Additional file 1: The gene models for the 51 HbAQP genes identified in this study. The coding region is marked with uppercase letters, under which is its deduced amino acids. The transcribed untranslated regions, including 5’ UTR, intron and 3’ UTR sequences, are marked with lowercase letters. The start and stop codons are blacked.

1. **HbPIP1;1**

```
1 caacctatcaaatcaacggccattaaacagcgtatcattcatcatcaatctcagttatgtgctg
1  MEGKEEDVRLGA
61   tttggctctttttggagctaatcaacgtctgatcatcaatttcagtgtattggc         ATGAGGGCAAGGAAGATGGTATGGGAG
13  NKYRETQPIGTSASQDDKD
121  CTACAAATATAGGGAGAGAGCCATTGTCAGTCAGTCAGCCAAAGATGCAACA
33 YTEPPAAPLFPEPTELTSWSF
181  ACTACATCGAACACAGAGGGCGCTGTGGCAAGGCCAGAGCTCACTTGTGGCTCT
53 YRAGIAEFIAFILFLYLISVL
241  TTTACGGGCTGTTATGGAAGTCTACATAGCTCACCTTCTTCTTCTGATCCTTTT
73 TVMGVVKAPKCSSTVGIQGI
301  TGGACTGTGTGGTGTAGTTAAGCACCACAAAGTGTTGAGGATCTGAGGGA
93 AWSGMGIMIFALVYCTAGISG
361  TAGCTGGTCTCCTTGTGACTAGTCTTGTTCATTGTACTGCTGCGATTCTCAG
421  gttcggaaattgtaattaataattcaacccccccccccccccccctcttccttttttcatcttga
113 GHINPAVT
481 aactaatagcaaatgatactagtgttattgtgtttgtagcagAGGTCACAATAAACCAGGGCTGA
121 FGLFLLARKLSSLTRALYVMVM
541 CGTTTGCGGTCTTTGTCAGAAAGAACTTGCTCGTGAACAAGGGGTTTTGTACTACATGGTGA
141 QCGLAICGAGVGKFGFGRHQP
601 TGTCGCTCTCGAGCAGTATGCGGTTGAGGTAAGGATAGTGAGGCTGCCCC
161 YTLGLGGANSVPYGTKGDG
661 AGTATACCTTGTGGTGGTGTTGCGCCTAGTAGTGGAAGCCAGTTTACACCAAGGATGATG
181 LGAEVGTFTFLVTVFSAFD
721 GGCTGGTGTGCAATATTGTGGAGCTCCTTGTTCATTGCACTGCTTCTGCTACTG
20 AKNARDSHPV
781 ATGGCAAAGTGAATGTCAGAGACTCCCCATGTCCCTGtaagctatagctatatagccctgcc
841 tcttgaattactctctctatatcaaatatggtaataaacaatattatactctctgatgctg
212 ILAPLPIGFAVFLVHL
901 aaatttagctagATTTTGGCACCCTTGTCCCAATTGGGGCTGGTCTGTGGCTGACT
228 ATIPITGTGINPAILSGLAGAI
961 TGGCTACATCCAAATAGGAACATGCTGATCAGTTACTCTTTGCGACAGCA
248 IFNKDGGWDDH
1021 TCATCTGACAAAGGAGACAGGGGTGGGATCACGtaagctatcaacttctcaactact
1081 tctttctcaaatctctctctctcctacttcaactttggtgttggcc
259 WIFWVGPFIGAALAA
1141 ttcgtggtcatgtctcagTG6ATTCTTGGGTGGGCTCCATTTGGAAGGACACTTGCAG
```
2. HbPIP1;2

