















C.reinhardtii Uncategorized


CAI Analyzer: 12.03.2012


Reference set:


-  chlB(photochlorophyllide reductase subunit B)
8914~10977 Length:2064
-  tufA(elongation factor Tu)
12709~13965 Length:1257
-  rpl20(ribosomal protein L20)
16184~15846 Length:339
-  clpP(ATP-dependent Clp protease proteolytic subunit)
19210~17636 Length:1575
-  chlL(photochlorophyllide reductase subunit L)
21286~22167 Length:882
-  rpl36(ribosomal protein L36)
22632~22745 Length:114
-  rpl23(ribosomal protein L23)
23947~24234 Length:288
-  rpl2(ribosomal protein L2)
24961~25797 Length:837
-  rps19(ribosomal protein S19)
26583~26861 Length:279
-  rpl16(ribosomal protein L16)
27994~28404 Length:411
-  rpl14(ribosomal protein L14)
28922~29290 Length:369
-  rpl5(ribosomal protein L5)
30125~30664 Length:540


 rps8(ribosomal protein S8)
31651~32064 Length:414


 rps4(ribosomal protein S4)
33599~34372 Length:774


 ycf12(hypothetical protein)
59760~59659 Length:102


 rps7(ribosomal protein S7)
62115~61609 Length:507


 rps14(ribosomal protein S14)
62747~62445 Length:303


 rpoA(RNA polymerase alpha subunit)
85922~84270 Length:1653


 rps2(ribosomal protein S2)
87724~87098 Length:627


 rps2(ribosomal protein S2)
89828~88116 Length:1713


 rps18(ribosomal protein S18)
91108~90695 Length:414

 ycf3(photosystem I assembly protein Ycf3)
91987~91469 Length:519


 ycf4(photosystem I assembly protein Ycf4)
92760~92167 Length:594


 rps9(ribosomal protein S9)
93737~93162 Length:576


 rpoB-2(RNA polymerase beta subunit II)
98006~96126 Length:1881


 rpoB-1(RNA polymerase beta subunit I)


101092~98624 Length:2469


 rps3(ribosomal protein S3)
104458~106596 Length:2139


 rpoC2(RNA polymerase beta' subunit)
108150~117512 Length:9363


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


 cemA(envelope membrane protein)
127222~128724 Length:1503

 rps11(ribosomal protein S11)
132953~133345 Length:393

 chlN(photochlorophyllide reductase subunit N)
136241~137650 Length:1410

 rps12(ribosomal protein S12)
170145~169744 Length:402

 rpoC1b(chloroplast RNA polymerase beta' chain)
196296~194827 Length:1470

 rpoC1a(chloroplast RNA polymerase beta' chain)
200565~198754 Length:1812

Codon frequency of reference set:

[chlB\(photochlorophyllide reductase subunit B\)](#)

Gene analysis...

Sequence length: 2064 Number of protein genes: 1 Total codons: 688

Amino acid Codon Number Frequency per thousand															
Phe	UUU	23	33.4	Ser	UCU	13	18.9	Tyr	UAU	14	20.3	Cys	UGU	10	14.5
	UUC	1	1.5		UCC	4	5.8		UAC	4	5.8		UGC	2	2.9
Leu	UUA	45	65.4		UCA	14	20.3	STOP	UAA	1	1.5	STOP	UGA	0	0.0
	UUG	6	8.7		UCG	5	7.3		UAG	0	0.0	Trp	UGG	5	7.3
Leu	CUU	7	10.2	Pro	CCU	11	16.0	His	CAU	17	24.7	Arg	CGU	18	26.2
	CUC	1	1.5		CCC	5	7.3		CAC	6	8.7		CGC	0	0.0
	CUA	3	4.4		CCA	9	13.1	Gln	CAA	30	43.6		CGA	3	4.4
	CUG	0	0.0		CCG	4	5.8		CAG	3	4.4		CGG	0	0.0
ile	AUU	39	56.7	Thr	ACU	19	27.6	Asn	AAU	38	55.2	Ser	AGU	8	11.6
	AUC	5	7.3		ACC	5	7.3		AAC	6	8.7		AGC	6	8.7
	AUA	6	8.7		ACA	17	24.7	Lys	AAA	35	50.9	Arg	AGA	4	5.8
Met	AUG	17	24.7		ACG	7	10.2		AAG	5	7.3		AGG	0	0.0
Val	GUU	16	23.3	Ala	GCU	19	27.6	Asp	GAU	25	36.3	Gly	GGU	14	20.3
	GUC	2	2.9		GCC	8	11.6		GAC	5	7.3		GGC	3	4.4
	GUA	19	27.6		GCA	18	26.2	Glu	GAA	43	62.5		GGA	14	20.3
	GUG	7	10.2		GCG	3	4.4		GAG	6	8.7		GGG	5	7.3

0 unidentified codons.

Nucleotide frequency: A=716 U=635 G=372 C=341 X=0

GC Content: 34.54% 1st letter GC: 47.09% 2nd letter GC: 36.77% 3rd letter GC: 19.77%

[tufA\(elongation factor Tu\)](#)

Gene analysis...

Sequence length: 1257 Number of protein genes: 1 Total codons: 419

Amino acid Codon Number Frequency per thousand															
Phe	UUU	3	7.2	Ser	UCU	2	4.8	Tyr	UAU	4	9.5	Cys	UGU	1	2.4
	UUC	7	16.7		UCC	0	0.0		UAC	6	14.3		UGC	0	0.0
Leu	UUA	21	50.1		UCA	8	19.1	STOP	UAA	1	2.4	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0		Trp	UGG	1
Leu	CUU	4	9.5	Pro	CCU	4	9.5	His	CAU	1	2.4	Arg	CGU	19	45.3
	CUC	0	0.0		CCC	0	0.0		CAC	11	26.3		CGC	0	0.0
	CUA	2	4.8		CCA	15	35.8	Gln	CAA	13	31.0		CGA	0	0.0
	CUG	1	2.4		CCG	1	2.4		CAG	1	2.4		CGG	0	0.0
ile	AUU	23	54.9	Thr	ACU	14	33.4	Asn	AAU	3	7.2	Ser	AGU	2	4.8
	AUC	4	9.5		ACC	0	0.0		AAC	12	28.6		AGC	1	2.4
	AUA	0	0.0		ACA	19	45.3	Lys	AAA	27	64.4	Arg	AGA	2	4.8
Met	AUG	14	33.4		ACG	0	0.0		AAG	1	2.4		AGG	0	0.0
Val	GUU	20	47.7	Ala	GCU	24	57.3	Asp	GAU	12	28.6	Gly	GGU	37	88.3
	GUC	0	0.0		GCC	0	0.0		GAC	11	26.3		GGC	1	2.4
	GUA	24	57.3		GCA	8	19.1	Glu	GAA	34	81.1		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=433 U=350 G=254 C=220 X=0

GC Content: 37.71% 1st letter GC: 58% 2nd letter GC: 37.95% 3rd letter GC: 17.18%

[rpl20\(ribosomal protein L20\)](#)

Gene analysis...

Sequence length: 339 Number of protein genes: 1 Total codons: 113

Amino acid Codon Number Frequency per thousand															
Phe	UUU	4	35.4	Ser	UCU	1	8.8	Tyr	UAU	4	35.4	Cys	UGU	1	8.8
	UUC	2	17.7		UCC	0	0.0		UAC	1	8.8		UGC	0	0.0
Leu	UUA	8	70.8		UCA	5	44.2	STOP	UAA	1	8.8	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	1	8.8
Leu	CUU	1	8.8	Pro	CCU	0	0.0	His	CAU	2	17.7	Arg	CGU	12	106.2
	CUC	0	0.0		CCC	0	0.0		CAC	0	0.0		CGC	2	17.7
	CUA	1	8.8		CCA	1	8.8	Gln	CAA	6	53.1		CGA	0	0.0
	CUG	0	0.0		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	5	44.2	Thr	ACU	2	17.7	Asn	AAU	8	70.8	Ser	AGU	1	8.8
	AUC	0	0.0		ACC	0	0.0		AAC	1	8.8		AGC	0	0.0
	AUA	0	0.0		ACA	3	26.5	Lys	AAA	11	97.3	Arg	AGA	3	26.5
Met	AUG	6	53.1		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	2	17.7	Ala	GCU	3	26.5	Asp	GAU	2	17.7	Gly	GGU	2	17.7
	GUC	0	0.0		GCC	0	0.0		GAC	0	0.0		GGC	1	8.8
	GUA	3	26.5		GCA	4	35.4	Glu	GAA	2	17.7		GGA	1	8.8
	GUG	0	0.0		GCG	0	0.0		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=127 U=110 G=51 C=51 X=0

GC Content: 30.09% 1st letter GC: 39.82% 2nd letter GC: 38.05% 3rd letter GC: 12.39%

[clpP\(ATP-dependent Clp protease proteolytic subunit\)](#)

Gene analysis...

