Gly	GGU	0	0.0
	GUC	0	0.0		GCC	0	0.0		GAC	1	21.3		GGC	0	0.0
	GUA	4	85.1		GCA	6	127.7	Glu	GAA	1	21.3		GGA	0	0.0
	GUG	0	0.0		GCG	0	0.0		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=34 U=52 G=24 C=31 X=0

GC Content: 39.01%    1st letter GC: 57.45%    2nd letter GC: 38.3%    3rd letter GC: 21.28%

# [petB\(cytochrome b6\)](#)

Gene analysis...

Sequence length: 648    Number of protein genes: 1    Total codons: 216

Amino acid		Codon	Number	Frequency per thousand											
Phe	UUU	5	23.1	Ser	UCU	1	4.6	Tyr	UAU	3	13.9	Cys	UGU	3	13.9
	UUC	11	50.9		UCC	0	0.0		UAC	7	32.4		UGC	0	0.0
Leu	UUA	14	64.8		UCA	5	23.1	STOP	UAA	1	4.6	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0		UGG	6	27.8
Leu	CUU	3	13.9	Pro	CCU	2	9.3	His	CAU	0	0.0	Arg	CGU	10	46.3
	CUC	0	0.0		CCC	0	0.0		CAC	5	23.1		CGC	0	0.0
	CUA	1	4.6		CCA	7	32.4	Gln	CAA	6	27.8		CGA	0	0.0
	CUG	0	0.0		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	13	60.2	Thr	ACU	6	27.8	Asn	AAU	1	4.6	Ser	AGU	4	18.5
	AUC	2	9.3		ACC	0	0.0		AAC	1	4.6		AGC	0	0.0
	AUA	0	0.0		ACA	11	50.9	Lys	AAA	5	23.1	Arg	AGA	0	0.0
Met	AUG	11	50.9		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	15	69.4	Ala	GCU	7	32.4	Asp	GAU	5	23.1	Gly	GGU	20	92.6
	GUC	0	0.0		GCC	0	0.0		GAC	1	4.6		GGC	0	0.0
	GUA	11	50.9		GCA	5	23.1	Glu	GAA	5	23.1		GGA	0	0.0
	GUG	1	4.6		GCG	1	4.6		GAG	1	4.6		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=166 U=241 G=135 C=106 X=0

GC Content: 37.19%    1st letter GC: 49.07%    2nd letter GC: 40.74%    3rd letter GC: 21.76%

# [psaA\(photosystem I P700 chlorophyll a apoprotein A1\)](#)

Gene analysis...

Sequence length: 2256    Number of protein genes: 1    Total codons: 752

Amino acid		Codon	Number	Frequency per thousand											
Phe	UUU	17	22.6	Ser	UCU	15	19.9	Tyr	UAU	6	8.0	Cys	UGU	4	5.3
	UUC	33	43.9		UCC	0	0.0		UAC	14	18.6		UGC	0	0.0
Leu	UUA	59	78.5		UCA	13	17.3	STOP	UAA	1	1.3	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	3	4.0		UAG	0	0.0		UGG	28	37.2
Leu	CUU	13	17.3	Pro	CCU	14	18.6	His	CAU	7	9.3	Arg	CGU	21	27.9
	CUC	0	0.0		CCC	0	0.0		CAC	36	47.9		CGC	1	1.3
	CUA	4	5.3		CCA	16	21.3	Gln	CAA	25	33.2		CGA	0	0.0
	CUG	2	2.7		CCG	0	0.0		CAG	1	1.3		CGG	0	0.0
ile	AUU	45	59.8	Thr	ACU	22	29.3	Asn	AAU	5	6.6	Ser	AGU	19	25.3
	AUC	8	10.6		ACC	0	0.0		AAC	22	29.3		AGC	5	6.6
	AUA	0	0.0		ACA	20	26.6	Lys	AAA	19	25.3	Arg	AGA	1	1.3
Met	AUG	19	25.3		ACG	1	1.3		AAG	2	2.7		AGG	0	0.0
Val	GUU	16	21.3	Ala	GCU	53	70.5	Asp	GAU	16	21.3	Gly	GGU	69	91.8
	GUC	0	0.0		GCC	0	0.0		GAC	11	14.6		GGC	2	2.7
	GUA	25	33.2		GCA	15	19.9	Glu	GAA	18	23.9		GGA	1	1.3
	GUG	1	1.3		GCG	2	2.7		GAG	2	2.7		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=590 U=777 G=443 C=446 X=0

GC Content: 39.41%    1st letter GC: 49.34%    2nd letter GC: 43.22%    3rd letter GC: 25.66%

# [psbA\(photosystem II protein D1\)](#)

### Gene analysis...

Sequence length: 1059    Number of protein genes: 1    Total codons: 353

Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	2	5.7	Ser	UCU	12	34.0	Tyr	UAU	0	0.0	Cys	UGU	3	8.5
	UUC	24	68.0		UCC	0	0.0		UAC	13	36.8		UGC	1	2.8
Leu	UUA	18	51.0		UCA	16	45.3		UAA	1	2.8	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	10	28.3
Leu	CUU	8	22.7	Pro	CCU	4	11.3	His	CAU	1	2.8	Arg	CGU	15	42.5
	CUC	0	0.0		CCC	0	0.0		CAC	9	25.5		CGC	0	0.0
	CUA	6	17.0		CCA	8	22.7	Gln	CAA	7	19.8		CGA	0	0.0
	CUG	0	0.0		CCG	2	5.7		CAG	0	0.0		CGG	0	0.0
ile	AUU	5	14.2	Thr	ACU	12	34.0	Asn	AAU	1	2.8	Ser	AGU	0	0.0
	AUC	23	65.2		ACC	0	0.0		AAC	24	68.0		AGC	2	5.7
	AUA	0	0.0		ACA	4	11.3	Lys	AAA	0	0.0	Arg	AGA	0	0.0
Met	AUG	12	34.0		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	5	14.2	Ala	GCU	25	70.8	Asp	GAU	1	2.8	Gly	GGU	30	85.0
	GUC	0	0.0		GCC	0	0.0		GAC	6	17.0		GGC	1	2.8
	GUA	16	45.3		GCA	7	19.8	Glu	GAA	15	42.5		GGA	0	0.0
	GUG	0	0.0		GCG	0	0.0		GAG	4	11.3		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=263 U=343 G=200 C=253 X=0

GC Content: 42.78%    1st letter GC: 48.16%    2nd letter GC: 43.06%    3rd letter GC: 37.11%

### [atpE\(ATP synthase CF1 epsilon subunit\)](#)

### Gene analysis...

Sequence length: 426    Number of protein genes: 1    Total codons: 142

Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	3	21.1	Ser	UCU	3	21.1	Tyr	UAU	2	14.1	Cys	UGU	0	0.0
	UUC	1	7.0		UCC	0	0.0		UAC	1	7.0		UGC	0	0.0
Leu	UUA	8	56.3		UCA	2	14.1	STOP	UAA	1	7.0	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	2	14.1
Leu	CUU	2	14.1	Pro	CCU	3	21.1	His	CAU	0	0.0	Arg	CGU	4	28.2
	CUC	0	0.0		CCC	0	0.0		CAC	1	7.0		CGC	0	0.0
	CUA	0	0.0		CCA	2	14.1	Gln	CAA	6	42.3		CGA	0	0.0
	CUG	0	0.0		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	8	56.3	Thr	ACU	0	0.0	Asn	AAU	7	49.3	Ser	AGU	1	7.0
	AUC	3	21.1		ACC	0	0.0		AAC	3	21.1		AGC	0	0.0
	AUA	0	0.0		ACA	6	42.3	Lys	AAA	13	91.5	Arg	AGA	0	0.0
Met	AUG	4	28.2		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	5	35.2	Ala	GCU	13	91.5	Asp	GAU	3	21.1	Gly	GGU	10	70.4
	GUC	0	0.0		GCC	1	7.0		GAC	0	0.0		GGC	1	7.0
	GUA	5	35.2		GCA	4	28.2	Glu	GAA	13	91.5		GGA	0	0.0
	GUG	0	0.0		GCG	0	0.0		GAG	1	7.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=156 U=126 G=81 C=63 X=0