actgataaaataaatgcgcgtgactatcaacctctttggtacatctctgattttggttt
1
megkeedvrlgank
tcttgcgcataataagtACTGAGGCGGAGGAAGAAGGATTAGTGGGAGCTAAACAA
61
yeretqpiatagtaaqsllddkdyt
TATAAGGAGACGCAAGCTTGAAGGTCAGCCAGCTAGACAGCAAAAGATTATACT
121
epplfepteltswsfyr
GAGCGCCACCGGCCGCCGCACTATTTGAGGCGACTGAGCTCTTCTTGCCTTCTTCAGAG
181
agffgmifalvycTAGISG
GCTTTCGGCTAGTGCATTGCCTTGGATGTACTGACTGATTCTGAAGGATGAATGAT
241
atatttatcaatatcaataagtgcgaatatataatttttttttttctttcacctgactgta
301
ghinpay
tgtcaatatgtttagatactacggtggcgtgtgtgtgtgtgcatgAGGTCACATAAAAACCCCGGCG
361
tgctaatagttgatactacggtggcgtgtgtgtgtgtgtgtgtgtgtgcatgAGGTCACATAAAAACCCCGG
421
a
accagtaactatcttgggggtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtg...
3. *HbPIP1:3*

```
1 attgggttaagggtcaacaataataagcactactagctatctataaaatgcccttatcttct
90 1 tCTGCAAGAAAGCTCTCCTTGACAAGGGCTCTGTTCTACATCATCATGCAATGCCTTGGTG
184 1 VGTGFVLVYVTFTVFSATDARKRNA
```
4. **HbPIP1.4**

```plaintext
1 gagagcatcaacaacccctccccccccctccccccccctccccccccctccccccccctcccccccctctctctctctgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgt
781 GGACTACAATGACCCGCCACCTGCACCACTGATCGATGCCGAGGAGTTTACTCAGTGGTC
38 F Y R A I I A E F I A T L L F L Y I T V
841 GTTTTATAGGGCTATCATTTGCTGATTTTATAGCCAGCTTTTTGTTTACATCAGTCTG
58 L T V I G Y S Q T D P A K N A D P C G
901 TTATAGCTTGATTTGTTACAAAGGCCAAACCGACTGCCCAAATGCGTATGATCGTG
78 GV G I L G I A W A F G M I F I L Y V
961 TGGTGTGGGATCTTCGTTGATCGCTGGGCTCTCGGGAGGATAGTCTTTATTTGTTTTTA
98 C T A G I S
1021 CTGCATGCTGGGTATCTCAGgtaaatatcttcctgtgactcctgtcttgtaaaagctgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtg
10. **HbPIP2;5**

1 aaaaattttttcataaatatatgaaatgaagactaaataagtactttatatgaaataaaa
12. *HbPIP2*:

```
attattatgagctttttttgttttttttcag
HbPIP
1
ataatttatcagttttttttttctctttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttt
HbTIPI1:1

1 gtcctacatgctctcctagttactacgctagctcagagttttggttttcacccggttggtct
  M P I R N I A V G H P Q E A
61 ttcagctacgagctgaagAG7CCGATCAAGAAACATCGCCGATAGGCGCCTCCCAAGGAGGC
15 T H P D A L K A A L A E F I S T L I F V
121 AACTCACCAGAGCCTTGAAGGGCCGTCTCAGAGTCTCAGACTCTCAGTCTATTGTTGCT
35 F A G E G S G M A F S K L T N N G A T T
181 GTTCCGGAGAGAATTCTCGGATGTTTCTGTTTCTTACCAAGCTCAAGAAGGGCAGTCTAT
55 P A G L V A A S I A H A F A L F V A V S
241 CCCTGCTGGTCGTGCTGATCATCAGCCTGAGCTTTTTGGCAGTCTTGTCTTTC
75 V G A N I S G H V N P A V T F G A F V
301 CGTGGCCGCAACATTTCGGGTGCTATCTCAACCTGTCTTTACATTGGCGCCTTCGCT
95 G G N I T L L R L G I L Y W I A Q L L G S
361 CGGCGCGCAAATCGTCTTGTGGAATCCCTACTGCTGCTGCTGCCTGGCTC
115 T V A C L L L K F S T G G L
421 CACAGCTGCTTCTGCTTCCAAGTCTCCGACTGTCGCTACGTCCCTGCTGCCTGCCT
481 taaataattcataatattcactccggtacatgttgcagatgtgtaatttttcggttattttt
129 T T A G F A L S S G V G W N
541 gatgtgctacagcagACACCGCGTGGTTTCGCCACTCTTCTCCGGGTGGTGTTGTAATGGA
144 A F V F E I V M T F G L V Y V Y A T A
601 ACCCGTGCTTTTGCAAGATGAGTTACCTTTGGGTAGTGACAGATACAGTACGCGCAACAG
164 I D P K K G N L I I A P I A I G F I V
661 CCATTGATCCAAGAAGGGTTATTTGGGAAATTATTGCAACCCATCGCAATTTGTTTCAATG
19. HbTIP1:4

