

Nucleotide sequence of a full-length cDNA coding for the mitochondrial precursor protein of the β-subunit of F_1-ATPase from *Neurospora crassa*

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Subunits of mitochondrial H^+-ATPases are investigated under a variety of different aspects: (i) mechanisms of energy coupling (1, 2); (ii) evolution of ATPases (3) and (iii) mechanisms of mitochondrial import and assembly of the nuclear coded subunits (4–7). For the latter reason, we have cloned and expressed a full-length cDNA coding for the nuclear coded β-subunit of the F_1-ATPase from *Neurospora crassa*. The nucleotide sequence and the deduced amino acid sequence are shown in Figure 1. The protein is synthesized in the cytosol as a precursor of 55,470 Da which is cleaved inside mitochondria to the mature protein. The mature protein shares 70–80% of sequence similarity to known mitochondrial β subunits, for example yeast (8), bovine (9) or human (10).

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Note added in proof

We have learned that Drs E. and B.Bowman (University of California, Santa Cruz) have cloned the corresponding gene from *N. crassa* (personal communication).

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-30                                                    CCACCATCGTCGCGCTTAATCATCGTCAAG
  1 ATGTTCAAGAGCGGCATTTCCGCCTTCGCCCGGACTGCCCGTCCCTCCTTTGCGGCGGCG
  1  M  F  K  S  G  I  S  A  F  A  R  T  A  R  P  S  F  A  A  A
 61 TCCCGTCGCGCCGTCCGCCCGGCTGCCCTCAACCTCCGTGCCCCTGCCCTCAGCAGATTC
 21  S  R  R  A  V  R  P  A  A  L  N  L  R  A  P  A  L  S  R  F
121 GCCAGCTCCGCCGGTGTTGGTGATGGCAAGATCTACCAGGTCATTGGTGCCGTCGTCGAT
 41  A  S  S  A  G  V  G  D  G  K  I  Y  Q  V  I  G  A  V  V  D
181 GTCAAGTTCGATACCGACAAGCTCCCTCCCATTCTCAACGCCCTTGAGACCCAGAACAAT
 61  V  K  F  D  T  D  K  L  P  P  I  L  N  A  L  E  T  Q  N  N
241 GGCCAGAAGCTCGTCCTCGAGGTCTCGCAACATCTCGGCGAGAACGTCGTGAGATGCATT
 81  G  Q  K  L  V  L  E  V  S  Q  H  L  G  E  N  V  V  R  C  I
301 GCCATGGACGGTACTGAGGGTCTCGTTCGTGGTGCCAAGGCCTCCGACACTGGTGCTCCC
101  A  M  D  G  T  E  G  L  V  R  G  A  K  A  S  D  T  G  A  P
361 ATCACCATCCCTGTCGGCCCTGCCACCCTTGGCCGTATCATCAACGTCACTGGTGACCCC
121  I  T  I  P  V  G  P  A  T  L  G  R  I  I  N  V  T  G  D  P
421 ATCGACGAGCGCGGTCCCATCAAGACCGACAAGTTCCGCCCTATCCACGCCGAGGCTCCC
141  I  D  E  R  G  P  I  K  T  D  K  F  R  P  I  H  A  E  A  P
481 GAGTTCGTTGAGCAGTCCACCACTGCCGAGATTCTCGTCACTGGTATCAAGGTCGTCGAT
161  E  F  V  E  Q  S  T  T  A  E  I  L  V  T  G  I  K  V  V  D