GC Content: 33.8%    1st letter GC: 52.11%    2nd letter GC: 36.62%    3rd letter GC: 12.68%

### [psbM\(photosystem II protein M\)](#)

### Gene analysis...

Sequence length: 105    Number of protein genes: 1    Total codons: 35

Amino acid	Codon	Number	Frequency per thousand												
Phe	UUU	1	28.6	Ser	UCU	2	57.1	Tyr	UAU	0	0.0	Cys	UGU	0	0.0
	UUC	1	28.6		UCC	0	0.0		UAC	2	57.1		UGC	0	0.0
Leu	UUA	4	114.3		UCA	0	0.0	STOP	UAA	1	28.6	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0		UGG	0	0.0
Leu	CUU	0	0.0	Pro	CCU	0	0.0	His	CAU	0	0.0	Arg	CGU	0	0.0
	CUC	0	0.0		CCC	0	0.0		CAC	0	0.0		CGC	0	0.0
	CUA	1	28.6		CCA	1	28.6	Gln	CAA	1	28.6		CGA	0	0.0
	CUG	0	0.0		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	4	114.3	Thr	ACU	2	57.1	Asn	AAU	1	28.6	Ser	AGU	0	0.0
	AUC	1	28.6		ACC	0	0.0		AAC	0	0.0		AGC	0	0.0
	AUA	0	0.0		ACA	3	85.7	Lys	AAA	1	28.6	Arg	AGA	0	0.0
Met	AUG	1	28.6		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	1	28.6	Ala	GCU	3	85.7	Asp	GAU	0	0.0	Gly	GGU	0	0.0
	GUC	0	0.0		GCC	0	0.0		GAC	1	28.6		GGC	0	0.0
	GUA	1	28.6		GCA	0	0.0	Glu	GAA	1	28.6		GGA	1	28.6
	GUG	0	0.0		GCG	0	0.0		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=36 U=40 G=10 C=19 X=0

GC Content: 27.62%    1st letter GC: 31.43%    2nd letter GC: 34.29%    3rd letter GC: 17.14%

### [psbZ\(photosystem II protein Z\)](#)

Gene analysis...

Sequence length: 189    Number of protein genes: 1    Total codons: 63

Amino acid	Codon	Number	Frequency per thousand												
Phe	UUU	4	63.5	Ser	UCU	1	15.9	Tyr	UAU	0	0.0	Cys	UGU	0	0.0
	UUC	2	31.7		UCC	0	0.0		UAC	0	0.0		UGC	0	0.0
Leu	UUA	6	95.2		UCA	3	47.6	STOP	UAA	1	15.9	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0		UGG	2	31.7
Leu	CUU	3	47.6	Pro	CCU	2	31.7	His	CAU	0	0.0	Arg	CGU	0	0.0
	CUC	0	0.0		CCC	0	0.0		CAC	0	0.0		CGC	0	0.0
	CUA	1	15.9		CCA	0	0.0	Gln	CAA	1	15.9		CGA	0	0.0
	CUG	1	15.9		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	2	31.7	Thr	ACU	2	31.7	Asn	AAU	2	31.7	Ser	AGU	0	0.0
	AUC	1	15.9		ACC	0	0.0		AAC	1	15.9		AGC	1	15.9
	AUA	0	0.0		ACA	1	15.9	Lys	AAA	1	15.9	Arg	AGA	0	0.0
Met	AUG	1	15.9		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	6	95.2	Ala	GCU	2	31.7	Asp	GAU	0	0.0	Gly	GGU	5	79.4
	GUC	0	0.0		GCC	1	15.9		GAC	1	15.9		GGC	0	0.0
	GUA	7	111.1		GCA	2	31.7	Glu	GAA	0	0.0		GGA	0	0.0
	GUG	0	0.0		GCG	0	0.0		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=42 U=82 G=36 C=29 X=0

GC Content: 34.39%    1st letter GC: 50.79%    2nd letter GC: 34.92%    3rd letter GC: 17.46%

### [ccsA\(cytochrome c biogenesis protein\)](#)

Gene analysis...

Sequence length: 1062    Number of protein genes: 1    Total codons: 354

Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	23	65.0	Ser	UCU	6	16.9	Tyr	UAU	14	39.5	Cys	UGU	5	14.1
	UUC	1	2.8		UCC	0	0.0		UAC	1	2.8		UGC	1	2.8
Leu	UUA	48	135.6		UCA	8	22.6	STOP	UAA	1	2.8	STOP	UGA	0	0.0
	UUG	5	14.1		UCG	2	5.6		UAG	0	0.0		UGG	12	33.9
Leu	CUU	2	5.6	Pro	CCU	5	14.1	His	CAU	4	11.3	Arg	CGU	3	8.5
	CUC	0	0.0		CCC	2	5.6		CAC	1	2.8		CGC	2	5.6
	CUA	1	2.8		CCA	7	19.8	Gln	CAA	8	22.6		CGA	0	0.0
	CUG	1	2.8		CCG	2	5.6		CAG	0	0.0		CGG	0	0.0
ile	AUU	22	62.1	Thr	ACU	9	25.4	Asn	AAU	20	56.5	Ser	AGU	9	25.4
	AUC	1	2.8		ACC	2	5.6		AAC	6	16.9		AGC	0	0.0
	AUA	2	5.6		ACA	11	31.1	Lys	AAA	12	33.9	Arg	AGA	1	2.8
Met	AUG	11	31.1		ACG	2	5.6		AAG	1	2.8		AGG	0	0.0
Val	GUU	11	31.1	Ala	GCU	9	25.4	Asp	GAU	3	8.5	Gly	GGU	12	33.9
	GUC	0	0.0		GCC	1	2.8		GAC	1	2.8		GGC	0	0.0
	GUA	7	19.8		GCA	9	25.4	Glu	GAA	14	39.5		GGA	5	14.1
	GUG	1	2.8		GCG	2	5.6		GAG	1	2.8		GGG	4	11.3

0 unidentified codons.

Nucleotide frequency: A=330 U=420 G=178 C=134 X=0

GC Content: 29.38% 1st letter GC: 33.33% 2nd letter GC: 37.01% 3rd letter GC: 17.8%

### [psbH\(photosystem II protein H\)](#)

Gene analysis...