1 MPINIRIEVGLRQDVTTPSA
2 ATGCCATACATTGGAATGAGTCTGGCGGATGAGTCATTCACCGTGCA
3 LKAALAEFISLTFVFAEEG
4 CCTAGGGGCTATGGCAAGTTCGGCGCTACCTGTTCTGCTGGAAAGGT
5 SGMFSLRLDNASNTPIGI
6 TCCGGTATGGGCTTTAGCAGATCACTCAACACACTGCGGCAATTTC
7 MASLAAGFLVGSATFNI
8 ATGGGCTCTATGGCAGATCGGTTCTTTCTTACGGGCTTTCAACATCG
9 TGIMPIRTIRAVGNTFATGGCAAC
10 TCTTTCTGCGCAAAAAATTATAATGCAGCAAACACCTGCGGCAATTTC
11 ATGCCCCCTTCCTAGGCAACCTGCTTTCCCTTTTGTCGGGCTTTCTACGGGAGATGTTATCTTC
12 LIRGILYWIALQLLGLSTVACL
13 CTCAATTGTTGCACTTTTATTGGATCGCTCAGCTCCTTGGCTCCACTTGACCGCTTGGC
14 LKFSTHGM
15 CTACTTAAGTTTCTCTACTCATGGCATGtgaatgactgaatttaatatgacttaagtttt
16 TASAAS
17 TGAATTTGCTAAGTTAATGAGACAGCAGCATCGGCTTTTCC
18 DALTARAAALAEFFSMIIIFVFAG
19 TGACGCTCAGGGCGGCTGCTGCTTTCCCTTCTATGATTATTTCTGATTCAGCTTG
20 EGSMAFN
21 GCGGAAGGATCCGGCATGGGCTTTTACAGTAAGATTATTAATAGATACCTATTCAATTT
22 NGSTTPAGLIAASLHAFAL
23 ATGGGCGACACCGCGGCGGCTGCTAATAGCTGCTGCTGGCTCAATTT
24 FAVSVGANISGSGHVNPAPV

20. HbTIP1:5

1 cagtttcatagcgaatgtcaatataaagaaaaagaataagcagaacacagctttctetaa
2 MPITRIAVGNPGEASQP
3 61 ATTCAAGAAATGCCATACATCGAATGAGTCTGGCGGATGAGTCATTCACCGTGCA
4 DALLRALAALAEFFSMIIIFVFAG
5 CAGACGCTCAGGGCGGCTGCTGCTTTCCCTTCTATGATTATTTCTGATTCAGCTTG
6 EGSMAN
7 GCCGAAGGATCCGGCATGGGCTTTTACAGTAAGATTATTAATAGATACCTATTCAATTT
8 46 KLTDD
9 TTTCACAATTGTGAATGACATATTTTTGAGATGAGGCAGGATAGGTAAACGGAC
10 NGSTTPAGLIAASLHAFAL
11 ATGGGCGACACCGCGGCGGCTGCTAATAGCTGCTGCTGGCTCAATTT
12 FAVSVGANISGSGHVNPAPV
27. HbTIP2;4