541 CTCCTCGCCCCCTACGCTCGTGGTGGAAAGATTGGTCTCTTCGGTGGTGCTGGTGTCGGC
181  L  L  A  P  Y  A  R  G  G  K  I  G  L  F  G  G  A  G  V  G
601 AAGACCGTCTTCATTCAGGAGCTCATCAACAACATCGCCAAGGCTCACGGTGGTTACTCC
201  K  T  V  F  I  Q  E  L  I  N  N  I  A  K  A  H  G  G  Y  S
661 GTCTTCACCGGTGTCGGTGAGCGTACCCGTGAGGGTAACGATCTGTACCACGAAATGCAG
221  V  F  T  G  V  G  E  R  T  R  E  G  N  D  L  Y  H  E  M  Q
721 GAGACCTCCGTCATTCAGCTCGATGGTGACTCCAAGGTCGCTCTTGTCTTCGGTCAGATG
241  E  T  S  V  I  Q  L  D  G  D  S  K  V  A  L  V  F  G  Q  M
781 AACGAGCCCCCCGGAGCTCGTGCCCGTGTCGCCCTTACTGGTCTTACCATTGCCGAGTAC
261  N  E  P  P  G  A  R  A  R  V  A  L  T  G  L  T  I  A  E  Y
841 TTCCGTGATGAGGAGGGTCAGGATGTGTTGCTCTTCATTGACAACATTTTCCGTTTCACC
281  F  R  D  E  E  G  Q  D  V  L  L  F  I  D  N  I  F  R  F  T
901 CAGGCCGGTTCTGAGGTGTCCGCTCTTCTCGGTCGTATTCCCTCTGCCGTCGGTTACCAG
301  Q  A  G  S  E  V  S  A  L  L  G  R  I  P  S  A  V  G  Y  Q
961 CCCACTCTCGCCGTCGACATGGGTCAGATGCAGGAGCGTATTACCACCACCACCAAGGGT
321  P  T  L  A  V  D  M  G  Q  M  Q  E  R  I  T  T  T  T  K  G
1021 TCCATTACCTCCGTCCAGGCCGTCTACGTCCCCGCTGACGATTTGACTGATCCTGCCCCC
341  S  I  T  S  V  Q  A  V  Y  V  P  A  D  D  L  T  D  P  A  P
1081 GCCACCACTTTCGCCCATCTTGACGCCACCACTGTCTTGTCCCGTGGTATCTCTGAGTTG
361  A  T  T  F  A  H  L  D  A  T  T  V  L  S  R  G  I  S  E  L
1141 GGTATCTACCCCGCTGTCGATCCCCTTGACTCCAAGTCCCGTATGCTCGACCCCCGTATT
381  G  I  Y  P  A  V  D  P  L  D  S  K  S  R  M  L  D  P  R  I
1201 GTCGGCCAGGAGCACTACGAGACCGCCACCCGCGTCCAGCAGATCCTCCAGGAGTACAAG
401  V  G  Q  E  H  Y  E  T  A  T  R  V  Q  Q  I  L  Q  E  Y  K
1261 TCCCTCCAGGATATCATTGCCATTCTTGGTATGGACGAACTTTCCGAGGCCGACAAGCTC
421  S  L  Q  D  I  I  A  I  L  G  M  D  E  L  S  E  A  D  K  L
1321 ACCGTCGAGCGTGCCCGTAAGATCCAGCGTTTCCTCAGCCAGCCTTTCACTGTCGCTCAG
441  T  V  E  R  A  R  K  I  Q  R  F  L  S  Q  P  F  T  V  A  Q
1381 GTCTTCACTGGTATCGAGGGTAAGCTCGTTGACCTTAAGGACACCATTGCCTCCTTCAAG
461  V  F  T  G  I  E  G  K  L  V  D  L  K  D  T  I  A  S  F  K
1441 GCTATTCTCGCTGGTGAGGGTGATGACCTCCCCGAGGGTGCCTTCTACATGGTTGGCGAC
481  A  I  L  A  G  E  G  D  D  L  P  E  G  A  F  Y  M  V  G  D
1501 TTCGCCTCTGCTCGCGCCAAGGGTGAGAAGATTCTTGCTGAGCTTGAGGGCCAGGCTTAA
501  F  A  S  A  R  A  K  G  E  K  I  L  A  E  L  E  G  Q  A
1561 GCGATTAATGCGGGAGTTCAAAATCGGGACGGAAACGATGGCCTGTGTATAGAGTAAAGA
1621 AAGGGTTTTTCGGGACGTTCCTCCTATGAGCTGTGTATCAAATGAAGTTCCTTTTTTTTT
1681 CTCTATATACCT
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Figure 1. Nucleotide sequence of a full-length cDNA insert and the deduced protein sequence for $F_1\beta$ precursor from *N. crassa*.