Sequence length: 267 Number of protein genes: 1 Total codons: 89

Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	2	22.5	Ser	UCU	4	44.9	Tyr	UAU	0	0.0	Cys	UGU	0	0.0
	UUC	2	22.5		UCC	0	0.0		UAC	1	11.2		UGC	0	0.0
Leu	UUA	13	146.1		UCA	3	33.7	STOP	UAA	1	11.2	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0		UGG	2	22.5
Leu	CUU	2	22.5	Pro	CCU	1	11.2	His	CAU	0	0.0	Arg	CGU	1	11.2
	CUC	0	0.0		CCC	0	0.0		CAC	0	0.0		CGC	0	0.0
	CUA	0	0.0		CCA	4	44.9	Gln	CAA	1	11.2		CGA	0	0.0
	CUG	0	0.0		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	3	33.7	Thr	ACU	4	44.9	Asn	AAU	1	11.2	Ser	AGU	2	22.5
	AUC	2	22.5		ACC	0	0.0		AAC	2	22.5		AGC	0	0.0
	AUA	0	0.0		ACA	3	33.7	Lys	AAA	5	56.2	Arg	AGA	0	0.0
Met	AUG	3	33.7		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	4	44.9	Ala	GCU	3	33.7	Asp	GAU	1	11.2	Gly	GGU	4	44.9
	GUC	0	0.0		GCC	0	0.0		GAC	2	22.5		GGC	1	11.2
	GUA	3	33.7		GCA	4	44.9	Glu	GAA	4	44.9		GGA	1	11.2
	GUG	0	0.0		GCG	0	0.0		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=85 U=94 G=43 C=45 X=0

GC Content: 32.96% 1st letter GC: 40.45% 2nd letter GC: 41.57% 3rd letter GC: 16.85%

### [psbN\(photosystem II protein N\)](#)

Gene analysis...

Sequence length: 135 Number of protein genes: 1 Total codons: 45



Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	7	155.6	Ser	UCU	0	0.0	Tyr	UAU	2	44.4	Cys	UGU	0	0.0
	UUC	1	22.2		UCC	0	0.0		UAC	0	0.0		UGC	0	0.0
Leu	UUA	3	66.7		UCA	2	44.4	STOP	UAA	1	22.2	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	1	22.2
Leu	CUU	1	22.2	Pro	CCU	2	44.4	His	CAU	0	0.0	Arg	CGU	1	22.2
	CUC	0	0.0		CCC	0	0.0		CAC	1	22.2		CGC	0	0.0
	CUA	0	0.0		CCA	2	44.4	Gln	CAA	0	0.0		CGA	0	0.0
	CUG	1	22.2		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	0	0.0	Thr	ACU	1	22.2	Asn	AAU	0	0.0	Ser	AGU	3	66.7
	AUC	0	0.0		ACC	1	22.2		AAC	0	0.0		AGC	0	0.0
	AUA	0	0.0		ACA	0	0.0	Lys	AAA	2	44.4	Arg	AGA	0	0.0
Met	AUG	1	22.2		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	2	44.4	Ala	GCU	1	22.2	Asp	GAU	2	44.4	Gly	GGU	1	22.2
	GUC	0	0.0		GCC	0	0.0		GAC	0	0.0		GGC	1	22.2
	GUA	1	22.2		GCA	0	0.0	Glu	GAA	4	88.9		GGA	0	0.0
	GUG	0	0.0		GCG	0	0.0		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=35 U=57 G=22 C=21 X=0

GC Content: 31.85% 1st letter GC: 44.44% 2nd letter GC: 35.56% 3rd letter GC: 15.56%

### [psbT\(photosystem II protein T\)](#)

Gene analysis...

Sequence length: 96 Number of protein genes: 1 Total codons: 32

Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	0	0.0	Ser	UCU	0	0.0	Tyr	UAU	1	31.2	Cys	UGU	0	0.0
	UUC	5	156.3		UCC	0	0.0		UAC	0	0.0		UGC	0	0.0
Leu	UUA	4	125.0		UCA	1	31.2	STOP	UAA	1	31.2	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	0	0.0
Leu	CUU	0	0.0	Pro	CCU	1	31.2	His	CAU	0	0.0	Arg	CGU	1	31.2
	CUC	0	0.0		CCC	0	0.0		CAC	0	0.0		CGC	0	0.0
	CUA	0	0.0		CCA	1	31.2	Gln	CAA	0	0.0		CGA	0	0.0
	CUG	0	0.0		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	4	125.0	Thr	ACU	2	62.5	Asn	AAU	0	0.0	Ser	AGU	0	0.0
	AUC	0	0.0		ACC	0	0.0		AAC	0	0.0		AGC	0	0.0
	AUA	0	0.0		ACA	0	0.0	Lys	AAA	1	31.2	Arg	AGA	1	31.2
Met	AUG	2	62.5		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	1	31.2	Ala	GCU	1	31.2	Asp	GAU	1	31.2	Gly	GGU	1	31.2
	GUC	0	0.0		GCC	0	0.0		GAC	0	0.0		GGC	0	0.0
	GUA	1	31.2		GCA	0	0.0	Glu	GAA	1	31.2		GGA	0	0.0
	GUG	0	0.0		GCG	0	0.0		GAG	0	0.0		GGG	1	31.2

0 unidentified codons.

Nucleotide frequency: A=26 U=42 G=14 C=14 X=0

GC Content: 29.17% 1st letter GC: 31.25% 2nd letter GC: 31.25% 3rd letter GC: 25%

### [psbB\(photosystem II 47 kDa protein\)](#)

Gene analysis...

Sequence length: 1527 Number of protein genes: 1 Total codons: 509

Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	16	31.4	Ser	UCU	14	27.5	Tyr	UAU	5	9.8	Cys	UGU	3	5.9
	UUC	27	53.0		UCC	0	0.0		UAC	9	17.7		UGC	0	0.0
Leu	UUA	38	74.7		UCA	12	23.6	STOP	UAA	1	2.0	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0		UGG	18	35.4
Leu	CUU	4	7.9	Pro	CCU	8	15.7	His	CAU	1	2.0	Arg	CGU	22	43.2
	CUC	0	0.0		CCC	0	0.0		CAC	13	25.5		CGC	1	2.0
	CUA	3	5.9		CCA	17	33.4	Gln	CAA	13	25.5		CGA	1	2.0
	CUG	0	0.0		CCG	0	0.0		CAG	1	2.0		CGG	0	0.0
ile	AUU	22	43.2	Thr	ACU	11	21.6	Asn	AAU	3	5.9	Ser	AGU	7	13.8
	AUC	7	13.8		ACC	0	0.0		AAC	5	9.8		AGC	3	5.9
	AUA	0	0.0		ACA	15	29.5	Lys	AAA	15	29.5	Arg	AGA	0	0.0
Met	AUG	10	19.6		ACG	1	2.0		AAG	0	0.0		AGG	1	2.0
Val	GUU	17	33.4	Ala	GCU	25	49.1	Asp	GAU	16	31.4	Gly	GGU	58	113.9
	GUC	0	0.0		GCC	0	0.0		GAC	11	21.6		GGC	0	0.0
	GUA	17	33.4		GCA	15	29.5	Glu	GAA	19	37.3		GGA	0	0.0
	GUG	1	2.0		GCG	2	3.9		GAG	0	0.0		GGG	1	2.0

0 unidentified codons.

Nucleotide frequency: A=378 U=537 G=332 C=280 X=0

GC Content: 40.08% 1st letter GC: 52.26% 2nd letter GC: 46.17% 3rd letter GC: 21.81%

### [psbE\(photosystem II protein V\)](#)

Gene analysis...