I M A R M A F G S F G D F F S I G S I K A
1 ATGGCGAGGATGGCTTTTGGCAGTTTTGGAGACTTTTTCAGTATTGGGTCCATCAAGGCT
21 S L S E F I A T L L L F V F V G V G S A I
61 TCTCTATCCGAGTTCATTGCCACTCTTCTTTTTGTGTTTGTTGGTGTTGGCTCAGCTATT
113 A Y S
121 GCTTACAgtaagtggaattatttgtttgaaaattttaa
44 K L T T D A A L D
181 taaattaatagtaaataaaaatattttagCGAAGCTTACAACAGATGCAAGCTTACAG
53 P P G P V A A A H A F G L F V G V A
241 CCCACCCGCGCGCGGCGGTGCTGCGCGGCGGCGCGCCATGCTTTTGGCCTGTGTTGGGTG
73 I A A S G H L N P A V T F G L A V
301 CATAGCGACACATCAGCGCGGACACATCAAATCCGCTGCTCAGCTTTTGGGTTGGGCTC
93 G N I T L T G I F Y C I A Q C L G S
361 CGAGGCGCAACATCCAGCTCAGCTCAGCTCAGCTCAGCTCAGCTCAGCTCAGCTCAGCT
113 I V A C P L L Y F V A N G K
421 CATTTACGCGCGCGCCCTCCTCATATTTCTGCTGCTAATGGGCAAGgtatattagattagttattctcttattcaaacatatt
30. \textit{HbTIP4.1}

\begin{verbatim}
 1  aaaaatcttgaccttgttaggcacatttgatctaatattggttagagacagacactgacagtacgac
 61  acctaatgcaagtgtaaaatgcaaagcagatggtttttttctcaagaacata
121  accttaagatcactgctgtgagacatagacaggtgctgtaaaaatgcaaagcagtagtgctgatgctgaatactctgtgattatcttcctctgttttttttttctcaagaacata
181  ggggttaccttgtaataatctctcgtatggcatgatgaccagctaaccccatatcctaat
241  gaatccctcgtatattatctctcgttgtccttttgctctgcaaacccaagcttttaaaagatggtgattattccttaccaaaatc
301  ctagtggaatttggtgtgattattccttaccaaaatcacccaga
361  ATG
421  G S Q R E A T Q P D C I K A L I V E F I
481  M I G L L G V A L A H A L L V V A V M I S A G
541  TAGAATCTCAGCGAGAGGCCACCAAGACGTCACTCAAGGGCGCCCTATTCGAGATTTTA
601  T T F F F V F V G V G A A M A A D
661  TTACCACCTTTTCTCTGTTCTTGCAGAGGCAGCTGGGCTACCATGGAGCTGAATCATCAT
721  ttctttcttttaaacatattttgttggaattttttatattttcttcattttgatgtggtggtttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttt
ATG