Sequence length: 1575 Number of protein genes: 1 Total codons: 525

Amino acid Codon Number Frequency per thousand															
Phe	UUU	16	30.5	Ser	UCU	18	34.3	Tyr	UAU	19	36.2	Cys	UGU	4	7.6
	UUC	2	3.8		UCC	0	0.0		UAC	3	5.7		UGC	0	0.0
Leu	UUA	52	99.0		UCA	10	19.0	STOP	UAA	0	0.0	STOP	UGA	0	0.0
	UUG	1	1.9		UCG	2	3.8		UAG	1	1.9	Trp	UGG	6	11.4
Leu	CUU	2	3.8	Pro	CCU	10	19.0	His	CAU	6	11.4	Arg	CGU	17	32.4
	CUC	0	0.0		CCC	0	0.0		CAC	4	7.6		CGC	1	1.9
	CUA	2	3.8		CCA	2	3.8	Gln	CAA	27	51.4		CGA	3	5.7
	CUG	1	1.9		CCG	1	1.9		CAG	2	3.8		CGG	0	0.0
ile	AUU	29	55.2	Thr	ACU	8	15.2	Asn	AAU	31	59.0	Ser	AGU	14	26.7
	AUC	1	1.9		ACC	1	1.9		AAC	6	11.4		AGC	1	1.9
	AUA	0	0.0		ACA	14	26.7	Lys	AAA	36	68.6	Arg	AGA	3	5.7
Met	AUG	13	24.8		ACG	4	7.6		AAG	2	3.8		AGG	0	0.0
Val	GUU	4	7.6	Ala	GCU	19	36.2	Asp	GAU	26	49.5	Gly	GGU	21	40.0
	GUC	0	0.0		GCC	0	0.0		GAC	1	1.9		GGC	4	7.6
	GUA	13	24.8		GCA	14	26.7	Glu	GAA	38	72.4		GGA	5	9.5
	GUG	2	3.8		GCG	1	1.9		GAG	1	1.9		GGG	1	1.9

0 unidentified codons.

Nucleotide frequency: A=585 U=516 G=268 C=206 X=0

GC Content: 30.1% 1st letter GC: 43.43% 2nd letter GC: 35.05% 3rd letter GC: 11.81%

[chlL\(photochlorophyllide reductase subunit L\)](#)

Gene analysis...

Sequence length: 882 Number of protein genes: 1 Total codons: 294

Amino acid Codon Number Frequency per thousand															
Phe	UUU	10	34.0	Ser	UCU	3	10.2	Tyr	UAU	9	30.6	Cys	UGU	8	27.2
	UUC	2	6.8		UCC	0	0.0		UAC	4	13.6		UGC	0	0.0
Leu	UUA	23	78.2		UCA	7	23.8	STOP	UAA	1	3.4	STOP	UGA	0	0.0
	UUG	2	6.8		UCG	3	10.2		UAG	0	0.0	Trp	UGG	1	3.4
Leu	CUU	4	13.6	Pro	CCU	3	10.2	His	CAU	4	13.6	Arg	CGU	10	34.0
	CUC	0	0.0		CCC	1	3.4		CAC	0	0.0		CGC	0	0.0
	CUA	0	0.0		CCA	9	30.6	Gln	CAA	2	6.8		CGA	1	3.4
	CUG	0	0.0		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	21	71.4	Thr	ACU	6	20.4	Asn	AAU	11	37.4	Ser	AGU	3	10.2
	AUC	1	3.4		ACC	1	3.4		AAC	1	3.4		AGC	0	0.0
	AUA	0	0.0		ACA	8	27.2	Lys	AAA	19	64.6	Arg	AGA	0	0.0
Met	AUG	5	17.0		ACG	2	6.8		AAG	0	0.0		AGG	0	0.0
Val	GUU	12	40.8	Ala	GCU	13	44.2	Asp	GAU	20	68.0	Gly	GGU	15	51.0
	GUC	0	0.0		GCC	1	3.4		GAC	1	3.4		GGC	3	10.2
	GUA	7	23.8		GCA	4	13.6	Glu	GAA	17	57.8		GGA	8	27.2
	GUG	2	6.8		GCG	2	6.8		GAG	1	3.4		GGG	3	10.2

0 unidentified codons.

Nucleotide frequency: A=274 U=314 G=182 C=112 X=0

GC Content: 33.33% 1st letter GC: 48.64% 2nd letter GC: 39.12% 3rd letter GC: 12.24%

[rpl36\(ribosomal protein L36\)](#)

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	0	0.0	Cys	UGU	3	78.9
	UUC	0	0.0		UCC	0	0.0		UAC	0	0.0		UGC	0	0.0
Leu	UUA	0	0.0		UCA	1	26.3	STOP	UAA	1	26.3	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	1	26.3		UAG	0	0.0	Trp	UGG	0	0.0
Leu	CUU	0	0.0	Pro	CCU	0	0.0	His	CAU	1	26.3	Arg	CGU	3	78.9
	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	2	52.6		CGA	0	0.0
	CUG	0	0.0		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	1	26.3	Thr	ACU	0	0.0	Asn	AAU	1	26.3	Ser	AGU	0	0.0
	AUC	1	26.3		ACC	0	0.0		AAC	1	26.3		AGC	0	0.0
	AUA	0	0.0		ACA	0	0.0	Lys	AAA	8	210.5	Arg	AGA	1	26.3
Met	AUG	3	78.9		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	3	78.9	Ala	GCU	2	52.6	Asp	GAU	1	26.3	Gly	GGU	1	26.3
	GUC	0	0.0		GCC	0	0.0		GAC	0	0.0		GGC	0	0.0
	GUA	2	52.6		GCA	0	0.0	Glu	GAA	0	0.0		GGA	1	26.3
	GUG	0	0.0		GCG	0	0.0		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=47 U=32 G=23 C=12 X=0

GC Content: 30.7% 1st letter GC: 42.11% 2nd letter GC: 34.21% 3rd letter GC: 15.79%

[rpl23\(ribosomal protein L23\)](#)

Gene analysis...

Sequence length: 288 Number of protein genes: 1 Total codons: 96

Amino acid Codon Number Frequency per thousand															
Phe	UUU	4	41.7	Ser	UCU	0	0.0	Tyr	UAU	5	52.1	Cys	UGU	0	0.0
	UUC	0	0.0		UCC	0	0.0		UAC	1	10.4		UGC	0	0.0
Leu	UUA	7	72.9		UCA	3	31.3	STOP	UAA	1	10.4	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	0	0.0
Leu	CUU	2	20.8	Pro	CCU	2	20.8	His	CAU	1	10.4	Arg	CGU	7	72.9
	CUC	0	0.0		CCC	0	0.0		CAC	0	0.0		CGC	0	0.0
	CUA	0	0.0		CCA	3	31.3	Gln	CAA	5	52.1		CGA	0	0.0
	CUG	0	0.0		CCG	0	0.0		CAG	1	10.4		CGG	0	0.0
ile	AUU	8	83.3	Thr	ACU	2	20.8	Asn	AAU	5	52.1	Ser	AGU	0	0.0
	AUC	1	10.4		ACC	0	0.0		AAC	0	0.0		AGC	0	0.0
	AUA	0	0.0		ACA	4	41.7	Lys	AAA	10	104.2	Arg	AGA	0	0.0
Met	AUG	1	10.4		ACG	1	10.4		AAG	0	0.0		AGG	0	0.0
Val	GUU	0	0.0	Ala	GCU	2	20.8	Asp	GAU	5	52.1	Gly	GGU	3	31.3
	GUC	0	0.0		GCC	0	0.0		GAC	1	10.4		GGC	0	0.0
	GUA	8	83.3		GCA	1	10.4	Glu	GAA	2	20.8		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=113 U=98 G=35 C=42 X=0

GC Content: 26.74% 1st letter GC: 44.79% 2nd letter GC: 29.17% 3rd letter GC: 6.25%

[rpl2\(ribosomal protein L2\)](#)

Gene analysis...

Sequence length: 837 Number of protein genes: 1 Total codons: 279

Amino acid Codon Number Frequency per thousand															
Phe	UUU	3	10.8	Ser	UCU	2	7.2	Tyr	UAU	6	21.5	Cys	UGU	2	7.2
	UUC	2	7.2		UCC	0	0.0		UAC	1	3.6		UGC	0	0.0
Leu	UUA	20	71.7		UCA	5	17.9	STOP	UAA	1	3.6	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	3	10.8		UAG	0	0.0	Trp	UGG	3	10.8
Leu	CUU	2	7.2	Pro	CCU	7	25.1	His	CAU	5	17.9	Arg	CGU	25	89.6
	CUC	0	0.0		CCC	0	0.0		CAC	2	7.2		CGC	2	7.2
	CUA	0	0.0		CCA	8	28.7	Gln	CAA	6	21.5		CGA	1	3.6
	CUG	0	0.0		CCG	2	7.2		CAG	1	3.6		CGG	0	0.0
ile	AUU	21	75.3	Thr	ACU	5	17.9	Asn	AAU	9	32.3	Ser	AGU	3	10.8
	AUC	1	3.6		ACC	0	0.0		AAC	8	28.7		AGC	1	3.6
	AUA	0	0.0		ACA	10	35.8	Lys	AAA	19	68.1	Arg	AGA	4	14.3
Met	AUG	3	10.8		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	8	28.7	Ala	GCU	6	21.5	Asp	GAU	9	32.3	Gly	GGU	26	93.2
	GUC	0	0.0		GCC	1	3.6		GAC	0	0.0		GGC	2	7.2
	GUA	6	21.5		GCA	10	35.8	Glu	GAA	11	39.4		GGA	1	3.6
	GUG	3	10.8		GCG	0	0.0		GAG	1	3.6		GGG	2	7.2

0 unidentified codons.

Nucleotide frequency: A=265 U=256 G=176 C=140 X=0

GC Content: 37.75% 1st letter GC: 52.69% 2nd letter GC: 46.95% 3rd letter GC: 13.62%

[rps19\(ribosomal protein S19\)](#)

Gene analysis...