Sequence length: 249 Number of protein genes: 1 Total codons: 83

Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	3	36.1	Ser	UCU	1	12.0	Tyr	UAU	2	24.1	Cys	UGU	0	0.0
	UUC	3	36.1		UCC	0	0.0		UAC	1	12.0		UGC	0	0.0
Leu	UUA	6	72.3		UCA	1	12.0	STOP	UAA	1	12.0	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0		UGG	2	24.1
Leu	CUU	1	12.0	Pro	CCU	2	24.1	His	CAU	0	0.0	Arg	CGU	5	60.2
	CUC	0	0.0		CCC	0	0.0		CAC	1	12.0		CGC	0	0.0
	CUA	0	0.0		CCA	4	48.2	Gln	CAA	2	24.1		CGA	0	0.0
	CUG	0	0.0		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	6	72.3	Thr	ACU	3	36.1	Asn	AAU	2	24.1	Ser	AGU	3	36.1
	AUC	0	0.0		ACC	0	0.0		AAC	1	12.0		AGC	0	0.0
	AUA	0	0.0		ACA	3	36.1	Lys	AAA	3	36.1	Arg	AGA	0	0.0
Met	AUG	1	12.0		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	2	24.1	Ala	GCU	5	60.2	Asp	GAU	2	24.1	Gly	GGU	5	60.2
	GUC	0	0.0		GCC	0	0.0		GAC	2	24.1		GGC	0	0.0
	GUA	4	48.2		GCA	1	12.0	Glu	GAA	4	48.2		GGA	0	0.0
	GUG	0	0.0		GCG	0	0.0		GAG	1	12.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=73 U=88 G=45 C=43 X=0

GC Content: 35.34% 1st letter GC: 49.4% 2nd letter GC: 42.17% 3rd letter GC: 14.46%

### [psbF\(photosystem II protein VI\)](#)

Gene analysis...

Sequence length: 135 Number of protein genes: 1 Total codons: 45

Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	0	0.0	Ser	UCU	0	0.0	Tyr	UAU	1	22.2	Cys	UGU	0	0.0
	UUC	4	88.9		UCC	0	0.0		UAC	0	0.0		UGC	0	0.0
Leu	UUA	2	44.4		UCA	1	22.2	STOP	UAA	1	22.2	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	1	22.2
Leu	CUU	1	22.2	Pro	CCU	1	22.2	His	CAU	0	0.0	Arg	CGU	2	44.4
	CUC	0	0.0		CCC	0	0.0		CAC	1	22.2		CGC	0	0.0
	CUA	0	0.0		CCA	1	22.2	Gln	CAA	2	44.4		CGA	0	0.0
	CUG	0	0.0		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	5	111.1	Thr	ACU	1	22.2	Asn	AAU	0	0.0	Ser	AGU	0	0.0
	AUC	1	22.2		ACC	0	0.0		AAC	0	0.0		AGC	0	0.0
	AUA	0	0.0		ACA	4	88.9	Lys	AAA	2	44.4	Arg	AGA	0	0.0
Met	AUG	2	44.4		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	2	44.4	Ala	GCU	4	88.9	Asp	GAU	0	0.0	Gly	GGU	1	22.2
	GUC	0	0.0		GCC	0	0.0		GAC	0	0.0		GGC	0	0.0
	GUA	2	44.4		GCA	1	22.2	Glu	GAA	1	22.2		GGA	1	22.2
	GUG	0	0.0		GCG	0	0.0		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=41 U=47 G=20 C=27 X=0

GC Content: 34.81% 1st letter GC: 44.44% 2nd letter GC: 40% 3rd letter GC: 20%

### [psbL\(photosystem II protein L\)](#)

Gene analysis...

Sequence length: 117 Number of protein genes: 1 Total codons: 39

Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	1	25.6	Ser	UCU	1	25.6	Tyr	UAU	1	25.6	Cys	UGU	0	0.0
	UUC	2	51.3		UCC	0	0.0		UAC	1	25.6		UGC	0	0.0
Leu	UUA	5	128.2		UCA	0	0.0	STOP	UAA	0	0.0	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	1	25.6		Trp	UGG	1
Leu	CUU	2	51.3	Pro	CCU	0	0.0	His	CAU	0	0.0	Arg	CGU	1	25.6
	CUC	0	0.0		CCC	0	0.0		CAC	0	0.0		CGC	0	0.0
	CUA	0	0.0		CCA	2	51.3	Gln	CAA	1	25.6		CGA	0	0.0
	CUG	0	0.0		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	1	25.6	Thr	ACU	1	25.6	Asn	AAU	2	51.3	Ser	AGU	2	51.3
	AUC	1	25.6		ACC	0	0.0		AAC	2	51.3		AGC	0	0.0
	AUA	0	0.0		ACA	0	0.0	Lys	AAA	1	25.6	Arg	AGA	1	25.6
Met	AUG	1	25.6		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	2	51.3	Ala	GCU	2	51.3	Asp	GAU	0	0.0	Gly	GGU	1	25.6
	GUC	0	0.0		GCC	0	0.0		GAC	0	0.0		GGC	0	0.0
	GUA	2	51.3		GCA	0	0.0	Glu	GAA	1	25.6		GGA	0	0.0
	GUG	0	0.0		GCG	0	0.0		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=35 U=47 G=17 C=18 X=0

GC Content: 29.91% 1st letter GC: 35.9% 2nd letter GC: 30.77% 3rd letter GC: 23.08%

### [petG\(cytochrome b6/f complex subunit V\)](#)

Gene analysis...

Sequence length: 114 Number of protein genes: 1 Total codons: 38

Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	0	0.0	Ser	UCU	0	0.0	Tyr	UAU	3	78.9	Cys	UGU	1	26.3
	UUC	1	26.3		UCC	0	0.0		UAC	0	0.0		UGC	0	0.0
Leu	UUA	6	157.9		UCA	0	0.0	STOP	UAA	1	26.3	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	0	0.0
Leu	CUU	0	0.0	Pro	CCU	1	26.3	His	CAU	0	0.0	Arg	CGU	1	26.3
	CUC	0	0.0		CCC	0	0.0		CAC	0	0.0		CGC	0	0.0
	CUA	1	26.3		CCA	1	26.3	Gln	CAA	1	26.3		CGA	0	0.0
	CUG	1	26.3		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	2	52.6	Thr	ACU	1	26.3	Asn	AAU	0	0.0	Ser	AGU	0	0.0
	AUC	0	0.0		ACC	0	0.0		AAC	0	0.0		AGC	0	0.0
	AUA	0	0.0		ACA	1	26.3	Lys	AAA	0	0.0	Arg	AGA	0	0.0
Met	AUG	1	26.3		ACG	1	26.3		AAG	0	0.0		AGG	0	0.0
Val	GUU	2	52.6	Ala	GCU	1	26.3	Asp	GAU	1	26.3	Gly	GGU	3	78.9
	GUC	0	0.0		GCC	0	0.0		GAC	0	0.0		GGC	1	26.3
	GUA	3	78.9		GCA	2	52.6	Glu	GAA	1	26.3		GGA	0	0.0
	GUG	0	0.0		GCG	0	0.0		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=30 U=45 G=23 C=16 X=0

GC Content: 34.21% 1st letter GC: 52.63% 2nd letter GC: 36.84% 3rd letter GC: 13.16%

#### [psaB\(photosystem I P700 chlorophyll a apoprotein A2\)](#)

Gene analysis...