GCCCCATCATCTCATAATGGCCGATTCAAACAATCTGTTACTCCGACGCTTTAAGA

ATGGCTGCAAGtatgtctctaataataacattataaagecaacccatatattatattttttt

TCATATCTCGCAGAGTTCATCTCCACTTTTTATGTGTTTGAAGTTGTAGGATCTGCA

ATTAGTCTGCGCAGTGAGCCACATACGTCCCTACTGCTCTATTCTACTGGATTTC

GAGCGTCGGTGATAGAAGGTGTGCTAACATTTGGTTTAGTATACACTGTTTATGCCGCAG

GAGCCAATGTGTTGGCTGCAGGACCCTTCTCAGGTGGTTCAATGAACCCTGCATGTGCAT

TTGGTTCTGCAGTCATTGGCTGGACGGTTCAAGAATCAAGCAGTCTACTGGGTTGGACCCT

CTGATTCTATTAGGGGAAATTTCAGACGGTGTTGGAGCGTAA

32. HbTIP5;2

1 MAP

S Y L A E F I S T F F Y V F E V V G S A

TCATATCTCGCAGAGTTCATCTCCACTTTTTATGTGTTTGAAGTTGTAGGATCTGCA

ATGGCTGCAAGtatgtctctaataataacattataaagecaacccatatattatattttttt

TCATATCTCGCAGAGTTCATCTCCACTTTTTATGTGTTTGAAGTTGTAGGATCTGCA

ATTAGTCTGCGCAGTGAGCCACATACGTCCCTACTGCTCTATTCTACTGGATTTC

GAGCGTCGGTGATAGAAGGTGTGCTAACATTTGGTTTAGTATACACTGTTTATGCCGCAG

GAGCCAATGTGTTGGCTGCAGGACCCTTCTCAGGTGGTTCAATGAACCCTGCATGTGCAT

TTGGTTCTGCAGTCATTGGCTGGACGGTTCAAGAATCAAGCAGTCTACTGGGTTGGACCCT

CTGATTCTATTAGGGGAAATTTCAGACGGTGTTGGAGCGTAA
33. HbNIP1:

1 ctaaccccttggtagcataacaacagcttcttgcagtttctttgattttccaacttcacta
301 aataaaaaactacaagtagatggagtaatcctttctttgcaggaatttta
361 tatgctaaattctttttattacaagatgcaattttttctttttgctaaactttgat
45 T E K L M P G A D P S S L V
121 tcgttagcttcacagATACAGAGAAATGGATCGACAGAGATCATCCAGTCTGTA
59 I V A I A N A F A L S S A V Y I A A N V
148 ATAGCGCCACTTGAATATTCTTTGGAAGAGCTCTTTCCTGGCTGTACATTGCTCGCAAGCT
79 S S G H V N P A V T F S L A V G G H I N
181 TCCAGTGCGGCGATGTAATTCCTGCTGACATATTAGCTCGGCGCAACATCAT
99 V P T A I F Y W I S Q M L A S V M A C
601 GTCCCACTGCTATATTTCTACTTGAATGTTTTCTGTCAATGGCGTTGCTCTT
119 L L R V A I V G Q
611 CTCCAGTAGATGGCATTTGCGACGtagtaaatctccctgcgttctgcaaaaaat
71 atttatataaatctctttttccaaaattgagattagactaatatttgcacatctgt
128 S L P T Y T I A A E M
781 tgtatgactccagtaatattaattgtgcctCTCTCCTACTACACTTATGCCAGCAGAAA
139 T G F G A S V F E G V L T F G L Y V T V
841 TGACAGGATTTGGGCGTGATATTGGGCTACATTGATGAGGTCTACATTGCTACAG
159 Y A A G D P R C S L L G A T G P L A I G
901 TTTACGCTCCGCGCAGCCCTAGATGACCTTGTGCGGGACACTCTGGCAGCAGAT
179 L M A G A N V L A A G P F S G G M N P
961 GGCTCAGGTGGCGGACCACATCTGGTGCTGCTGAACTGATG
199 A C A F G S A V I A G R F K N Q A V Y W
1021 CTGGCTGTCATTGTTGCTGACATTTGGGCTAAACGTTACAGGTTCAAGATCAATCGTTTTACT
219 V G P L I G G T V A G L L Y D N V V F P
1081 GGGTTGGACCCCTTAAATTGAGGCCAGCAGGGGTTTCTCTCTATGATAATGTTGCTCTCC
239 S Q V P D S I G V *
1141 CTAGTCAGTTTCTCGATTTTGGGTGTAAtttgcataattcgttaaatgaaagattgtact
1201 ttgatatatatgtatgatcttttttttctttcttcatatttgacatattgcaatgtga
1261 ttkgcaacacattttatgtagttgagctaacaca

1 caracccctttgtctgtagcttcaccaagttatctataactaagaactatacatatctttttttctctttctttcctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttctttc
35. *HbNIP2;1*

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1  atatatttcctgcttcactctgtatataaaacaataattttttctctagctcaataacagacactttt
61  cattataatcccaataatttttctcttgatataatatttttctttctctgttatattttct
121  ctgttctagctgaaggttatattagcaaaattttggtttttgttgattctggaattttctttta
181  ttggtttcttcctctctctactgtatatattttctttttccccagctttttttttttttctgt
1  MATIDPNPN
241  caatatttgcaggttcctgcttgcatcaagaaaaATGCGCAACATCGATCCAAATATCCCAAC
10  NSASIGDLGVSVEPNKSLV
301  AACTCAGCTTCATAGGAGATGGTGCTCTCTGTGGAGAACCCAAAGTGCCACTTGTT
30  EFGKKNYPDPFLKK
361  GAATCTTGGAAAAAATTCTCTCTCTATCTCAAAAAAGttaaatcatctttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttt
38. HbNIP4:2