Sequence length: 279 Number of protein genes: 1 Total codons: 93

Amino acid Codon Number Frequency per thousand															
Phe	UUU	3	32.3	Ser	UCU	1	10.8	Tyr	UAU	2	21.5	Cys	UGU	0	0.0
	UUC	0	0.0		UCC	0	0.0		UAC	0	0.0		UGC	0	0.0
Leu	UUA	3	32.3		UCA	5	53.8	STOP	UAA	1	10.8	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	1	10.8
Leu	CUU	2	21.5	Pro	CCU	3	32.3	His	CAU	5	53.8	Arg	CGU	6	64.5
	CUC	0	0.0		CCC	1	10.8		CAC	0	0.0		CGC	0	0.0
	CUA	0	0.0		CCA	1	10.8	Gln	CAA	1	10.8		CGA	0	0.0
	CUG	0	0.0		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	6	64.5	Thr	ACU	2	21.5	Asn	AAU	2	21.5	Ser	AGU	1	10.8
	AUC	0	0.0		ACC	0	0.0		AAC	0	0.0		AGC	0	0.0
	AUA	0	0.0		ACA	2	21.5	Lys	AAA	14	150.5	Arg	AGA	1	10.8
Met	AUG	4	43.0		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	4	43.0	Ala	GCU	2	21.5	Asp	GAU	3	32.3	Gly	GGU	6	64.5
	GUC	0	0.0		GCC	0	0.0		GAC	0	0.0		GGC	1	10.8
	GUA	4	43.0		GCA	2	21.5	Glu	GAA	2	21.5		GGA	0	0.0
	GUG	0	0.0		GCG	0	0.0		GAG	1	10.8		GGG	1	10.8

0 unidentified codons.

Nucleotide frequency: A=99 U=90 G=50 C=40 X=0

GC Content: 32.26% 1st letter GC: 48.39% 2nd letter GC: 38.71% 3rd letter GC: 9.68%

[rpl16\(ribosomal protein L16\)](#)

Gene analysis...

Sequence length: 411 Number of protein genes: 1 Total codons: 137

Amino acid Codon Number Frequency per thousand															
Phe	UUU	3	21.9	Ser	UCU	2	14.6	Tyr	UAU	4	29.2	Cys	UGU	1	7.3
	UUC	2	14.6		UCC	0	0.0		UAC	0	0.0		UGC	0	0.0
Leu	UUA	7	51.1		UCA	1	7.3	STOP	UAA	1	7.3	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	3	21.9
Leu	CUU	0	0.0	Pro	CCU	4	29.2	His	CAU	2	14.6	Arg	CGU	12	87.6
	CUC	0	0.0		CCC	0	0.0		CAC	1	7.3		CGC	1	7.3
	CUA	0	0.0		CCA	4	29.2	Gln	CAA	5	36.5		CGA	0	0.0
	CUG	0	0.0		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	8	58.4	Thr	ACU	2	14.6	Asn	AAU	1	7.3	Ser	AGU	1	7.3
	AUC	0	0.0		ACC	0	0.0		AAC	0	0.0		AGC	0	0.0
	AUA	0	0.0		ACA	8	58.4	Lys	AAA	13	94.9	Arg	AGA	3	21.9
Met	AUG	6	43.8		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	4	29.2	Ala	GCU	5	36.5	Asp	GAU	3	21.9	Gly	GGU	11	80.3
	GUC	0	0.0		GCC	1	7.3		GAC	0	0.0		GGC	0	0.0
	GUA	5	36.5		GCA	6	43.8	Glu	GAA	4	29.2		GGA	2	14.6
	GUG	1	7.3		GCG	0	0.0		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=135 U=123 G=86 C=67 X=0

GC Content: 37.23% 1st letter GC: 51.82% 2nd letter GC: 48.91% 3rd letter GC: 10.95%

[rpl14\(ribosomal protein L14\)](#)

Gene analysis...

Sequence length: 369 Number of protein genes: 1 Total codons: 123

Amino acid Codon Number Frequency per thousand															
Phe	UUU	3	24.4	Ser	UCU	2	16.3	Tyr	UAU	2	16.3	Cys	UGU	1	8.1
	UUC	0	0.0		UCC	0	0.0		UAC	0	0.0		UGC	0	0.0
Leu	UUA	7	56.9		UCA	1	8.1	STOP	UAA	1	8.1	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	1	8.1		UAG	0	0.0		Trp	UGG	0
Leu	CUU	1	8.1	Pro	CCU	4	32.5	His	CAU	0	0.0	Arg	CGU	13	105.7
	CUC	0	0.0		CCC	0	0.0		CAC	0	0.0		CGC	0	0.0
	CUA	0	0.0		CCA	2	16.3	Gln	CAA	0	0.0		CGA	1	8.1
	CUG	0	0.0		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	12	97.6	Thr	ACU	0	0.0	Asn	AAU	7	56.9	Ser	AGU	2	16.3
	AUC	1	8.1		ACC	0	0.0		AAC	2	16.3		AGC	0	0.0
	AUA	0	0.0		ACA	3	24.4	Lys	AAA	7	56.9	Arg	AGA	0	0.0
Met	AUG	4	32.5		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	8	65.0	Ala	GCU	4	32.5	Asp	GAU	7	56.9	Gly	GGU	7	56.9
	GUC	0	0.0		GCC	0	0.0		GAC	0	0.0		GGC	1	8.1
	GUA	4	32.5		GCA	8	65.0	Glu	GAA	6	48.8		GGA	1	8.1
	GUG	0	0.0		GCG	0	0.0		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=111 U=131 G=77 C=50 X=0

GC Content: 34.42% 1st letter GC: 54.47% 2nd letter GC: 41.46% 3rd letter GC: 7.32%

[rpl5\(ribosomal protein L5\)](#)

Gene analysis...

Sequence length: 540 Number of protein genes: 1 Total codons: 180

Amino acid Codon Number Frequency per thousand															
Phe	UUU	5	27.8	Ser	UCU	1	5.6	Tyr	UAU	4	22.2	Cys	UGU	0	0.0
	UUC	3	16.7		UCC	0	0.0		UAC	1	5.6		UGC	0	0.0
Leu	UUA	16	88.9		UCA	4	22.2	STOP	UAA	1	5.6	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	0	0.0
Leu	CUU	1	5.6	Pro	CCU	2	11.1	His	CAU	2	11.1	Arg	CGU	8	44.4
	CUC	0	0.0		CCC	1	5.6		CAC	0	0.0		CGC	1	5.6
	CUA	1	5.6		CCA	2	11.1	Gln	CAA	10	55.6		CGA	0	0.0
	CUG	0	0.0		CCG	1	5.6		CAG	0	0.0		CGG	0	0.0
ile	AUU	14	77.8	Thr	ACU	4	22.2	Asn	AAU	5	27.8	Ser	AGU	4	22.2
	AUC	0	0.0		ACC	0	0.0		AAC	2	11.1		AGC	1	5.6
	AUA	0	0.0		ACA	7	38.9	Lys	AAA	18	100.0	Arg	AGA	1	5.6
Met	AUG	7	38.9		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	4	22.2	Ala	GCU	3	16.7	Asp	GAU	8	44.4	Gly	GGU	13	72.2
	GUC	0	0.0		GCC	0	0.0		GAC	0	0.0		GGC	1	5.6
	GUA	6	33.3		GCA	5	27.8	Glu	GAA	11	61.1		GGA	0	0.0
	GUG	2	11.1		GCG	0	0.0		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=207 U=172 G=92 C=69 X=0

GC Content: 29.81% 1st letter GC: 45.56% 2nd letter GC: 32.78% 3rd letter GC: 11.11%

[rps8\(ribosomal protein S8\)](#)

Gene analysis...

Sequence length: 414 Number of protein genes: 1 Total codons: 138

Amino acid Codon Number Frequency per thousand															
Phe	UUU	2	14.5	Ser	UCU	2	14.5	Tyr	UAU	4	29.0	Cys	UGU	3	21.7
	UUC	0	0.0		UCC	0	0.0		UAC	0	0.0		UGC	0	0.0
Leu	UUA	11	79.7		UCA	7	50.7	STOP	UAA	1	7.2	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	1	7.2
Leu	CUU	2	14.5	Pro	CCU	1	7.2	His	CAU	1	7.2	Arg	CGU	7	50.7
	CUC	0	0.0		CCC	0	0.0		CAC	0	0.0		CGC	5	36.2
	CUA	3	21.7		CCA	2	14.5	Gln	CAA	6	43.5		CGA	0	0.0
	CUG	0	0.0		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	17	123.2	Thr	ACU	4	29.0	Asn	AAU	3	21.7	Ser	AGU	3	21.7
	AUC	0	0.0		ACC	0	0.0		AAC	3	21.7		AGC	0	0.0
	AUA	0	0.0		ACA	3	21.7	Lys	AAA	11	79.7	Arg	AGA	0	0.0
Met	AUG	2	14.5		ACG	1	7.2		AAG	0	0.0		AGG	0	0.0
Val	GUU	4	29.0	Ala	GCU	1	7.2	Asp	GAU	5	36.2	Gly	GGU	12	87.0
	GUC	0	0.0		GCC	1	7.2		GAC	1	7.2		GGC	0	0.0
	GUA	0	0.0		GCA	2	14.5	Glu	GAA	6	43.5		GGA	0	0.0
	GUG	1	7.2		GCG	0	0.0		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=140 U=144 G=69 C=61 X=0

GC Content: 31.4% 1st letter GC: 43.48% 2nd letter GC: 39.86% 3rd letter GC: 10.87%

[rps4\(ribosomal protein S4\)](#)

Gene analysis...