Sequence length: 2208 Number of protein genes: 1 Total codons: 736

Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	21	28.5	Ser	UCU	24	32.6	Tyr	UAU	5	6.8	Cys	UGU	3	4.1
	UUC	35	47.6		UCC	0	0.0		UAC	21	28.5		UGC	0	0.0
Leu	UUA	57	77.4		UCA	12	16.3	STOP	UAA	1	1.4	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	3	4.1		UAG	0	0.0	Trp	UGG	30	40.8
Leu	CUU	19	25.8	Pro	CCU	10	13.6	His	CAU	5	6.8	Arg	CGU	16	21.7
	CUC	0	0.0		CCC	0	0.0		CAC	36	48.9		CGC	0	0.0
	CUA	5	6.8		CCA	20	27.2	Gln	CAA	36	48.9		CGA	0	0.0
	CUG	1	1.4		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	33	44.8	Thr	ACU	25	34.0	Asn	AAU	5	6.8	Ser	AGU	5	6.8
	AUC	7	9.5		ACC	0	0.0		AAC	22	29.9		AGC	6	8.2
	AUA	0	0.0		ACA	19	25.8	Lys	AAA	16	21.7	Arg	AGA	1	1.4
Met	AUG	16	21.7		ACG	0	0.0		AAG	2	2.7		AGG	0	0.0
Val	GUU	14	19.0	Ala	GCU	54	73.4	Asp	GAU	15	20.4	Gly	GGU	64	87.0
	GUC	0	0.0		GCC	1	1.4		GAC	13	17.7		GGC	2	2.7
	GUA	23	31.3		GCA	14	19.0	Glu	GAA	14	19.0		GGA	1	1.4
	GUG	0	0.0		GCG	1	1.4		GAG	2	2.7		GGG	1	1.4

0 unidentified codons.

Nucleotide frequency: A=569 U=761 G=404 C=474 X=0

GC Content: 39.76% 1st letter GC: 49.86% 2nd letter GC: 42.39% 3rd letter GC: 27.04%

#### [rbcL\(ribulose-1,5-bisphosphate carboxylase/oxygenase large subunit\)](#)

Gene analysis...

Sequence length: 1428 Number of protein genes: 1 Total codons: 476

Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	2	4.2	Ser	UCU	5	10.5	Tyr	UAU	2	4.2	Cys	UGU	12	25.2
	UUC	17	35.7		UCC	0	0.0		UAC	17	35.7		UGC	0	0.0
Leu	UUA	15	31.5		UCA	8	16.8	STOP	UAA	1	2.1	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	8	16.8
Leu	CUU	17	35.7	Pro	CCU	7	14.7	His	CAU	0	0.0	Arg	CGU	30	63.0
	CUC	0	0.0		CCC	0	0.0		CAC	13	27.3		CGC	0	0.0
	CUA	6	12.6		CCA	13	27.3	Gln	CAA	8	16.8		CGA	0	0.0
	CUG	0	0.0		CCG	1	2.1		CAG	2	4.2		CGG	0	0.0
ile	AUU	15	31.5	Thr	ACU	17	35.7	Asn	AAU	0	0.0	Ser	AGU	1	2.1
	AUC	6	12.6		ACC	0	0.0		AAC	14	29.4		AGC	1	2.1
	AUA	0	0.0		ACA	12	25.2	Lys	AAA	23	48.3	Arg	AGA	1	2.1
Met	AUG	13	27.3		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	16	33.6	Ala	GCU	35	73.5	Asp	GAU	7	14.7	Gly	GGU	46	96.6
	GUC	0	0.0		GCC	1	2.1		GAC	23	48.3		GGC	2	4.2
	GUA	19	39.9		GCA	8	16.8	Glu	GAA	30	63.0		GGA	1	2.1
	GUG	0	0.0		GCG	1	2.1		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=388 U=425 G=316 C=299 X=0

GC Content: 43.07% 1st letter GC: 60.08% 2nd letter GC: 44.12% 3rd letter GC: 25%

#### [atpA\(ATP synthase CF1 alpha subunit\)](#)

Gene analysis...

Sequence length: 1527 Number of protein genes: 1 Total codons: 509

Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	2	3.9	Ser	UCU	13	25.5	Tyr	UAU	10	19.6	Cys	UGU	2	3.9
	UUC	10	19.6		UCC	0	0.0		UAC	12	23.6		UGC	0	0.0
Leu	UUA	40	78.6		UCA	11	21.6	STOP	UAA	1	2.0	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	0	0.0
Leu	CUU	12	23.6	Pro	CCU	3	5.9	His	CAU	0	0.0	Arg	CGU	27	53.0
	CUC	0	0.0		CCC	0	0.0		CAC	1	2.0		CGC	1	2.0
	CUA	5	9.8		CCA	18	35.4	Gln	CAA	25	49.1		CGA	0	0.0
	CUG	0	0.0		CCG	1	2.0		CAG	1	2.0		CGG	0	0.0
ile	AUU	24	47.2	Thr	ACU	11	21.6	Asn	AAU	7	13.8	Ser	AGU	2	3.9
	AUC	7	13.8		ACC	0	0.0		AAC	10	19.6		AGC	4	7.9
	AUA	0	0.0		ACA	15	29.5	Lys	AAA	23	45.2	Arg	AGA	0	0.0
Met	AUG	10	19.6		ACG	1	2.0		AAG	1	2.0		AGG	0	0.0
Val	GUU	16	31.4	Ala	GCU	42	82.5	Asp	GAU	11	21.6	Gly	GGU	46	90.4
	GUC	0	0.0		GCC	0	0.0		GAC	9	17.7		GGC	0	0.0
	GUA	20	39.3		GCA	14	27.5	Glu	GAA	35	68.8		GGA	0	0.0
	GUG	1	2.0		GCG	3	5.9		GAG	2	3.9		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=470 U=476 G=301 C=280 X=0

GC Content: 38.05% 1st letter GC: 57.56% 2nd letter GC: 42.04% 3rd letter GC: 14.54%

#### [psbI\(photosystem II protein I\)](#)

Gene analysis...

Sequence length: 114 Number of protein genes: 1 Total codons: 38

Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	4	105.3	Ser	UCU	1	26.3	Tyr	UAU	1	26.3	Cys	UGU	1	26.3
	UUC	2	52.6		UCC	0	0.0		UAC	0	0.0		UGC	0	0.0
Leu	UUA	5	131.6		UCA	0	0.0	STOP	UAA	1	26.3	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	0	0.0
Leu	CUU	0	0.0	Pro	CCU	1	26.3	His	CAU	0	0.0	Arg	CGU	1	26.3
	CUC	0	0.0		CCC	0	0.0		CAC	0	0.0		CGC	0	0.0
	CUA	0	0.0		CCA	1	26.3	Gln	CAA	0	0.0		CGA	0	0.0
	CUG	0	0.0		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	2	52.6	Thr	ACU	0	0.0	Asn	AAU	2	52.6	Ser	AGU	0	0.0
	AUC	0	0.0		ACC	0	0.0		AAC	1	26.3		AGC	0	0.0
	AUA	0	0.0		ACA	2	52.6	Lys	AAA	2	52.6	Arg	AGA	0	0.0
Met	AUG	1	26.3		ACG	1	26.3		AAG	0	0.0		AGG	0	0.0
Val	GUU	3	78.9	Ala	GCU	1	26.3	Asp	GAU	0	0.0	Gly	GGU	2	52.6
	GUC	0	0.0		GCC	0	0.0		GAC	2	52.6		GGC	0	0.0
	GUA	1	26.3		GCA	0	0.0	Glu	GAA	0	0.0		GGA	0	0.0
	GUG	0	0.0		GCG	0	0.0		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=32 U=52 G=15 C=15 X=0

GC Content: 26.32% 1st letter GC: 31.58% 2nd letter GC: 28.95% 3rd letter GC: 18.42%

#### [atpH\(ATP synthase CF0 C subunit\)](#)

Gene analysis...

Sequence length: 249 Number of protein genes: 1 Total codons: 83

Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	0	0.0	Ser	UCU	3	36.1	Tyr	UAU	1	12.0	Cys	UGU	0	0.0
	UUC	4	48.2		UCC	0	0.0		UAC	1	12.0		UGC	0	0.0
Leu	UUA	5	60.2		UCA	0	0.0	STOP	UAA	1	12.0	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	0	0.0
Leu	CUU	3	36.1	Pro	CCU	3	36.1	His	CAU	0	0.0	Arg	CGU	2	24.1
	CUC	0	0.0		CCC	0	0.0		CAC	0	0.0		CGC	0	0.0
	CUA	2	24.1		CCA	1	12.0	Gln	CAA	2	24.1		CGA	0	0.0
	CUG	0	0.0		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	3	36.1	Thr	ACU	2	24.1	Asn	AAU	0	0.0	Ser	AGU	1	12.0
	AUC	2	24.1		ACC	0	0.0		AAC	2	24.1		AGC	0	0.0
	AUA	0	0.0		ACA	1	12.0	Lys	AAA	1	12.0	Arg	AGA	0	0.0
Met	AUG	3	36.1		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	5	60.2	Ala	GCU	13	156.6	Asp	GAU	0	0.0	Gly	GGU	12	144.6
	GUC	0	0.0		GCC	0	0.0		GAC	0	0.0		GGC	0	0.0
	GUA	2	24.1		GCA	3	36.1	Glu	GAA	4	48.2		GGA	0	0.0
	GUG	0	0.0		GCG	1	12.0		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=49 U=92 G=59 C=49 X=0

GC Content: 43.37% 1st letter GC: 63.86% 2nd letter GC: 50.6% 3rd letter GC: 15.66%

#### [atpF\(ATP synthase CF0 B subunit\)](#)

Gene analysis...

Sequence length: 528 Number of protein genes: 1 Total codons: 176

Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	9	51.1	Ser	UCU	4	22.7	Tyr	UAU	4	22.7	Cys	UGU	0	0.0
	UUC	2	11.4		UCC	0	0.0		UAC	1	5.7		UGC	0	0.0
Leu	UUA	17	96.6		UCA	2	11.4	STOP	UAA	1	5.7	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0		UGG	0	0.0
Leu	CUU	1	5.7	Pro	CCU	0	0.0	His	CAU	3	17.0	Arg	CGU	11	62.5
	CUC	0	0.0		CCC	0	0.0		CAC	0	0.0		CGC	0	0.0
	CUA	0	0.0		CCA	1	5.7	Gln	CAA	12	68.2		CGA	0	0.0
	CUG	0	0.0		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	9	51.1	Thr	ACU	6	34.1	Asn	AAU	6	34.1	Ser	AGU	0	0.0
	AUC	2	11.4		ACC	0	0.0		AAC	9	51.1		AGC	0	0.0
	AUA	0	0.0		ACA	4	22.7	Lys	AAA	11	62.5	Arg	AGA	0	0.0
Met	AUG	2	11.4		ACG	1	5.7		AAG	1	5.7		AGG	0	0.0
Val	GUU	12	68.2	Ala	GCU	6	34.1	Asp	GAU	3	17.0	Gly	GGU	6	34.1
	GUC	0	0.0		GCC	1	5.7		GAC	0	0.0		GGC	2	11.4
	GUA	5	28.4		GCA	7	39.8	Glu	GAA	15	85.2		GGA	0	0.0
	GUG	0	0.0		GCG	0	0.0		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=192 U=179 G=80 C=77 X=0

GC Content: 29.73% 1st letter GC: 48.3% 2nd letter GC: 28.98% 3rd letter GC: 11.93%

#### [atpB\(ATP synthase CF1 beta subunit\)](#)

Gene analysis...

Sequence length: 1476 Number of protein genes: 1 Total codons: 492

Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	5	10.2	Ser	UCU	11	22.4	Tyr	UAU	4	8.1	Cys	UGU	2	4.1
	UUC	14	28.5		UCC	0	0.0		UAC	8	16.3		UGC	0	0.0
Leu	UUA	32	65.0		UCA	10	20.3	STOP	UAA	1	2.0	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	1	2.0		UAG	0	0.0		UGG	2	4.1
Leu	CUU	11	22.4	Pro	CCU	11	22.4	His	CAU	0	0.0	Arg	CGU	22	44.7
	CUC	0	0.0		CCC	0	0.0		CAC	4	8.1		CGC	0	0.0
	CUA	3	6.1		CCA	11	22.4	Gln	CAA	15	30.5		CGA	0	0.0
	CUG	1	2.0		CCG	2	4.1		CAG	1	2.0		CGG	0	0.0
ile	AUU	30	61.0	Thr	ACU	16	32.5	Asn	AAU	2	4.1	Ser	AGU	3	6.1
	AUC	3	6.1		ACC	0	0.0		AAC	16	32.5		AGC	1	2.0
	AUA	1	2.0		ACA	17	34.6	Lys	AAA	24	48.8	Arg	AGA	1	2.0
Met	AUG	16	32.5		ACG	0	0.0		AAG	1	2.0		AGG	0	0.0
Val	GUU	20	40.7	Ala	GCU	36	73.2	Asp	GAU	18	36.6	Gly	GGU	39	79.3
	GUC	0	0.0		GCC	0	0.0		GAC	7	14.2		GGC	3	6.1
	GUA	25	50.8		GCA	6	12.2	Glu	GAA	33	67.1		GGA	2	4.1
	GUG	0	0.0		GCG	1	2.0		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=446 U=481 G=290 C=259 X=0

GC Content: 37.2% 1st letter GC: 55.08% 2nd letter GC: 40.04% 3rd letter GC: 16.46%

#### [psaJ\(photosystem I subunit IX\)](#)

Gene analysis...

Sequence length: 126 Number of protein genes: 1 Total codons: 42



Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	5	119.0	Ser	UCU	0	0.0	Tyr	UAU	2	47.6	Cys	UGU	0	0.0
	UUC	1	23.8		UCC	0	0.0		UAC	0	0.0		UGC	0	0.0
Leu	UUA	3	71.4		UCA	2	47.6	STOP	UAA	1	23.8	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	1	23.8
Leu	CUU	1	23.8	Pro	CCU	2	47.6	His	CAU	0	0.0	Arg	CGU	1	23.8
	CUC	0	0.0		CCC	0	0.0		CAC	0	0.0		CGC	0	0.0
	CUA	0	0.0		CCA	1	23.8	Gln	CAA	0	0.0		CGA	0	0.0
	CUG	0	0.0		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	4	95.2	Thr	ACU	4	95.2	Asn	AAU	0	0.0	Ser	AGU	0	0.0
	AUC	0	0.0		ACC	0	0.0		AAC	1	23.8		AGC	0	0.0
	AUA	0	0.0		ACA	2	47.6	Lys	AAA	1	23.8	Arg	AGA	0	0.0
Met	AUG	1	23.8		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	0	0.0	Ala	GCU	1	23.8	Asp	GAU	2	47.6	Gly	GGU	1	23.8
	GUC	0	0.0		GCC	0	0.0		GAC	0	0.0		GGC	0	0.0
	GUA	2	47.6		GCA	2	47.6	Glu	GAA	1	23.8		GGA	0	0.0
	GUG	0	0.0		GCG	0	0.0		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=36 U=55 G=14 C=21 X=0

GC Content: 27.78% 1st letter GC: 33.33% 2nd letter GC: 40.48% 3rd letter GC: 9.52%

#### [atpI\(ATP synthase CF0 A subunit\)](#)

Gene analysis...

Sequence length: 717 Number of protein genes: 1 Total codons: 239

Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	9	37.7	Ser	UCU	3	12.6	Tyr	UAU	5	20.9	Cys	UGU	0	0.0
	UUC	7	29.3		UCC	0	0.0		UAC	5	20.9		UGC	0	0.0
Leu	UUA	28	117.2		UCA	5	20.9	STOP	UAA	1	4.2	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	4	16.7
Leu	CUU	9	37.7	Pro	CCU	4	16.7	His	CAU	0	0.0	Arg	CGU	2	8.4
	CUC	0	0.0		CCC	0	0.0		CAC	4	16.7		CGC	1	4.2
	CUA	2	8.4		CCA	7	29.3	Gln	CAA	4	16.7		CGA	1	4.2
	CUG	0	0.0		CCG	1	4.2		CAG	1	4.2		CGG	0	0.0
ile	AUU	19	79.5	Thr	ACU	6	25.1	Asn	AAU	5	20.9	Ser	AGU	2	8.4
	AUC	1	4.2		ACC	0	0.0		AAC	6	25.1		AGC	3	12.6
	AUA	0	0.0		ACA	6	25.1	Lys	AAA	6	25.1	Arg	AGA	0	0.0
Met	AUG	2	8.4		ACG	2	8.4		AAG	0	0.0		AGG	0	0.0
Val	GUU	10	41.8	Ala	GCU	5	20.9	Asp	GAU	6	25.1	Gly	GGU	16	66.9
	GUC	0	0.0		GCC	2	8.4		GAC	1	4.2		GGC	1	4.2
	GUA	9	37.7		GCA	8	33.5	Glu	GAA	13	54.4		GGA	1	4.2
	GUG	0	0.0		GCG	5	20.9		GAG	1	4.2		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=207 U=264 G=125 C=121 X=0

GC Content: 34.31% 1st letter GC: 47.7% 2nd letter GC: 35.56% 3rd letter GC: 19.67%

#### [psbJ\(photosystem II reaction center protein J\)](#)

Gene analysis...

Sequence length: 153 Number of protein genes: 1 Total codons: 51



Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	4	78.4	Ser	UCU	2	39.2	Tyr	UAU	1	19.6	Cys	UGU	2	39.2
	UUC	5	98.0		UCC	0	0.0		UAC	0	0.0		UGC	0	0.0
Leu	UUA	2	39.2		UCA	0	0.0	STOP	UAA	0	0.0	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	1	19.6	Trp	UGG	2	39.2
Leu	CUU	1	19.6	Pro	CCU	1	19.6	His	CAU	0	0.0	Arg	CGU	1	19.6
	CUC	0	0.0		CCC	0	0.0		CAC	0	0.0		CGC	0	0.0
	CUA	1	19.6		CCA	0	0.0	Gln	CAA	0	0.0		CGA	0	0.0
	CUG	0	0.0		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	2	39.2	Thr	ACU	5	98.0	Asn	AAU	1	19.6	Ser	AGU	0	0.0
	AUC	2	39.2		ACC	0	0.0		AAC	0	0.0		AGC	1	19.6
	AUA	1	19.6		ACA	0	0.0	Lys	AAA	2	39.2	Arg	AGA	0	0.0
Met	AUG	1	19.6		ACG	0	0.0		AAG	0	0.0		AGG	1	19.6
Val	GUU	2	39.2	Ala	GCU	1	19.6	Asp	GAU	0	0.0	Gly	GGU	2	39.2
	GUC	0	0.0		GCC	0	0.0		GAC	0	0.0		GGC	1	19.6
	GUA	0	0.0		GCA	1	19.6	Glu	GAA	2	39.2		GGA	3	58.8
	GUG	0	0.0		GCG	0	0.0		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=35 U=65 G=30 C=23 X=0

GC Content: 34.64% 1st letter GC: 31.37% 2nd letter GC: 45.1% 3rd letter GC: 27.45%

### [psbD\(photosystem II protein D2\)](#)

Gene analysis...

Sequence length: 1059 Number of protein genes: 1 Total codons: 353

Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	5	14.2	Ser	UCU	5	14.2	Tyr	UAU	2	5.7	Cys	UGU	4	11.3
	UUC	32	90.7		UCC	0	0.0		UAC	7	19.8		UGC	0	0.0
Leu	UUA	23	65.2		UCA	8	22.7	STOP	UAA	1	2.8	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	14	39.7
Leu	CUU	9	25.5	Pro	CCU	6	17.0	His	CAU	1	2.8	Arg	CGU	15	42.5
	CUC	0	0.0		CCC	0	0.0		CAC	7	19.8		CGC	1	2.8
	CUA	5	14.2		CCA	8	22.7	Gln	CAA	10	28.3		CGA	0	0.0
	CUG	0	0.0		CCG	0	0.0		CAG	2	5.7		CGG	0	0.0
ile	AUU	12	34.0	Thr	ACU	10	28.3	Asn	AAU	0	0.0	Ser	AGU	3	8.5
	AUC	3	8.5		ACC	0	0.0		AAC	15	42.5		AGC	0	0.0
	AUA	0	0.0		ACA	11	31.2	Lys	AAA	3	8.5	Arg	AGA	0	0.0
Met	AUG	9	25.5		ACG	1	2.8		AAG	0	0.0		AGG	0	0.0
Val	GUU	12	34.0	Ala	GCU	31	87.8	Asp	GAU	3	8.5	Gly	GGU	31	87.8
	GUC	0	0.0		GCC	0	0.0		GAC	8	22.7		GGC	0	0.0
	GUA	11	31.2		GCA	8	22.7	Glu	GAA	14	39.7		GGA	0	0.0
	GUG	0	0.0		GCG	1	2.8		GAG	2	5.7		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=244 U=371 G=218 C=226 X=0

GC Content: 41.93% 1st letter GC: 52.41% 2nd letter GC: 44.48% 3rd letter GC: 28.9%

### [psbC\(photosystem II 44 kDa protein\)](#)

Gene analysis...

Sequence length: 1386 Number of protein genes: 1 Total codons: 462

Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	8	17.3	Ser	UCU	9	19.5	Tyr	UAU	4	8.7	Cys	UGU	5	10.8
	UUC	22	47.6		UCC	0	0.0		UAC	13	28.1		UGC	0	0.0
Leu	UUA	27	58.4		UCA	12	26.0	STOP	UAA	1	2.2	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	19	41.1
Leu	CUU	13	28.1	Pro	CCU	6	13.0	His	CAU	0	0.0	Arg	CGU	18	39.0
	CUC	0	0.0		CCC	0	0.0		CAC	13	28.1		CGC	0	0.0
	CUA	4	8.7		CCA	18	39.0	Gln	CAA	8	17.3		CGA	0	0.0
	CUG	0	0.0		CCG	1	2.2		CAG	0	0.0		CGG	0	0.0
ile	AUU	20	43.3	Thr	ACU	12	26.0	Asn	AAU	5	10.8	Ser	AGU	3	6.5
	AUC	8	17.3		ACC	0	0.0		AAC	13	28.1		AGC	1	2.2
	AUA	0	0.0		ACA	12	26.0	Lys	AAA	11	23.8	Arg	AGA	0	0.0
Met	AUG	12	26.0		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	14	30.3	Ala	GCU	25	54.1	Asp	GAU	5	10.8	Gly	GGU	58	125.5
	GUC	0	0.0		GCC	1	2.2		GAC	10	21.6		GGC	3	6.5
	GUA	13	28.1		GCA	10	21.6	Glu	GAA	22	47.6		GGA	1	2.2
	GUG	1	2.2		GCG	1	2.2		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=341 U=467 G=306 C=272 X=0

GC Content: 41.7% 1st letter GC: 53.03% 2nd letter GC: 46.54% 3rd letter GC: 25.54%

#### [psaC\(photosystem I subunit VII\)](#)

Gene analysis...

Sequence length: 246 Number of protein genes: 1 Total codons: 82

Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	0	0.0	Ser	UCU	1	12.2	Tyr	UAU	1	12.2	Cys	UGU	8	97.6
	UUC	1	12.2		UCC	0	0.0		UAC	2	24.4		UGC	1	12.2
Leu	UUA	4	48.8		UCA	2	24.4	STOP	UAA	1	12.2	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	1	12.2
Leu	CUU	0	0.0	Pro	CCU	1	12.2	His	CAU	1	12.2	Arg	CGU	3	36.6
	CUC	0	0.0		CCC	0	0.0		CAC	0	0.0		CGC	1	12.2
	CUA	1	12.2		CCA	3	36.6	Gln	CAA	2	24.4		CGA	0	0.0
	CUG	0	0.0		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	2	24.4	Thr	ACU	4	48.8	Asn	AAU	0	0.0	Ser	AGU	3	36.6
	AUC	1	12.2		ACC	0	0.0		AAC	0	0.0		AGC	1	12.2
	AUA	0	0.0		ACA	2	24.4	Lys	AAA	3	36.6	Arg	AGA	1	12.2
Met	AUG	4	48.8		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	5	61.0	Ala	GCU	5	61.0	Asp	GAU	3	36.6	Gly	GGU	4	48.8
	GUC	0	0.0		GCC	0	0.0		GAC	2	24.4		GGC	1	12.2
	GUA	2	24.4		GCA	0	0.0	Glu	GAA	4	48.8		GGA	0	0.0
	GUG	0	0.0		GCG	1	12.2		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=65 U=83 G=57 C=41 X=0

GC Content: 39.84% 1st letter GC: 47.56% 2nd letter GC: 52.44% 3rd letter GC: 19.51%

#### [petL\(cytochrome b6/f complex subunit VI\)](#)

Gene analysis...

Sequence length: 99 Number of protein genes: 1 Total codons: 33

Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	1	30.3	Ser	UCU	0	0.0	Tyr	UAU	1	30.3	Cys	UGU	0	0.0
	UUC	0	0.0		UCC	0	0.0		UAC	1	30.3		UGC	0	0.0
Leu	UUA	6	181.8		UCA	0	0.0	STOP	UAA	1	30.3	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	0	0.0
Leu	CUU	3	90.9	Pro	CCU	0	0.0	His	CAU	0	0.0	Arg	CGU	0	0.0
	CUC	0	0.0		CCC	0	0.0		CAC	0	0.0		CGC	0	0.0
	CUA	0	0.0		CCA	0	0.0	Gln	CAA	0	0.0		CGA	0	0.0
	CUG	0	0.0		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	2	60.6	Thr	ACU	1	30.3	Asn	AAU	0	0.0	Ser	AGU	1	30.3
	AUC	2	60.6		ACC	0	0.0		AAC	0	0.0		AGC	0	0.0
	AUA	0	0.0		ACA	2	60.6	Lys	AAA	2	60.6	Arg	AGA	0	0.0
Met	AUG	1	30.3		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	2	60.6	Ala	GCU	1	30.3	Asp	GAU	0	0.0	Gly	GGU	4	121.2
	GUC	0	0.0		GCC	0	0.0		GAC	0	0.0		GGC	0	0.0
	GUA	2	60.6		GCA	0	0.0	Glu	GAA	0	0.0		GGA	0	0.0
	GUG	0	0.0		GCG	0	0.0		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=29 U=45 G=15 C=10 X=0

GC Content: 25.25% 1st letter GC: 36.36% 2nd letter GC: 27.27% 3rd letter GC: 12.12%

### Summary table:

Sequence length: 21279 Number of protein genes: 32 Total codons: 7093

Amino acid   Codon   Number   Frequency per thousand															
Phe	UUU	171	24.1	Ser	UCU	147	20.7	Tyr	UAU	87	12.3	Cys	UGU	61	8.6
	UUC	285	40.2		UCC	0	0.0		UAC	152	21.4		UGC	3	0.4
Leu	UUA	544	76.7		UCA	144	20.3	STOP	UAA	30	4.2	STOP	UGA	0	0.0
	UUG	5	0.7		UCG	9	1.3		UAG	2	0.3	Trp	UGG	170	24.0
Leu	CUU	152	21.4	Pro	CCU	119	16.8	His	CAU	23	3.2	Arg	CGU	245	34.5
	CUC	0	0.0		CCC	2	0.3		CAC	148	20.9		CGC	10	1.4
	CUA	53	7.5		CCA	200	28.2	Gln	CAA	218	30.7		CGA	2	0.3
	CUG	9	1.3		CCG	13	1.8		CAG	10	1.4		CGG	0	0.0
ile	AUU	343	48.4	Thr	ACU	210	29.6	Asn	AAU	83	11.7	Ser	AGU	80	11.3
	AUC	102	14.4		ACC	3	0.4		AAC	198	27.9		AGC	30	4.2
	AUA	4	0.6		ACA	193	27.2	Lys	AAA	240	33.8	Arg	AGA	8	1.1
Met	AUG	182	25.7		ACG	12	1.7		AAG	9	1.3		AGG	2	0.3
Val	GUU	258	36.4	Ala	GCU	433	61.0	Asp	GAU	135	19.0	Gly	GGU	586	82.6
	GUC	0	0.0		GCC	9	1.3		GAC	115	16.2		GGC	24	3.4
	GUA	261	36.8		GCA	173	24.4	Glu	GAA	311	43.8		GGA	19	2.7
	GUG	6	0.8		GCG	23	3.2		GAG	20	2.8		GGG	7	1.0

0 unidentified codons.

Nucleotide frequency: A=5880 U=7318 G=4106 C=3975 X=0

GC Content: 37.98% 1st letter GC: 50.53% 2nd letter GC: 41.41% 3rd letter GC: 21.99%

### Weight table from reference set:

Amino acid   Codon   Weight											
Phe	UUU	0.6	Ser	UCU	1	Tyr	UAU	0.572	Cys	UGU	1
	UUC	1		UCC	0		UAC	1		UGC	0.049
Leu	UUA	1		UCA	0.98	STOP	UAA	---	STOP	UGA	---
	UUG	0.009		UCG	0.061		UAG	---	Trp	UGG	---
Leu	CUU	0.279	Pro	CCU	0.595	His	CAU	0.155	Arg	CGU	1
	CUC	0		CCC	0.01		CAC	1		CGC	0.041
	CUA	0.097		CCA	1	Gln	CAA	1		CGA	0.008
	CUG	0.017		CCG	0.065		CAG	0.046		CGG	0
ile	AUU	1	Thr	ACU	1	Asn	AAU	0.419	Ser	AGU	0.544
	AUC	0.297		ACC	0.014		AAC	1		AGC	0.204
	AUA	0.012		ACA	0.919	Lys	AAA	1	Arg	AGA	0.033
Met	AUG	---		ACG	0.057		AAG	0.038		AGG	0.008
Val	GUU	0.989	Ala	GCU	1	Asp	GAU	1	Gly	GGU	1
	GUC	0		GCC	0.021		GAC	0.852		GGC	0.041
	GUA	1		GCA	0.4	Glu	GAA	1		GGA	0.032
	GUG	0.023		GCG	0.053		GAG	0.064		GGG	0.012