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IMATAHADIIEEEEEEVESKIE
ATGGCACACAGGCTAGCATATAATTGGAGAGAGAGGAGGTTTCCAAATGGAA
QGLPPSTTDASNNTTVGPC
CAAGCCCTACCCCATCTACCACGGCTAGCCAAGACCTATTGCTCTTGGCTCCTGC
LSTSFSVITSQK
CTATCAACTTCTTTCGACATCACAACAAAGgtcagttgacatatatattttgt
1ttatattcatatgtgatgatttgcatatgagcataagctggtttatggtttgtt
LIAEVIGTYFV
gtaggtattattatatttttcagCTGATAGCTGAAGTTTGGCACCATTATTTTGT
VFGAGCGVVTVNKIGSVTFP
GTATTTGGCTGGCTGGAGTCGTTACTGTAACAAAGACCTATTGGCTCTTCCTCCCA
GISVTWGLIMVMIMYTVHGHI
GGCATAAGTGTAGCTGGGCTACTATTGTAAATGTTATGATCATACAGTGGTCAATC
SGAHFPAVTITSAIFRRFP
TCTGGAGCACATTTCAATCTCGGTACTATCATTCTGCAATTTTTCCCGATTCTC
FR
TTCCGGAGgtgatctctagacattaataacaaagcttaaaaaagttttgctctata
agaggtagttcttggagtaaatattttgatattctctggtctgatggttttgtat
VPLYIQAQVLSILAGT
gggttagGTACCTTTATACATATGGTCAACGGTAGATCTTCTGATGTGCA
LALVDFVTNPAYFGTVPGS
CACTAGCTTTAGTGTTGTGTAACACATACCTTGGAAAGACTACAGTGGGAT
NVQLPVIEIIITTFLMLMVIS
CACAAGGGCATTAGTTATAGAAATTCTACATACACTACCTTCCCTACTTTTTCTC
GGAT
GTTDTHRA
CTGGCACACTAAGCATAAGCgtttgtctttgcacacaacacatcatttttttaag
attactagatctctcttttgcaaaatagtgacacctatataactgcatatatgtaatgtat
VGEILGGIGVGMT
TCGTCAAAATTTATTTTTCGAGGGAGAGTTGACATGGTGGGTATGGGACTGAC
ILLNVFVAG
TATAGTATTGGTATCTGCGAGgttaattttcatctatcttttgatcataagatattga
PVGASMN
agttctcctagcaatattgttattttcgacGCGGTTCAGGACATCGATGA
PARSIGNPAIVKHVVTGLWY
ACCCAGCAAGAGACCTTGGGCCAGCATAGTTAAGCACTACAGGATTTGGGTGT
IVGPIVGAIGAFAYNLRLRT
ATAGTTGGGCCAATTTTGCTGAGCGCATACGAGACTTGTGTCTACAGA
PEKPLDELANKGILKNSSNR
CTCGGAAAAAGCCACTCGATAGGTAGTACAAAGGGAATCTCCTCAAAAACAGCAATCAA
N*
GGAAATTAAstatattcatccatttttg
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39. HbNIP5:1