Sequence length: 774 Number of protein genes: 1 Total codons: 258

Amino acid Codon Number Frequency per thousand															
Phe	UUU	8	31.0	Ser	UCU	4	15.5	Tyr	UAU	10	38.8	Cys	UGU	2	7.8
	UUC	3	11.6		UCC	0	0.0		UAC	1	3.9		UGC	0	0.0
Leu	UUA	19	73.6		UCA	2	7.8	STOP	UAA	1	3.9	STOP	UGA	0	0.0
	UUG	1	3.9		UCG	2	7.8		UAG	0	0.0	Trp	UGG	0	0.0
Leu	CUU	5	19.4	Pro	CCU	6	23.3	His	CAU	3	11.6	Arg	CGU	21	81.4
	CUC	0	0.0		CCC	0	0.0		CAC	0	0.0		CGC	1	3.9
	CUA	4	15.5		CCA	7	27.1	Gln	CAA	10	38.8		CGA	2	7.8
	CUG	0	0.0		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	16	62.0	Thr	ACU	3	11.6	Asn	AAU	10	38.8	Ser	AGU	3	11.6
	AUC	1	3.9		ACC	0	0.0		AAC	4	15.5		AGC	1	3.9
	AUA	0	0.0		ACA	8	31.0	Lys	AAA	32	124.0	Arg	AGA	4	15.5
Met	AUG	6	23.3		ACG	2	7.8		AAG	1	3.9		AGG	0	0.0
Val	GUU	6	23.3	Ala	GCU	2	7.8	Asp	GAU	5	19.4	Gly	GGU	13	50.4
	GUC	0	0.0		GCC	0	0.0		GAC	0	0.0		GGC	1	3.9
	GUA	12	46.5		GCA	5	19.4	Glu	GAA	7	27.1		GGA	2	7.8
	GUG	2	7.8		GCG	0	0.0		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=290 U=253 G=119 C=112 X=0

GC Content: 29.84% 1st letter GC: 44.19% 2nd letter GC: 35.27% 3rd letter GC: 10.08%

[ycf12\(hypothetical protein\)](#)

Gene analysis...

Sequence length: 102 Number of protein genes: 1 Total codons: 34

Amino acid Codon Number Frequency per thousand															
Phe	UUU	0	0.0	Ser	UCU	1	29.4	Tyr	UAU	0	0.0	Cys	UGU	0	0.0
	UUC	0	0.0		UCC	0	0.0		UAC	0	0.0		UGC	0	0.0
Leu	UUA	5	147.1		UCA	1	29.4	STOP	UAA	1	29.4	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	0	0.0
Leu	CUU	2	58.8	Pro	CCU	1	29.4	His	CAU	0	0.0	Arg	CGU	1	29.4
	CUC	0	0.0		CCC	0	0.0		CAC	0	0.0		CGC	0	0.0
	CUA	2	58.8		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	1	29.4	Thr	ACU	0	0.0	Asn	AAU	2	58.8	Ser	AGU	1	29.4
	AUC	0	0.0		ACC	0	0.0		AAC	0	0.0		AGC	0	0.0
	AUA	0	0.0		ACA	1	29.4	Lys	AAA	0	0.0	Arg	AGA	0	0.0
Met	AUG	1	29.4		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	7	205.9	Ala	GCU	2	58.8	Asp	GAU	0	0.0	Gly	GGU	3	88.2
	GUC	0	0.0		GCC	0	0.0		GAC	0	0.0		GGC	0	0.0
	GUA	0	0.0		GCA	1	29.4	Glu	GAA	1	29.4		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=22 U=47 G=20 C=13 X=0

GC Content: 32.35% 1st letter GC: 58.82% 2nd letter GC: 35.29% 3rd letter GC: 2.94%

[rps7\(ribosomal protein S7\)](#)

Gene analysis...

Sequence length: 507 Number of protein genes: 1 Total codons: 169

Amino acid Codon Number Frequency per thousand															
Phe	UUU	1	5.9	Ser	UCU	1	5.9	Tyr	UAU	5	29.6	Cys	UGU	0	0.0
	UUC	1	5.9		UCC	0	0.0		UAC	0	0.0		UGC	1	5.9
Leu	UUA	12	71.0		UCA	3	17.8	STOP	UAA	1	5.9	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0		Trp	UGG	1
Leu	CUU	1	5.9	Pro	CCU	0	0.0	His	CAU	2	11.8	Arg	CGU	12	71.0
	CUC	0	0.0		CCC	1	5.9		CAC	0	0.0		CGC	2	11.8
	CUA	0	0.0		CCA	9	53.3	Gln	CAA	4	23.7		CGA	2	11.8
	CUG	1	5.9		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	12	71.0	Thr	ACU	1	5.9	Asn	AAU	3	17.8	Ser	AGU	3	17.8
	AUC	0	0.0		ACC	0	0.0		AAC	7	41.4		AGC	0	0.0
	AUA	0	0.0		ACA	4	23.7	Lys	AAA	18	106.5	Arg	AGA	0	0.0
Met	AUG	6	35.5		ACG	0	0.0		AAG	1	5.9		AGG	0	0.0
Val	GUU	9	53.3	Ala	GCU	9	53.3	Asp	GAU	7	41.4	Gly	GGU	6	35.5
	GUC	0	0.0		GCC	2	11.8		GAC	0	0.0		GGC	0	0.0
	GUA	9	53.3		GCA	3	17.8	Glu	GAA	8	47.3		GGA	0	0.0
	GUG	0	0.0		GCG	1	5.9		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=184 U=150 G=91 C=82 X=0

GC Content: 34.12% 1st letter GC: 52.07% 2nd letter GC: 36.09% 3rd letter GC: 14.2%

[rps14\(ribosomal protein S14\)](#)

Gene analysis...

Sequence length: 303 Number of protein genes: 1 Total codons: 101

Amino acid Codon Number Frequency per thousand															
Phe	UUU	2	19.8	Ser	UCU	2	19.8	Tyr	UAU	2	19.8	Cys	UGU	2	19.8
	UUC	1	9.9		UCC	0	0.0		UAC	0	0.0		UGC	0	0.0
Leu	UUA	11	108.9		UCA	1	9.9	STOP	UAA	1	9.9	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0		UGG	1	9.9
Leu	CUU	2	19.8	Pro	CCU	3	29.7	His	CAU	3	29.7	Arg	CGU	7	69.3
	CUC	0	0.0		CCC	0	0.0		CAC	1	9.9		CGC	2	19.8
	CUA	0	0.0		CCA	0	0.0	Gln	CAA	6	59.4		CGA	0	0.0
	CUG	0	0.0		CCG	0	0.0		CAG	1	9.9		CGG	0	0.0
ile	AUU	3	29.7	Thr	ACU	1	9.9	Asn	AAU	1	9.9	Ser	AGU	3	29.7
	AUC	0	0.0		ACC	0	0.0		AAC	1	9.9		AGC	1	9.9
	AUA	0	0.0		ACA	3	29.7	Lys	AAA	13	128.7	Arg	AGA	2	19.8
Met	AUG	5	49.5		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	2	19.8	Ala	GCU	2	19.8	Asp	GAU	1	9.9	Gly	GGU	3	29.7
	GUC	0	0.0		GCC	0	0.0		GAC	0	0.0		GGC	2	19.8
	GUA	1	9.9		GCA	4	39.6	Glu	GAA	4	39.6		GGA	0	0.0
	GUG	1	9.9		GCG	0	0.0		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=113 U=90 G=51 C=49 X=0

GC Content: 33% 1st letter GC: 44.55% 2nd letter GC: 38.61% 3rd letter GC: 15.84%

[rpoA\(RNA polymerase alpha subunit\)](#)

Gene analysis...

Sequence length: 1653 Number of protein genes: 1 Total codons: 551

Amino acid Codon Number Frequency per thousand															
Phe	UUU	29	52.6	Ser	UCU	14	25.4	Tyr	UAU	16	29.0	Cys	UGU	5	9.1
	UUC	3	5.4		UCC	2	3.6		UAC	1	1.8		UGC	0	0.0
Leu	UUA	51	92.6		UCA	11	20.0	STOP	UAA	1	1.8	STOP	UGA	0	0.0
	UUG	2	3.6		UCG	4	7.3		UAG	0	0.0		UGG	1	1.8
Leu	CUU	9	16.3	Pro	CCU	8	14.5	His	CAU	7	12.7	Arg	CGU	8	14.5
	CUC	0	0.0		CCC	2	3.6		CAC	1	1.8		CGC	2	3.6
	CUA	7	12.7		CCA	10	18.1	Gln	CAA	28	50.8		CGA	2	3.6
	CUG	0	0.0		CCG	2	3.6		CAG	0	0.0		CGG	0	0.0
ile	AUU	25	45.4	Thr	ACU	16	29.0	Asn	AAU	47	85.3	Ser	AGU	16	29.0
	AUC	1	1.8		ACC	7	12.7		AAC	6	10.9		AGC	4	7.3
	AUA	2	3.6		ACA	22	39.9	Lys	AAA	48	87.1	Arg	AGA	2	3.6
Met	AUG	13	23.6		ACG	5	9.1		AAG	2	3.6		AGG	1	1.8
Val	GUU	9	16.3	Ala	GCU	9	16.3	Asp	GAU	17	30.9	Gly	GGU	11	20.0
	GUC	0	0.0		GCC	4	7.3		GAC	7	12.7		GGC	4	7.3
	GUA	10	18.1		GCA	8	14.5	Glu	GAA	19	34.5		GGA	3	5.4
	GUG	3	5.4		GCG	0	0.0		GAG	2	3.6		GGG	2	3.6

0 unidentified codons.

Nucleotide frequency: A=643 U=550 G=206 C=254 X=0

GC Content: 27.83% 1st letter GC: 35.21% 2nd letter GC: 33.58% 3rd letter GC: 14.7%

[rps2\(ribosomal protein S2\)](#)

Gene analysis...

Sequence length: 627 Number of protein genes: 1 Total codons: 209

Amino acid Codon Number Frequency per thousand															
Phe	UUU	5	23.9	Ser	UCU	4	19.1	Tyr	UAU	5	23.9	Cys	UGU	2	9.6
	UUC	4	19.1		UCC	0	0.0		UAC	0	0.0		UGC	0	0.0
Leu	UUA	16	76.6		UCA	2	9.6	STOP	UAA	1	4.8	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0		UGG	1	4.8
Leu	CUU	0	0.0	Pro	CCU	4	19.1	His	CAU	2	9.6	Arg	CGU	14	67.0
	CUC	0	0.0		CCC	0	0.0		CAC	1	4.8		CGC	0	0.0
	CUA	2	9.6		CCA	3	14.4	Gln	CAA	11	52.6		CGA	0	0.0
	CUG	1	4.8		CCG	0	0.0		CAG	1	4.8		CGG	0	0.0
ile	AUU	19	90.9	Thr	ACU	1	4.8	Asn	AAU	8	38.3	Ser	AGU	1	4.8
	AUC	1	4.8		ACC	0	0.0		AAC	2	9.6		AGC	0	0.0
	AUA	0	0.0		ACA	10	47.8	Lys	AAA	34	162.7	Arg	AGA	1	4.8
Met	AUG	6	28.7		ACG	0	0.0		AAG	1	4.8		AGG	0	0.0
Val	GUU	7	33.5	Ala	GCU	7	33.5	Asp	GAU	7	33.5	Gly	GGU	6	28.7
	GUC	0	0.0		GCC	2	9.6		GAC	0	0.0		GGC	0	0.0
	GUA	4	19.1		GCA	4	19.1	Glu	GAA	7	33.5		GGA	0	0.0
	GUG	1	4.8		GCG	0	0.0		GAG	1	4.8		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=260 U=198 G=83 C=86 X=0

GC Content: 26.95% 1st letter GC: 40.67% 2nd letter GC: 29.67% 3rd letter GC: 10.53%

[rps2\(ribosomal protein S2\)](#)

Gene analysis...

Sequence length: 1713 Number of protein genes: 1 Total codons: 571

Amino acid Codon Number Frequency per thousand															
Phe	UUU	19	33.3	Ser	UCU	5	8.8	Tyr	UAU	6	10.5	Cys	UGU	2	3.5
	UUC	3	5.3		UCC	0	0.0		UAC	2	3.5		UGC	0	0.0
Leu	UUA	53	92.8		UCA	13	22.8	STOP	UAA	1	1.8	STOP	UGA	0	0.0
	UUG	2	3.5		UCG	1	1.8		UAG	0	0.0		UGG	3	5.3
Leu	CUU	8	14.0	Pro	CCU	3	5.3	His	CAU	2	3.5	Arg	CGU	19	33.3
	CUC	0	0.0		CCC	0	0.0		CAC	0	0.0		CGC	3	5.3
	CUA	5	8.8		CCA	10	17.5	Gln	CAA	27	47.3		CGA	0	0.0
	CUG	2	3.5		CCG	1	1.8		CAG	1	1.8		CGG	0	0.0
ile	AUU	39	68.3	Thr	ACU	18	31.5	Asn	AAU	34	59.5	Ser	AGU	7	12.3
	AUC	3	5.3		ACC	2	3.5		AAC	9	15.8		AGC	3	5.3
	AUA	2	3.5		ACA	33	57.8	Lys	AAA	76	133.1	Arg	AGA	2	3.5
Met	AUG	10	17.5		ACG	3	5.3		AAG	4	7.0		AGG	0	0.0
Val	GUU	13	22.8	Ala	GCU	21	36.8	Asp	GAU	6	10.5	Gly	GGU	23	40.3
	GUC	0	0.0		GCC	1	1.8		GAC	0	0.0		GGC	4	7.0
	GUA	23	40.3		GCA	19	33.3	Glu	GAA	14	24.5		GGA	6	10.5
	GUG	3	5.3		GCG	2	3.5		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=711 U=520 G=239 C=243 X=0

GC Content: 28.14% 1st letter GC: 37.83% 2nd letter GC: 35.73% 3rd letter GC: 10.86%

[rps18\(ribosomal protein S18\)](#)

Gene analysis...

Sequence length: 414 Number of protein genes: 1 Total codons: 138

Amino acid Codon Number Frequency per thousand															
Phe	UUU	4	29.0	Ser	UCU	1	7.2	Tyr	UAU	4	29.0	Cys	UGU	0	0.0
	UUC	1	7.2		UCC	1	7.2		UAC	0	0.0		UGC	0	0.0
Leu	UUA	13	94.2		UCA	2	14.5	STOP	UAA	1	7.2	STOP	UGA	0	0.0
	UUG	1	7.2		UCG	1	7.2		UAG	0	0.0		UGG	0	0.0
Leu	CUU	2	14.5	Pro	CCU	3	21.7	His	CAU	0	0.0	Arg	CGU	11	79.7
	CUC	0	0.0		CCC	0	0.0		CAC	1	7.2		CGC	2	14.5
	CUA	0	0.0		CCA	5	36.2	Gln	CAA	9	65.2		CGA	1	7.2
	CUG	0	0.0		CCG	1	7.2		CAG	1	7.2		CGG	0	0.0
ile	AUU	10	72.5	Thr	ACU	3	21.7	Asn	AAU	3	21.7	Ser	AGU	3	21.7
	AUC	0	0.0		ACC	0	0.0		AAC	1	7.2		AGC	0	0.0
	AUA	0	0.0		ACA	3	21.7	Lys	AAA	22	159.4	Arg	AGA	4	29.0
Met	AUG	2	14.5		ACG	0	0.0		AAG	0	0.0		AGG	0	0.0
Val	GUU	4	29.0	Ala	GCU	0	0.0	Asp	GAU	1	7.2	Gly	GGU	5	36.2
	GUC	0	0.0		GCC	0	0.0		GAC	0	0.0		GGC	1	7.2
	GUA	4	29.0		GCA	3	21.7	Glu	GAA	4	29.0		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=169 U=124 G=55 C=66 X=0

GC Content: 29.23% 1st letter GC: 42.03% 2nd letter GC: 36.23% 3rd letter GC: 9.42%

[ycf3\(photosystem I assembly protein Ycf3\)](#)

Gene analysis...

Sequence length: 519 Number of protein genes: 1 Total codons: 173

Amino acid Codon Number Frequency per thousand															
Phe	UUU	4	23.1	Ser	UCU	4	23.1	Tyr	UAU	13	75.1	Cys	UGU	0	0.0
	UUC	0	0.0		UCC	0	0.0		UAC	2	11.6		UGC	0	0.0
Leu	UUA	14	80.9		UCA	3	17.3	STOP	UAA	1	5.8	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0		UGG	2	11.6
Leu	CUU	1	5.8	Pro	CCU	1	5.8	His	CAU	3	17.3	Arg	CGU	4	23.1
	CUC	0	0.0		CCC	0	0.0		CAC	0	0.0		CGC	1	5.8
	CUA	2	11.6		CCA	3	17.3	Gln	CAA	8	46.2		CGA	2	11.6
	CUG	0	0.0		CCG	0	0.0		CAG	1	5.8		CGG	1	5.8
ile	AUU	10	57.8	Thr	ACU	3	17.3	Asn	AAU	11	63.6	Ser	AGU	3	17.3
	AUC	2	11.6		ACC	0	0.0		AAC	1	5.8		AGC	0	0.0
	AUA	0	0.0		ACA	5	28.9	Lys	AAA	6	34.7	Arg	AGA	3	17.3
Met	AUG	4	23.1		ACG	1	5.8		AAG	0	0.0		AGG	0	0.0
Val	GUU	4	23.1	Ala	GCU	13	75.1	Asp	GAU	5	28.9	Gly	GGU	6	34.7
	GUC	0	0.0		GCC	1	5.8		GAC	1	5.8		GGC	1	5.8
	GUA	0	0.0		GCA	4	23.1	Glu	GAA	15	86.7		GGA	2	11.6
	GUG	1	5.8		GCG	1	5.8		GAG	0	0.0		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=184 U=170 G=90 C=75 X=0

GC Content: 31.79% 1st letter GC: 46.82% 2nd letter GC: 36.99% 3rd letter GC: 11.56%

[ycf4\(photosystem I assembly protein Ycf4\)](#)

Gene analysis...

Sequence length: 594 Number of protein genes: 1 Total codons: 198

Amino acid Codon Number Frequency per thousand															
Phe	UUU	13	65.7	Ser	UCU	5	25.3	Tyr	UAU	7	35.4	Cys	UGU	2	10.1
	UUC	1	5.1		UCC	0	0.0		UAC	1	5.1		UGC	0	0.0
Leu	UUA	25	126.3		UCA	5	25.3	STOP	UAA	1	5.1	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	1	5.1		UAG	0	0.0	Trp	UGG	6	30.3
Leu	CUU	2	10.1	Pro	CCU	3	15.2	His	CAU	0	0.0	Arg	CGU	4	20.2
	CUC	0	0.0		CCC	0	0.0		CAC	0	0.0		CGC	2	10.1
	CUA	0	0.0		CCA	2	10.1	Gln	CAA	7	35.4		CGA	1	5.1
	CUG	0	0.0		CCG	1	5.1		CAG	0	0.0		CGG	0	0.0
ile	AUU	18	90.9	Thr	ACU	3	15.2	Asn	AAU	7	35.4	Ser	AGU	4	20.2
	AUC	1	5.1		ACC	0	0.0		AAC	3	15.2		AGC	0	0.0
	AUA	1	5.1		ACA	5	25.3	Lys	AAA	10	50.5	Arg	AGA	4	20.2
Met	AUG	2	10.1		ACG	1	5.1		AAG	0	0.0		AGG	0	0.0
Val	GUU	5	25.3	Ala	GCU	5	25.3	Asp	GAU	3	15.2	Gly	GGU	14	70.7
	GUC	0	0.0		GCC	1	5.1		GAC	0	0.0		GGC	1	5.1
	GUA	2	10.1		GCA	2	10.1	Glu	GAA	12	60.6		GGA	4	20.2
	GUG	0	0.0		GCG	0	0.0		GAG	0	0.0		GGG	1	5.1

0 unidentified codons.

Nucleotide frequency: A=191 U=232 G=105 C=66 X=0

GC Content: 28.79% 1st letter GC: 36.36% 2nd letter GC: 38.89% 3rd letter GC: 11.11%

[rps9\(ribosomal protein S9\)](#)

Gene analysis...

Sequence length: 576 Number of protein genes: 1 Total codons: 192

Amino acid Codon Number Frequency per thousand															
Phe	UUU	5	26.0	Ser	UCU	3	15.6	Tyr	UAU	4	20.8	Cys	UGU	1	5.2
	UUC	1	5.2		UCC	0	0.0		UAC	2	10.4		UGC	0	0.0
Leu	UUA	16	83.3		UCA	11	57.3	STOP	UAA	1	5.2	STOP	UGA	0	0.0
	UUG	1	5.2		UCG	0	0.0		UAG	0	0.0	Trp	UGG	0	0.0
Leu	CUU	1	5.2	Pro	CCU	2	10.4	His	CAU	2	10.4	Arg	CGU	8	41.7
	CUC	0	0.0		CCC	1	5.2		CAC	0	0.0		CGC	0	0.0
	CUA	1	5.2		CCA	2	10.4	Gln	CAA	9	46.9		CGA	1	5.2
	CUG	1	5.2		CCG	1	5.2		CAG	0	0.0		CGG	0	0.0
ile	AUU	11	57.3	Thr	ACU	2	10.4	Asn	AAU	14	72.9	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	7	36.5	Lys	AAA	18	93.8	Arg	AGA	1	5.2
Met	AUG	4	20.8		ACG	0	0.0		AAG	1	5.2		AGG	0	0.0
Val	GUU	6	31.3	Ala	GCU	9	46.9	Asp	GAU	7	36.5	Gly	GGU	8	41.7
	GUC	0	0.0		GCC	0	0.0		GAC	1	5.2		GGC	3	15.6
	GUA	3	15.6		GCA	8	41.7	Glu	GAA	10	52.1		GGA	0	0.0
	GUG	1	5.2		GCG	1	5.2		GAG	0	0.0		GGG	3	15.6

0 unidentified codons.

Nucleotide frequency: A=215 U=179 G=98 C=84 X=0

GC Content: 31.6% 1st letter GC: 46.35% 2nd letter GC: 37.5% 3rd letter GC: 10.94%

[rpoB-2\(RNA polymerase beta subunit II\)](#)

Gene analysis...

Sequence length: 1881 Number of protein genes: 1 Total codons: 627

Amino acid Codon Number Frequency per thousand															
Phe	UUU	18	28.7	Ser	UCU	13	20.7	Tyr	UAU	20	31.9	Cys	UGU	4	6.4
	UUC	2	3.2		UCC	0	0.0		UAC	3	4.8		UGC	1	1.6
Leu	UUA	49	78.1		UCA	13	20.7	STOP	UAA	1	1.6	STOP	UGA	0	0.0
	UUG	2	3.2		UCG	4	6.4		UAG	0	0.0	Trp	UGG	6	9.6
Leu	CUU	6	9.6	Pro	CCU	10	15.9	His	CAU	10	15.9	Arg	CGU	16	25.5
	CUC	0	0.0		CCC	3	4.8		CAC	2	3.2		CGC	3	4.8
	CUA	2	3.2		CCA	15	23.9	Gln	CAA	22	35.1		CGA	4	6.4
	CUG	2	3.2		CCG	3	4.8		CAG	5	8.0		CGG	0	0.0
ile	AUU	38	60.6	Thr	ACU	16	25.5	Asn	AAU	30	47.8	Ser	AGU	13	20.7
	AUC	6	9.6		ACC	5	8.0		AAC	7	11.2		AGC	1	1.6
	AUA	4	6.4		ACA	13	20.7	Lys	AAA	54	86.1	Arg	AGA	1	1.6
Met	AUG	17	27.1		ACG	2	3.2		AAG	4	6.4		AGG	1	1.6
Val	GUU	19	30.3	Ala	GCU	19	30.3	Asp	GAU	27	43.1	Gly	GGU	18	28.7
	GUC	1	1.6		GCC	4	6.4		GAC	1	1.6		GGC	5	8.0
	GUA	9	14.4		GCA	7	11.2	Glu	GAA	37	59.0		GGA	13	20.7
	GUG	5	8.0		GCG	3	4.8		GAG	2	3.2		GGG	6	9.6

0 unidentified codons.

Nucleotide frequency: A=681 U=593 G=330 C=277 X=0

GC Content: 32.27% 1st letter GC: 44.5% 2nd letter GC: 35.41% 3rd letter GC: 16.91%

[rpoB-1\(RNA polymerase beta subunit I\)](#)

Gene analysis...

Sequence length: 2469 Number of protein genes: 1 Total codons: 823

Amino acid Codon Number Frequency per thousand															
Phe	UUU	31	37.7	Ser	UCU	9	10.9	Tyr	UAU	28	34.0	Cys	UGU	3	3.6
	UUC	5	6.1		UCC	3	3.6		UAC	1	1.2		UGC	0	0.0
Leu	UUA	58	70.5		UCA	29	35.2	STOP	UAA	1	1.2	STOP	UGA	0	0.0
	UUG	5	6.1		UCG	6	7.3		UAG	0	0.0	Trp	UGG	7	8.5
Leu	CUU	3	3.6	Pro	CCU	17	20.7	His	CAU	7	8.5	Arg	CGU	26	31.6
	CUC	0	0.0		CCC	3	3.6		CAC	2	2.4		CGC	2	2.4
	CUA	6	7.3		CCA	21	25.5	Gln	CAA	37	45.0		CGA	8	9.7
	CUG	0	0.0		CCG	1	1.2		CAG	0	0.0		CGG	0	0.0
ile	AUU	48	58.3	Thr	ACU	24	29.2	Asn	AAU	44	53.5	Ser	AGU	15	18.2
	AUC	8	9.7		ACC	2	2.4		AAC	7	8.5		AGC	3	3.6
	AUA	15	18.2		ACA	29	35.2	Lys	AAA	77	93.6	Arg	AGA	2	2.4
Met	AUG	19	23.1		ACG	1	1.2		AAG	3	3.6		AGG	2	2.4
Val	GUU	24	29.2	Ala	GCU	23	27.9	Asp	GAU	32	38.9	Gly	GGU	24	29.2
	GUC	2	2.4		GCC	5	6.1		GAC	3	3.6		GGC	4	4.9
	GUA	12	14.6		GCA	13	15.8	Glu	GAA	36	43.7		GGA	11	13.4
	GUG	5	6.1		GCG	1	1.2		GAG	6	7.3		GGG	4	4.9

0 unidentified codons.

Nucleotide frequency: A=938 U=785 G=376 C=370 X=0

GC Content: 30.21% 1st letter GC: 41.07% 2nd letter GC: 36.21% 3rd letter GC: 13.37%

[rps3\(ribosomal protein S3\)](#)

Gene analysis...

Sequence length: 2139 Number of protein genes: 1 Total codons: 713

Amino acid Codon Number Frequency per thousand															
Phe	UUU	22	30.9	Ser	UCU	13	18.2	Tyr	UAU	19	26.6	Cys	UGU	3	4.2
	UUC	8	11.2		UCC	0	0.0		UAC	2	2.8		UGC	0	0.0
Leu	UUA	57	79.9		UCA	21	29.5	STOP	UAA	1	1.4	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	6	8.4
Leu	CUU	14	19.6	Pro	CCU	3	4.2	His	CAU	6	8.4	Arg	CGU	36	50.5
	CUC	0	0.0		CCC	0	0.0		CAC	1	1.4		CGC	2	2.8
	CUA	2	2.8		CCA	8	11.2	Gln	CAA	35	49.1		CGA	2	2.8
	CUG	2	2.8		CCG	1	1.4		CAG	2	2.8		CGG	0	0.0
ile	AUU	48	67.3	Thr	ACU	13	18.2	Asn	AAU	43	60.3	Ser	AGU	7	9.8
	AUC	1	1.4		ACC	0	0.0		AAC	8	11.2		AGC	2	2.8
	AUA	0	0.0		ACA	39	54.7	Lys	AAA	107	150.1	Arg	AGA	5	7.0
Met	AUG	13	18.2		ACG	1	1.4		AAG	2	2.8		AGG	0	0.0
Val	GUU	19	26.6	Ala	GCU	22	30.9	Asp	GAU	17	23.8	Gly	GGU	25	35.1
	GUC	0	0.0		GCC	3	4.2		GAC	0	0.0		GGC	1	1.4
	GUA	19	26.6		GCA	21	29.5	Glu	GAA	23	32.3		GGA	1	1.4
	GUG	2	2.8		GCG	4	5.6		GAG	0	0.0		GGG	1	1.4

0 unidentified codons.

Nucleotide frequency: A=896 U=669 G=283 C=291 X=0

GC Content: 26.83% 1st letter GC: 38.15% 2nd letter GC: 33.66% 3rd letter GC: 8.7%

[rpoC2\(RNA polymerase beta' subunit\)](#)

Gene analysis...

Sequence length: 9363 Number of protein genes: 1 Total codons: 3121

Amino acid Codon Number Frequency per thousand															
Phe	UUU	135	43.3	Ser	UCU	77	24.7	Tyr	UAU	110	35.2	Cys	UGU	18	5.8
	UUC	29	9.3		UCC	15	4.8		UAC	15	4.8		UGC	5	1.6
Leu	UUA	245	78.5		UCA	57	18.3	STOP	UAA	1	0.3	STOP	UGA	0	0.0
	UUG	30	9.6		UCG	22	7.0		UAG	0	0.0		Trp	UGG	19
Leu	CUU	45	14.4	Pro	CCU	43	13.8	His	CAU	50	16.0	Arg	CGU	59	18.9
	CUC	3	1.0		CCC	3	1.0		CAC	16	5.1		CGC	6	1.9
	CUA	23	7.4		CCA	54	17.3	Gln	CAA	142	45.5		CGA	17	5.4
	CUG	12	3.8		CCG	9	2.9		CAG	23	7.4		CGG	1	0.3
ile	AUU	147	47.1	Thr	ACU	90	28.8	Asn	AAU	205	65.7	Ser	AGU	65	20.8
	AUC	19	6.1		ACC	16	5.1		AAC	63	20.2		AGC	20	6.4
	AUA	48	15.4		ACA	93	29.8	Lys	AAA	324	103.8	Arg	AGA	20	6.4
Met	AUG	47	15.1		ACG	18	5.8		AAG	37	11.9		AGG	6	1.9
Val	GUU	73	23.4	Ala	GCU	49	15.7	Asp	GAU	64	20.5	Gly	GGU	59	18.9
	GUC	4	1.3		GCC	19	6.1		GAC	21	6.7		GGC	13	4.2
	GUA	61	19.5		GCA	49	15.7	Glu	GAA	106	34.0		GGA	37	11.9
	GUG	14	4.5		GCG	13	4.2		GAG	20	6.4		GGG	17	5.4

0 unidentified codons.

Nucleotide frequency: A=3692 U=3002 G=1269 C=1400 X=0

GC Content: 28.51% 1st letter GC: 36.05% 2nd letter GC: 31.69% 3rd letter GC: 17.78%

[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%

[cemA\(envelope membrane protein\)](#)

Gene analysis...

Sequence length: 1503 Number of protein genes: 1 Total codons: 501

Amino acid Codon Number Frequency per thousand															
Phe	UUU	36	71.9	Ser	UCU	4	8.0	Tyr	UAU	22	43.9	Cys	UGU	1	2.0
	UUC	4	8.0		UCC	3	6.0		UAC	2	4.0		UGC	1	2.0
Leu	UUA	47	93.8		UCA	17	33.9	STOP	UAA	1	2.0	STOP	UGA	0	0.0
	UUG	6	12.0		UCG	2	4.0		UAG	0	0.0	Trp	UGG	2	4.0
Leu	CUU	6	12.0	Pro	CCU	10	20.0	His	CAU	9	18.0	Arg	CGU	12	24.0
	CUC	1	2.0		CCC	2	4.0		CAC	2	4.0		CGC	2	4.0
	CUA	2	4.0		CCA	11	22.0	Gln	CAA	19	37.9		CGA	3	6.0
	CUG	2	4.0		CCG	1	2.0		CAG	2	4.0		CGG	0	0.0
ile	AUU	34	67.9	Thr	ACU	9	18.0	Asn	AAU	25	49.9	Ser	AGU	11	22.0
	AUC	3	6.0		ACC	4	8.0		AAC	6	12.0		AGC	4	8.0
	AUA	10	20.0		ACA	18	35.9	Lys	AAA	26	51.9	Arg	AGA	3	6.0
Met	AUG	2	4.0		ACG	1	2.0		AAG	1	2.0		AGG	1	2.0
Val	GUU	12	24.0	Ala	GCU	7	14.0	Asp	GAU	14	27.9	Gly	GGU	10	20.0
	GUC	1	2.0		GCC	1	2.0		GAC	4	8.0		GGC	1	2.0
	GUA	9	18.0		GCA	8	16.0	Glu	GAA	28	55.9		GGA	4	8.0
	GUG	2	4.0		GCG	2	4.0		GAG	5	10.0		GGG	3	6.0

0 unidentified codons.

Nucleotide frequency: A=530 U=547 G=201 C=225 X=0

GC Content: 28.34% 1st letter GC: 38.92% 2nd letter GC: 31.54% 3rd letter GC: 14.57%

[rps11\(ribosomal protein S11\)](#)

Gene analysis...

Sequence length: 393 Number of protein genes: 1 Total codons: 131

Amino acid Codon Number Frequency per thousand															
Phe	UUU	4	30.5	Ser	UCU	1	7.6	Tyr	UAU	0	0.0	Cys	UGU	2	15.3
	UUC	1	7.6		UCC	0	0.0		UAC	0	0.0		UGC	1	7.6
Leu	UUA	3	22.9		UCA	2	15.3	STOP	UAA	1	7.6	STOP	UGA	0	0.0
	UUG	0	0.0		UCG	0	0.0		UAG	0	0.0	Trp	UGG	1	7.6
Leu	CUU	0	0.0	Pro	CCU	0	0.0	His	CAU	2	15.3	Arg	CGU	10	76.3
	CUC	0	0.0		CCC	0	0.0		CAC	2	15.3		CGC	0	0.0
	CUA	0	0.0		CCA	2	15.3	Gln	CAA	3	22.9		CGA	0	0.0
	CUG	0	0.0		CCG	2	15.3		CAG	0	0.0		CGG	0	0.0
ile	AUU	10	76.3	Thr	ACU	0	0.0	Asn	AAU	4	30.5	Ser	AGU	4	30.5
	AUC	1	7.6		ACC	1	7.6		AAC	0	0.0		AGC	1	7.6
	AUA	0	0.0		ACA	11	84.0	Lys	AAA	17	129.8	Arg	AGA	2	15.3
Met	AUG	2	15.3		ACG	0	0.0		AAG	1	7.6		AGG	0	0.0
Val	GUU	4	30.5	Ala	GCU	9	68.7	Asp	GAU	1	7.6	Gly	GGU	8	61.1
	GUC	0	0.0		GCC	0	0.0		GAC	0	0.0		GGC	3	22.9
	GUA	5	38.2		GCA	4	30.5	Glu	GAA	4	30.5		GGA	1	7.6
	GUG	0	0.0		GCG	0	0.0		GAG	1	7.6		GGG	0	0.0

0 unidentified codons.

Nucleotide frequency: A=145 U=105 G=80 C=63 X=0

GC Content: 36.39% 1st letter GC: 46.56% 2nd letter GC: 49.62% 3rd letter GC: 12.98%

[chlN\(photochlorophyllide reductase subunit N\)](#)

Gene analysis...

Sequence length: 1410 Number of protein genes: 1 Total codons: 470

Amino acid Codon Number Frequency per thousand															
Phe	UUU	21	44.7	Ser	UCU	8	17.0	Tyr	UAU	13	27.7	Cys	UGU	10	21.3
	UUC	1	2.1		UCC	2	4.3		UAC	0	0.0		UGC	2	4.3
Leu	UUA	45	95.7		UCA	6	12.8	STOP	UAA	1	2.1	STOP	UGA	0	0.0
	UUG	1	2.1		UCG	0	0.0		UAG	0	0.0		Trp	UGG	5
Leu	CUU	9	19.1	Pro	CCU	7	14.9	His	CAU	3	6.4	Arg	CGU	12	25.5
	CUC	1	2.1		CCC	4	8.5		CAC	0	0.0		CGC	2	4.3
	CUA	2	4.3		CCA	9	19.1	Gln	CAA	13	27.7		CGA	4	8.5
	CUG	0	0.0		CCG	2	4.3		CAG	2	4.3		CGG	0	0.0
ile	AUU	27	57.4	Thr	ACU	16	34.0	Asn	AAU	24	51.1	Ser	AGU	6	12.8
	AUC	4	8.5		ACC	1	2.1		AAC	4	8.5		AGC	3	6.4
	AUA	4	8.5		ACA	19	40.4	Lys	AAA	24	51.1	Arg	AGA	3	6.4
Met	AUG	12	25.5		ACG	3	6.4		AAG	2	4.3		AGG	1	2.1
Val	GUU	11	23.4	Ala	GCU	12	25.5	Asp	GAU	17	36.2	Gly	GGU	13	27.7
	GUC	0	0.0		GCC	4	8.5		GAC	2	4.3		GGC	5	10.6
	GUA	13	27.7		GCA	11	23.4	Glu	GAA	31	66.0		GGA	8	17.0
	GUG	0	0.0		GCG	0	0.0		GAG	0	0.0		GGG	5	10.6

0 unidentified codons.

Nucleotide frequency: A=482 U=475 G=244 C=209 X=0

GC Content: 32.13% 1st letter GC: 42.98% 2nd letter GC: 38.94% 3rd letter GC: 14.47%

[rps12\(ribosomal protein S12\)](#)

Gene analysis...

Sequence length: 402 Number of protein genes: 1 Total codons: 134

Amino acid Codon Number Frequency per thousand															
Phe	UUU	1	7.5	Ser	UCU	3	22.4	Tyr	UAU	4	29.9	Cys	UGU	2	14.9
	UUC	0	0.0		UCC	0	0.0		UAC	0	0.0		UGC	0	0.0
Leu	UUA	6	44.8		UCA	3	22.4	STOP	UAA	1	7.5	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	22.4	Pro	CCU	3	22.4	His	CAU	0	0.0	Arg	CGU	11	82.1
	CUC	0	0.0		CCC	0	0.0		CAC	3	22.4		CGC	0	0.0
	CUA	0	0.0		CCA	4	29.9	Gln	CAA	5	37.3		CGA	2	14.9
	CUG	0	0.0		CCG	0	0.0		CAG	0	0.0		CGG	0	0.0
ile	AUU	5	37.3	Thr	ACU	1	7.5	Asn	AAU	1	7.5	Ser	AGU	2	14.9
	AUC	1	7.5		ACC	0	0.0		AAC	2	14.9		AGC	0	0.0
	AUA	0	0.0		ACA	10	74.6	Lys	AAA	16	119.4	Arg	AGA	0	0.0
Met	AUG	2	14.9		ACG	0	0.0		AAG	1	7.5		AGG	1	7.5
Val	GUU	9	67.2	Ala	GCU	6	44.8	Asp	GAU	2	14.9	Gly	GGU	9	67.2
	GUC	0	0.0		GCC	0	0.0		GAC	0	0.0		GGC	1	7.5
	GUA	6	44.8		GCA	4	29.9	Glu	GAA	2	14.9		GGA	1	7.5
	GUG	0	0.0		GCG	0	0.0		GAG	0	0.0		GGG	1	7.5

0 unidentified codons.

Nucleotide frequency: A=139 U=115 G=76 C=72 X=0

GC Content: 36.82% 1st letter GC: 53.73% 2nd letter GC: 47.76% 3rd letter GC: 8.96%

[rpoC1b\(chloroplast RNA polymerase beta' chain\)](#)

Gene analysis...

Sequence length: 1470 Number of protein genes: 1 Total codons: 490

Amino acid Codon Number Frequency per thousand															
Phe	UUU	10	20.4	Ser	UCU	7	14.3	Tyr	UAU	18	36.7	Cys	UGU	5	10.2
	UUC	6	12.2		UCC	0	0.0		UAC	1	2.0		UGC	0	0.0
Leu	UUA	55	112.2		UCA	11	22.4	STOP	UAA	1	2.0	STOP	UGA	0	0.0
	UUG	4	8.2		UCG	3	6.1		UAG	0	0.0	Trp	UGG	4	8.2
Leu	CUU	6	12.2	Pro	CCU	6	12.2	His	CAU	8	16.3	Arg	CGU	13	26.5
	CUC	2	4.1		CCC	2	4.1		CAC	5	10.2		CGC	2	4.1
	CUA	1	2.0		CCA	14	28.6	Gln	CAA	23	46.9		CGA	5	10.2
	CUG	2	4.1		CCG	0	0.0		CAG	1	2.0		CGG	2	4.1
ile	AUU	27	55.1	Thr	ACU	5	10.2	Asn	AAU	30	61.2	Ser	AGU	5	10.2
	AUC	4	8.2		ACC	1	2.0		AAC	6	12.2		AGC	1	2.0
	AUA	6	12.2		ACA	9	18.4	Lys	AAA	38	77.6	Arg	AGA	6	12.2
Met	AUG	9	18.4		ACG	2	4.1		AAG	0	0.0		AGG	0	0.0
Val	GUU	11	22.4	Ala	GCU	14	28.6	Asp	GAU	15	30.6	Gly	GGU	16	32.7
	GUC	0	0.0		GCC	7	14.3		GAC	2	4.1		GGC	2	4.1
	GUA	7	14.3		GCA	8	16.3	Glu	GAA	21	42.9		GGA	7	14.3
	GUG	6	12.2		GCG	4	8.2		GAG	2	4.1		GGG	2	4.1

0 unidentified codons.

Nucleotide frequency: A=532 U=477 G=235 C=226 X=0

GC Content: 31.36% 1st letter GC: 44.08% 2nd letter GC: 33.27% 3rd letter GC: 16.73%

[rpoC1a\(chloroplast RNA polymerase beta' chain\)](#)

Gene analysis...

Sequence length: 1812 Number of protein genes: 1 Total codons: 604

Amino acid Codon Number Frequency per thousand															
Phe	UUU	18	29.8	Ser	UCU	7	11.6	Tyr	UAU	25	41.4	Cys	UGU	5	8.3
	UUC	2	3.3		UCC	7	11.6		UAC	7	11.6		UGC	0	0.0
Leu	UUA	35	57.9		UCA	10	16.6	STOP	UAA	1	1.7	STOP	UGA	0	0.0
	UUG	6	9.9		UCG	4	6.6		UAG	0	0.0	Trp	UGG	5	8.3
Leu	CUU	6	9.9	Pro	CCU	16	26.5	His	CAU	7	11.6	Arg	CGU	13	21.5
	CUC	1	1.7		CCC	3	5.0		CAC	2	3.3		CGC	1	1.7
	CUA	9	14.9		CCA	12	19.9	Gln	CAA	26	43.0		CGA	0	0.0
	CUG	4	6.6		CCG	2	3.3		CAG	5	8.3		CGG	0	0.0
ile	AUU	29	48.0	Thr	ACU	19	31.5	Asn	AAU	38	62.9	Ser	AGU	12	19.9
	AUC	3	5.0		ACC	10	16.6		AAC	9	14.9		AGC	5	8.3
	AUA	9	14.9		ACA	19	31.5	Lys	AAA	69	114.2	Arg	AGA	4	6.6
Met	AUG	10	16.6		ACG	5	8.3		AAG	8	13.2		AGG	0	0.0
Val	GUU	9	14.9	Ala	GCU	11	18.2	Asp	GAU	4	6.6	Gly	GGU	12	19.9
	GUC	2	3.3		GCC	3	5.0		GAC	2	3.3		GGC	3	5.0
	GUA	12	19.9		GCA	12	19.9	Glu	GAA	23	38.1		GGA	8	13.2
	GUG	4	6.6		GCG	4	6.6		GAG	3	5.0		GGG	4	6.6

0 unidentified codons.

Nucleotide frequency: A=727 U=522 G=252 C=311 X=0

GC Content: 31.07% 1st letter GC: 36.92% 2nd letter GC: 35.76% 3rd letter GC: 20.53%

Summary table:

Sequence length: 41421 Number of protein genes: 35 Total codons: 13807

Amino acid Codon Number Frequency per thousand															
Phe	UUU	467	33.8	Ser	UCU	238	17.2	Tyr	UAU	410	29.7	Cys	UGU	115	8.3
	UUC	114	8.3		UCC	37	2.7		UAC	78	5.6		UGC	13	0.9
Leu	UUA	1070	77.5		UCA	302	21.9	STOP	UAA	34	2.5	STOP	UGA	0	0.0
	UUG	70	5.1		UCG	65	4.7		UAG	1	0.1	Trp	UGG	100	7.2
Leu	CUU	176	12.7	Pro	CCU	207	15.0	His	CAU	173	12.5	Arg	CGU	504	36.5
	CUC	9	0.7		CCC	32	2.3		CAC	76	5.5		CGC	47	3.4
	CUA	88	6.4		CCA	272	19.7	Gln	CAA	565	40.9		CGA	65	4.7
	CUG	31	2.2		CCG	37	2.7		CAG	55	4.0		CGG	4	0.3
ile	AUU	796	57.7	Thr	ACU	329	23.8	Asn	AAU	708	51.3	Ser	AGU	227	16.4
	AUC	80	5.8		ACC	56	4.1		AAC	202	14.6		AGC	60	4.3
	AUA	107	7.7		ACA	471	34.1	Lys	AAA	1280	92.7	Arg	AGA	92	6.7
Met	AUG	290	21.0		ACG	60	4.3		AAG	77	5.6		AGG	13	0.9
Val	GUU	368	26.7	Ala	GCU	389	28.2	Asp	GAU	385	27.9	Gly	GGU	506	36.6
	GUC	12	0.9		GCC	70	5.1		GAC	87	6.3		GGC	74	5.4
	GUA	341	24.7		GCA	288	20.9	Glu	GAA	618	44.8		GGA	142	10.3
	GUG	68	4.9		GCG	43	3.1		GAG	52	3.8		GGG	61	4.4

0 unidentified codons.

Nucleotide frequency: A=15384 U=13199 G=6554 C=6284 X=0

GC Content: 30.99% 1st letter GC: 42.33% 2nd letter GC: 35.63% 3rd letter GC: 15.02%

Weight table from reference set:



Amino acid Codon Weight											
Phe	UUU	1	Ser	UCU	0.788	Tyr	UAU	1	Cys	UGU	1
	UUC	0.244		UCC	0.123		UAC	0.19		UGC	0.113
Leu	UUA	1		UCA	1	STOP	UAA	---	STOP	UGA	---
	UUG	0.065		UCG	0.215		UAG	---	Trp	UGG	---
Leu	CUU	0.164	Pro	CCU	0.761	His	CAU	1	Arg	CGU	1
	CUC	0.008		CCC	0.118		CAC	0.439		CGC	0.093
	CUA	0.082		CCA	1	Gln	CAA	1		CGA	0.129
	CUG	0.029		CCG	0.136		CAG	0.097		CGG	0.008
ile	AUU	1	Thr	ACU	0.699	Asn	AAU	1	Ser	AGU	0.752
	AUC	0.101		ACC	0.119		AAC	0.285		AGC	0.199
	AUA	0.134		ACA	1	Lys	AAA	1	Arg	AGA	0.183
Met	AUG	---		ACG	0.127		AAG	0.06		AGG	0.026
Val	GUU	1	Ala	GCU	1	Asp	GAU	1	Gly	GGU	1
	GUC	0.033		GCC	0.18		GAC	0.226		GGC	0.146
	GUA	0.927		GCA	0.74	Glu	GAA	1		GGA	0.281
	GUG	0.185		GCG	0.111		GAG	0.084		GGG	0.121