cacaagatgaaattgtaaggtggtctccctctttttttgtatatataaaacctgaa

cattatggttttaacgcccctctttttttttattttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttt
1681 GAATAGCTTTGGAGCAACTTTAGCTCAACTTTGTTGCAAGGtaagtaataattc
1741 ttgcccgcctcctccatcccccccccccccccccccctgcgtacccacacccctctttat
1801 tgcagagtaaagctgaatagaaaggaagaaagataaattaaaacacaattcaatcactttt
1861 aactattagaggctttgtgtgtgtgtggtggtgtggtgtgtgtttgtgtttttggtggtggtgtgtgtgtgtgtgtgtgtgtgtggtggtggtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtg
43. *HbXIP1;2*

```
IMDSHTKGSQYPMMTMFLYRI
1ATGATTTCTCACAAATACATAAGGGCAAGCAAATACATGACATTCTTTATCGCAATT
2GAAYESPE
61GGTGCTATGAAATCTTTTCCTCCAGAGttaaatatgttctttatatattctttta
121tgaaactctagttgagatttaaacttgtaaacttagcataaatgcgattccattacaact
30LCAVVT
181gattttggtgatacttttgattattttcagTTTGCAAGGGCAGTGTAACCG
38MAATTCLFLMFTTTIARLE
241AGATGGCAAGCAAATCTTTGCTCTCTCATTCCACGCACTTTTCTTTAT
58SHETEPKLLIIPIAVIVIAPFL
30AATCACAGAGACCTAAATCTCTTTACATGCGTCACTTTACATTATGCGTCTC
78LLVTVPLSGGHMSPIFTFI
361TTTGCTTGTTGACAGTCCTTTCACTTGGGACATATAGACTTCTTTATCTCAATT
98SALRGLITLVRALFNVLAQC
421TCTCCGCTATATGGGCTCTACATCTGTCTAGCTCTCTTTAATGTCAGCACAT
118VGSMAYLVIKSVMNENTAE
481GTGTGGCCAATATGGGCTTCTTACATGCGTCTTTTCATATGCGAATATGCAAGG
138KYSLGCGMNVNGRSGVNAVGT
541AAAAGTTTCTTGGGACTGGGATTAATGAGTTTTCAGTAAAGTGAAGG
158ALILEFTCSFLVLYVAITIA
601CTGCCCTGATACATGATGTTTATATGCTCTATTCTGCTGTTATGTCATATATG
178FKNKMCQELGFTMVCVIVAG
661CATTAAACAGAAATATGGCGGAAGATGGGCTTTTAAATGTTTGGTTATAGCAAG
198VYALAVFASITVTGQAGYRG
721GGGTAGTGCACATAGAGCTTTTATGCTATCACTAGAATATGCGTCTAGAG
218VGGLNPARCHFLGPPALLLGGSGLW
```
44. HbXPI;3

1 M D L D L V L S H D A G N Q A F P N Q L

1 ATG

21 D G Q N K N I N D S L E S P K T F L S

61 G A C G G C A A G A A A A A A A T T A T A A G C T G G A A G C A G A A T T A

41 C I G V H E L S P E

121 T G A T T G G G T C C A T G A A G C T G G A A G C A G A A T T A

841 G G G T G C A C G G C T G G A A G C A G A A T T A

1021 45. HbXPI;4

1 M D L D L V L S H D A G N Q A F P N Q L

1 ATG

21 D G Q N K N I N D S L E S P K T F L S

61 G A C G G C A A G A A A A A A T T A T A A G C T G G A A G C A G A A T T A

41 C I G V H E L S P E

121 T G A T T G G G T C C A T G A A G C T G G A A G C A G A A T T A
21 D G Q D K N I K G S L E S P K K T F L S
61 GACGGCCAGGACA AAAAAATTTAAGGGACGTTGAATCTCCAAGAAGAAACACTTTCTTCT
41 C I V V H E L L S P E
121 TGCAATTTGTTGCCACAACTCCTTTCAACGAGGtgaattaatatatttgatagattatact
181 aatcattagttttctcataataaaacatagatttacatataattggtagttcagcatgtc
52    K W K A A I T
241 tgcacgcatataataactctctctgtttttttttttttttttttgtaattaaattatttgatagattaatc
59   Q L V S T A C L L F T L I T M V T A C L
301 CACACGTAGTATCAACAGCTTTGCTCTGTTGCCACACTAATCACAATGTTACCAGCATGCT
79   E S H V A E P K L L V P V V V F S T I F
361 TGGAATCAGTAGTTGCAAGAATCCTTTTCTCTAGTCTTCAGTTGCTCTCTCTCTAATCT
99   L L L V L T I P V S G G H M N P T F T
421 TCTCTTGGTTGTTGAGCAATTCTCTGTAATCTGGGGCTACATGAACCAACTTCCCAT
119   I F A L K G A I T F V R A L Y I L A Q
481 TTATCTTGGCTGAAGGCTGAAATACCTTTTGGCTGTGCTACATCTGGGCTC
139   C L G S T M A N L I V K R A M N P K I A
541 AATGTTCAGGCTCAACATGCGCAATCTATAGTGAAGAAGAATACCCATTAAATAG
159   E K Y S L G S C S V G G N G E G I S A G
601 CAGAAAGTATTTCTTAGTACGTGAGTTGAGGTAAATGGAAGGAATATAGTGCAAG
179   T A L A I E F A C T F L V L Y F S I S V
661 GAACGTACCTGGCAATAGAATTCTGACACACCTTTCTTGGCTGTATTTTTTCTATTAGT
199   A F D K E R C K Q L G L T M F C V I V S
721 TGCGATTTGACAGAAGGAAAGTGCTGAAACTAGGCTTGACATTTGTTTGTATGATG
219   G I P A V A Y F I S L T I T G Q V Y G Y
781 CAGGATATTGTCGATACATATTTTATCTACACTACATTACACTGCGCTGTCACGC
239   G A R L N P A R C I G P A V L V G G S L
841 GGGGTGACCGGTCAAGCCCAAGCAAGGTGACATAGGCCAACGCTAGATGGTGCGATCAT
259   W Q S L W V V W V G P F C A S I V L *
901 TGTTGGACAGGCTTTGTTGGCTGCTGGGATGGGCCCCTTTTGTGCCCTCTATGTGGTTATGA
46. HbXIP2;1

1 M A D N A S R V V E D E E
1 aagatacatccacactaaaaagATGGCAGATAATGCTAGTAGGGTTTTAGGATAGAAG
14 N G Y G G R K V Q P F A S T P R
61 AAAATGGCTATGGAGGAAGAAGAAGTCCCAACATTGGCTTTGCTCTACACCCgtgaatttcaaa
121 attttttttttttttctctttatgttttttgatgtttttcttcagtcttttattattacatc
30    P D M D K T E G K K H
181 tgggatataacccctttttttgacgGCCAGATATGGAACAAACTGAAGGGAAAGAACGA
41   H P T T L S R I L G F E D L S S L H
241 TCACTCCACTACATTAGCCGAAATTTTGGGCTCAGAAGCCCTTTTCTCTCTCTACGTtag
301 tatctttcataataatttttaaatagcagcataataattttatgcaccataactttttcttttctattagcag
361 tattactgttgcaatttggcataattttgtgaactgtaattctattactgttactgtataata
59    V W R A S L A E A L G T A
421 gcagaccaattttgtcgctacgATAGGAGGCACTTTAGCAGAGGCTCTGGACACGC
72 S L V F A M D T I V I S S Y E T E T K T
1141 tagcttactgtttgacacttagtttaaaaattttttatttttttaaaaacttaaactttcata
d1201 acescctagttgtctcctcattttgccacaaatatattctaaagatttattttctttcataa
1261 tttattcagaacatataacacagtcttttcttttttccccaa
g49. **HbsIP1**:2

1 gagaaacaggtgcaataagggttagaaaagaataagaataagggcagagtttggagtaatatatttttttttgagtaatatattttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttt
2341  tgatctctgaagttccacatcatatttttttcccctcagagcaacccttgatattgacatttttgc
2351  tgccatcatactctgtactacatcttttgcaaatgaaataccaaattaacctcttaaccc
2361  ctaatttttgtaaccctatttggacattgttttttttttattatttgaattttgaag
2371  aatatacgtgatgtatattttgatcaccacaaatcaattttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttt