Supplementary Information

Figure S1. The promoter sequence of *HbACS1* and major *cis*-elements. The start code was boxed. The *cis*-acting regulatory elements were noted at lower position of sequence. CGTCA-motif, MeJA responsiveness; Skn-1_motif, endosperm expression; GCN4_motif, endosperm expression; TATC-box, gibberellin-responsive element; MBS, MYB binding site involved in drought inducibility.

AAAAAATTAATAAAAAAAAAATAGTGGAACATGACGTCCTCTACATAGGTGCATTGTATTTGTGTG
CGTCA-motif
TTGGGATTTCTTTTTAAATAAAAATAAGAAGTTAAATATTTCATATTTTAGCTTAGCAGCCGATGAA
AAGTATTGAGTTTGTCACATTTAGATATCTAAATAGAAATTGACTGAATTTATATCAAAACTGTAGT
ATTTTGCATGTATAACTATAGAAAATTAATGTATTCGATTTGTAAAATTTCTGAAAATGTTCATAAA
GTTGTTATCAACAAGTTTAGATGGTAAATTGCTGTACCCACAAGGAAGTACACCCAATTCAACTG
MBS
AAGGGTGATGAAGAAGTTTTAATAAAATTACCTAGAAGCTAAGTTAAGAGGAAAATACTCAAAA
CTTTACAAGGAACACACTACCTTTGTTCGTGAAATATTAATCAGAATGAAATATTTCACTAAAATG
CCAGCCCATAGTATTCCCAATTCCCTACTTTATATGGCAATAGCCAATAAATAAAGAAAAAGGAGT
GCATACCGAATAATTAGTTCATAGGGTACCCTACTCGACCAAGCTTCCAATTGAAGCTCATGAGTT
GGTCTATATTTAAGACAAAGAGGCACAATGCTGGCCTATAAATGGGAACAAATTAAGAAATTGTT
HSE
TTGAACCAGTTTGACACCAGTTGTCGTTTAATCCACTTAGTTGTTAGTAGATAGTAGTTGCAGCA
MBS TGA-element
ACTACACAATTGTTAGGTCACATTAGATGGGATAAATACAACAATTCATTTATGTGATGCCACGGT
TATC-box
AACCTACTTCACATTAATTTTATGGGTTTCAAATCTCAATTATACAATTTCAAGATAATAATGTCAT
as-2-box O2-site
CTTATTTTAATAAATAATAAATAATTTTTTAAAAAAAGTTTATATAATTTCAAAAACAATTCGTGTG
CT
ERE
ATTGATTTTAATACCATAAAATCATCTCAAATTTTAAAATATAAATATTATGTTGGAAACATCCATAC
AAGATTTAAGAGATTATAATCCCTTATTCTAAGAAGGATTCATTTTTATGTGAGCGAGATTGTGATT
AGGAGTATCATGGAATTTTCCACTCCAAAAGTTTACCATTATACAACAGAATAGACTTAATAATCA
GARE-motif
ACGCTGACAAAGAAAGCAAGAACGCCCACCGAATCTCACCAATTTTCAAAGAATAGCAGTTGAT
MBS
CCTTCACGGAACTTTCTTAATTCCTCAGTCATCGACGAAGGAAAGAGCATAGAGGCATAGACAC
Skn-1_motif
ACACCTCACACCTCATCTTGGGATCTATAAATATTTATGCAATGTGAGAAGCTCCTGGCAGCTCTC
AACCTTACTCCTATATATACTAATTTAATTATTCACCAACACCTGCGAGGTCATTAGCGCAAGCAA
Skn-1_motif
CTACGCCTGCTTCAAGAAACAGCCTCAAAATCTCTCTACATATAAGTACTTGATATCATCTCTTTG
Skn-1_motif
TGCATTTCTTGGAAAATTATTTAATTCCAAGCTCACGTTCAGAACAGAAAATATGGTGTTCAA

Figure S2. The promoter sequence of *HbACS2* and major *cis*-elements. The start code was boxed. The *cis*-acting regulatory elements were noted at lower position of sequence. CGTCA-motif, MeJA responsiveness; TGA-element, auxin-responsive element; TATC-box, gibberellin-responsive element; as-2-box, shoot-specific expression and light responsiveness; O_2-site, zein metabolism regulation; GARE-motif, gibberellin-responsive element; MBS, MYB binding site involved in drought inducibility; Skn-1_motif, endosperm expression.

AAGACAGTTTTATACTTTAAATATGAATTTATTTTATCTGATTAAATTAATTTTCTTCTTTATTTCTATTT
ATTCTGAAAATGGCACTGCTTAATTTGCTTAATTGGCTGAATTTCTTAATTTTAATATAAATAATCTATA
CGTCA-motif
TTTTGTTAAAATAAAAAAAATAAGATGTTAGATATTTATATAATCAAAACTAATGAGTATTATGATTCA
ATATGTACGTAATACAAAAATATTAAAAATTTAAAAAAGAATATTAAAATGGAAAATCTGTCTGAAA
AAATTAATTTTACTATGCGAAACATAGATGATGTAAAGTTGACACAACTCACCAACCCATAAAAGTT
ERE GCN4_motif
GCATTAATTATATATATATATATGTAGAAATAGTCTTTCAAAAGTCAAACAAAATCTACTCAAATTATTT
TATTTTTTATAAATAATCATTTTCAAATTAAATTTAGACCAGTAGATCTCCTCAGCACACCTAAATTTA
AGACTTAAAATATTAAGTAAAAAAATTTAAATTATTTTTAAATTAAAATTAGACTTAAAATGGAATTG
HSE
AATAATAATATAGTTTATAATTCTTTTATGACTGTATTTTTTTTTAATAATTGTTGACTCTTTTAGTCTTT
Skn-1_motif
TTTAACGTGTAAAGTTGGACACTTCATTTACTAAAGCTCAAGTTATAATCAAAACACATGGGACTAA
ERE
TTTCAAAAATATATCACAATCAAACACTAATTGTTATTGTTAGTTCAGCTAATCCCATGTTTTTTCAAC
TCA-element
ATTGTTATGAGCAATTAAAATTATCTAAAGTGAGCACAGTTTTTCTCAAATTAATTAGTGGAAAATTA
TTATTAAATTAAATATTTACTATAGATAGTATACTCATTATTTTAATTATGTATCAAGGGAAATTAATATT
ATGACGGTCTAATTAATATATAACTATTAATTAATAGACATATCTAATATAAATTCACTTTATTGAAGAT
Skn-1_motif
AAATTTAATAATATTAAGTAGTTATATTAATATTTATATAAAATTAATTTAAATATATATAATGAATATAAA
TATTTTATGAGAAATTTTTGTTTGAATCGCATTTATCGTGAATTTAATACATAAATACGTGATAGCAGT
HSE
ABRE
TTATTATTATTATTATTATTATATAACTAAATGGCTCTGCCCTCTTGAAGGGGACATCACCGTAGTTTAC
AATTTAGTAAGGTTGAAAATTTCAAAATAAACAAGTCTTGTGTTCACACTTTATTAAAATGAAGCTG
GCCTTTTTCTTCCACAGGATTAAAAACAAAGGAAGTAATTTAGATTTATCAACGAGGATTACCCAAT
TGCATATGTAATTATTATATATAGAATTCTCTTTTAAAAAAATATTTCATTAATTTAGCAAATCCTTCGT
HSE
AGAAATAAATAATTTTATTCTATGGTAGTCAAATCAAATGCCCAACACAAACTTTGTAGTTCTTGCAG
ATCCTTGTCCCATTAATACTTTAACTCCATCCTCCCTTCCTTATAAATAGACGTCTCGCCTCTCCTCTG
CCTCACTCCAAACCTAGCTAGCTTCAGAATTCTCCGGCATTCCTGACTTGAGAATTCCAGTTTATTT
GTATTCGGCATTGTCTGTAGTCTTTGAGTAGCTTTGCACAGAAATCAAA**ATG**GTTAGTGGCCA

Figure S3. The promoter sequence of *HbACS3* and major *cis*-elements. The start code was boxed. The *cis*-acting regulatory elements were noted at lower position of sequence. CGTCA-motif, MeJA responsiveness; ERE, ethylene-responsive element; TCA-element, salicylic acid-responsive element; ABRE, abscisic acid-responsive element; GCN4_motif, endosperm expression; HSE, heat stress responsiveness; Skn-1_motif, endosperm expression

ATATAGATAAATCATAAGTAATGTATTCTTACTTTTGATTTCTGTTTTATTTTAATATTTTTTTTAATTT
ATAAGTCAAACCAAACATTAATTTACCTACGATTTTCTATTTTTAAGTAGGTTTAATCGACTTATGA
GTTAAACTAAAAAACATTCTTAATTATTAAGTATTTCTATTTTGAATAAATTAGATTTAGAACTGTGCG
TATTAATAGTATATATATAACGTGTTTTCAACTGTGATATAAAGTTGAAATTAAGTTGAAAATTAGTT
MBS
TATCATCTTCAAATGGAATATATACCAAATTTATAAATCTTTTCCTTGAAAATTATTTTAACACTACA
TGGAAGATTTCCATATATTGCCAAGCAATCGAGAGGAGAATTAAGTTGGTTAATCATGTGAAAGA
AGAAGGAAAATATAAACGATTTTGGTAAGGTAACAACGTGGTATAATAAATCACATGGAGTTTTGT
TTTGTTCAGAAGCAAAAGGAGAAGATTGTCAATCTTTAGACATGATACACGTTCAAGTACCATAT
P-box
GCATTAATTTCGTTTCAATCAGAAATTTCGAAGCTCTGCCACCTTAATAGGAAATAAAAGACTTTA
HSE
TATACTCGGCAACAAAAACACTTAGCACGTTTTCCATGGTTAACTCTGCACCGAAAGCTTAGAGC
LTR
AAAAGGGAAAAAGAGGAAGAACTAAAAAACCCACATCAAACGCGCATATAATATGGCAAATTTA
P-box
GCATGGAGAGGTAGAGTTAGATTGGTATTCTATGCAGTCGTTTTAGATGAATTTTAATTAGTTATTA
TGA-element
GGGTATCTCTTAAATCTTATCAGATCAAGTATTTCCATAACAAGGAAGGGGGATCTATCAAAATATG
TGGTAGCTAGAGATTAAAGGGTTAACCCAGTAAGTGGAAACCAGAAGAAGAAAAATGCGTGGAC
ARE
CCTGAGACTAATCCATTTCCACCACTTTGGCACCGGAGGTCACTCTGAATCTTGCCACATAATGTA
AACTTCCTAGAAAGAGCAAACACATCTCAATTTTTTTCAAACCGCATATGGATATATCTCCTGGTT
Circadian TC-rich repeats
CGCACTTCCTGGGAAAGTTCTTGATTGTACTGAATAGTTTTATTTTCTATGGAATAACTTTCCGAGC
AGAAATTAACGATATACCTAACCCAGGACAGCCTATACATAAGCAGTAACATAAATTTCCATAAATA
TAGTGAAAAATCTAAGAATCCCACCGGACATTCTCTCTTCTCTTGGGTTTTTTTCCCTCACACGTG
ABRE
CTTCTTGGTGATATCATTATCAACACGCAAGCCGTTACGATTGACTGACAATAGATTTAAACTTAAT
as-2-box
TTATGTTATTTCCAATTCCTTTCAATTCTCAACATTTGAAACTTTGAAACATACTTCTAATAGCTTTG
TTCCTTCAATACTTAACTCCATCAGGCACTTATATAAATAGCCGTCTCCTCCCTTCTCTGCCTCACT
TCAAACCTAGCTAGCTTCAGAATTATTCACGAGTATTCCCTACTTGAGAAGTCCTCCCTGTATAAC
TTGTATTCTGCACTGTTTGCAGTCATTAACTAGCTATAGCTTTAGACAGTAACAAA**ATG**GTGAGTG
Skn-1_motif

Figure S4. The promoter sequence of *HbACS4* and major *cis*-elements. The start code was boxed. The *cis*-acting regulatory elements were noted at lower position of sequence. MBS, MYB binding site involved in drought inducibility; P-box, gibberellin-responsive element; HSE, heat stress responsiveness; LTR, low-temperature responsiveness; TGA-element, auxin-responsive element; ARE, element essential for the anaerobic induction; Circadian, circadian control; TC-rich repeats, defense and stress responsiveness; ABRE, abscisic acid-responsive element; as-2-box, shoot-specific expression and light responsiveness; Skn-1_motif, endosperm expression

TTTTTTAATATGT**AACTTTATTTGTTGTAGAAC**AGAGATTTTATGACCAACCAATCTCCACCGTCCAT
Skn-1_motif
CCGTAGCATAGCATTATCTATTGGCATTTTCTATTGAAATAATTGCTATCGGCCCACCAGTTGATTGAG
MBS
AATTTTGTTATATGTTAACTATACAACTAGAAAGGCAATCAAGGGAAATGAAAAATACCTACATCAAC
CTAGTTATTGCATAATATATGAATTAATCATTTACATCCTCCCATATGTTTATTAAAAATGATCTAAATTAT
TACAAAAAATTATTAAAATTTCATGTTAGTAATACGTGTGATGAATATCAGTTGATATAAGAACTTTTC
ABRE MBS
ATATTAAATTTTTTGACTTCAGTATTTTCATGCTTAGATCGAGAGTGTTATTCAAGCTCAATAAGGATG
HSE
ACTTCAAAATTTGAATCATAACTTTGTAGCTAAAGTTTACCTGGATTAGTTGATATAAGAATTTTTCATA
TTGAATTTAATGAAATAATGTAAACTCATATATATGCCTTTAATTAAGAAAGAAATATATTGCCTGAACA
AGATCTCATACACCTAATTAAGATATTAATTATACCCCATTATTAATTTGTTCCCACTTGAGATTTTGATT
GGTTTTGACTTCAAAATCAAAAAGGGTTCGTTCGCTTTTTTTTTTTTTTTTAATTACAAAAGCAAAAAT
ARE
TCAAAATTAAAGGAAAGAAGAATCAAATAAGGCGTTTGGAATATATTGTTGTAGGTGCATAGAAATAC
AAAATAATAATAATAATAAAAAAATAGAAGCAAATTAAAGGAGTAATGTTAAAGAGGGAGAATCAAG
AATGTGGCCGACATGGCTTGGATATTGGGTTGAAGAGACAGGAAGCACATAGGACCCTCGTGTGGA
C-repeat/DRE GCN4_motif
ACCATGGCTTGAGTTCAAGTTTAGCCATTGGAGTTCATGTAGGTCATGTAAGGCCATTTTCTTTAAGA
GCN4_motif Skn-1_motif TC-rich repeats
TTTGCTGTCGGAGAGGCTTTTAAACACTACTGTTATACTACTGCAATCTCTTTCCTTTATAAGTCAATT
ATTTGTTTTCTACTTACTACATGATTCTGTTATAATTGAATTAAATTAAAAATTTCTTAAATCTCTTGAAT
HSE
AACTCCACTCGAGTTTTGGAGTTGGTGGATTGCACCTTTCAATCAAGAAATGAAGAAATGGTTATGG
TGGTGGTATTAAGAGTAATGTGCAAATGTTGCAAACGAAAATCAGCATAGAAATGTGCAATGTCGAA
TGGGAAAGCGCGTATAAGTATGATTTGTCCTATAATATAAATAATTATTAAACAAAACAAGCCCTGTCT
CTATGGTCAAATTTGCCTTTGTGAATCTGTCGCGGTAAGCCGGCCGGGATCATGCTATAACTTCCCCA
Box-W1/*W* box
TATATATCTAATGTTTGCTATGGACCTCTCCACAACACCAACCCCATTCTTCTTCTTCTTCAATACTCTT
AuxRR-core
CAATCTACTCATCTATAAAATTCTTTCTGTTTCCCTGTGCATCTCTTTTATTTGTCTGCGTATATATTTTT
GARE-motif
GCCTGTTAATTAATCTCAGCTTGATTATACCTCATCTATTTGTTCAAGAAAATACCAAAA**ATG**AGGCT
TC-rich repeats

Figure S5. The promoter sequence of *HbACS5* and major *cis*-elements. The start code was boxed. The *cis*-acting regulatory elements were noted at lower position of sequence. Skn-1_motif, endosperm expression; MBS, MYB binding site involved in drought inducibility; ABRE, abscisic acid-responsive element; HSE, heat stress responsiveness; ARE, element essential for the anaerobic induction; C-repeat/DRE, cold- and dehydration-responsiveness; GCN4_motif, endosperm expression; Box-W1, funga elicitor-responsive element; AuxRR-core, auxin-responsive element; GARE-motif, gibberellin-responsive element; TC-rich repeats, defense and stress responsiveness.

Figure S6. The promoter sequence of *HbACS6* and major *cis*-elements. The start code was boxed. The *cis*-acting regulatory elements were noted at lower position of sequence. O_2-site, zein metabolism regulation; MBS, MYB binding site involved in drought inducibility; GARE-motif, gibberellin-responsive element; Skn-1_motif, endosperm expression; Box-W1, funga elicitor-responsive element; TC-rich repeats, defense and stress responsiveness; HSE, heat stress responsiveness; TGA-element, auxin-responsive element; Skn-1_motif, endosperm expression.

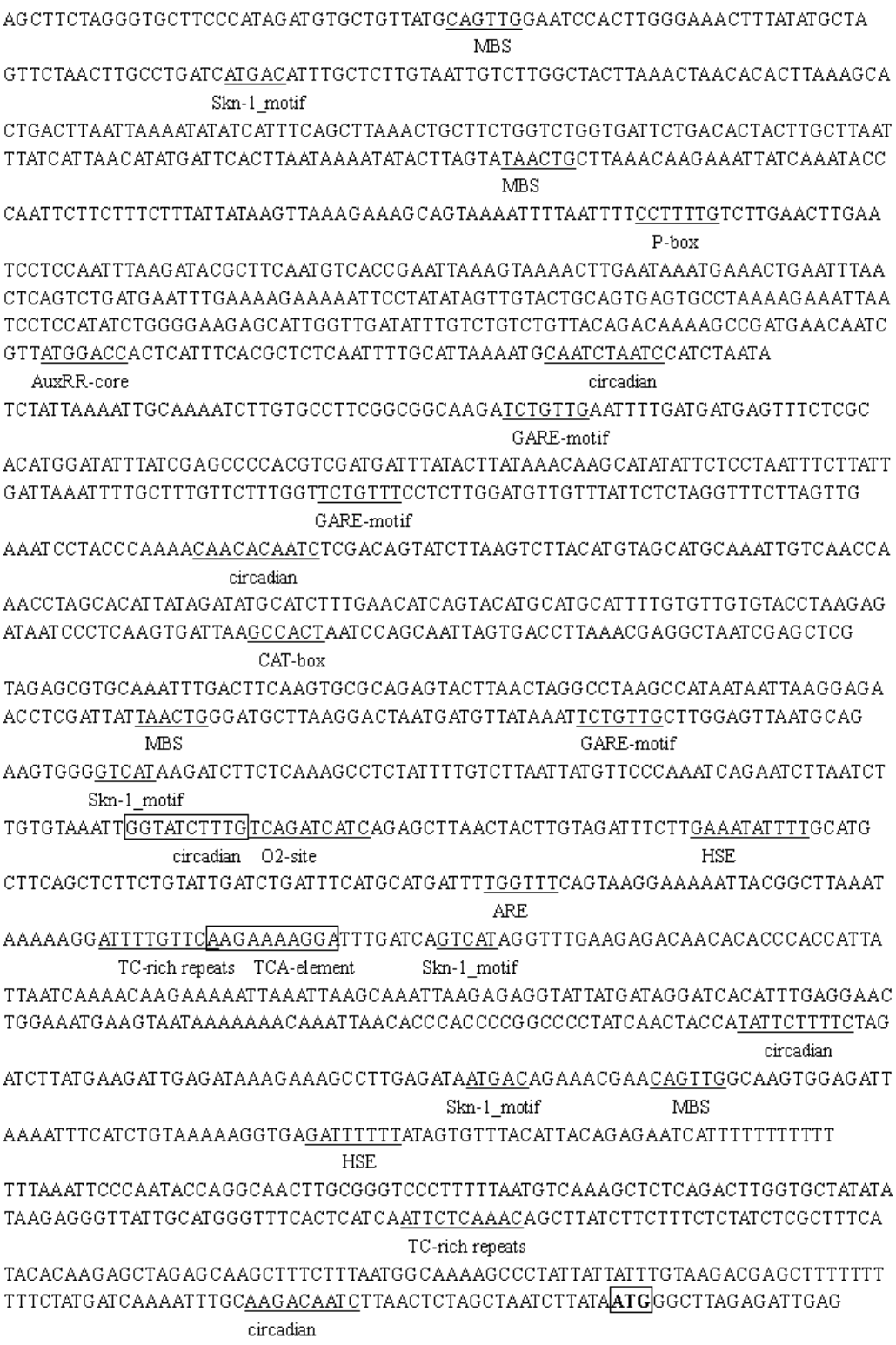

Figure S7. The promoter sequence of *HbACS7* and major *cis*-elements. The start code was boxed. The *cis*-acting regulatory elements were noted at lower position of sequence. MBS, MYB binding site involved in drought inducibility; Skn-1_motif, endosperm expression; P-box, gibberellin-responsive element; AuxRR-core, auxin-responsive element; Circadian, circadian control; CAT-box, meristem expression; GARE-motif, gibberellin-responsive element; O_2-site, zein metabolism regulation; HSE, heat stress responsiveness; TCA-element, salicylic acid-responsive element; TC-rich repeats, defense and stress responsiveness.

Promoter sequences of *HbACSs*

Promoter sequences of *HbACS1*

TTTGAGGAACGGGGCCAATTACCCCATCTCTAGAACGTGACGTCGGCACTGACACCATTGTCATTAGATC
ACTTGCTTGTTAGCAGTAGCAGCAAGCCAGCAACAACACGATTTGTAGGACACACAGAATGGGATAAAT
CCAAAAAGGCAAAAATTCATTAATGCCAGCTAAATAATTTTACGCGGTAACAGGTCTATATTAATATTGTG
GGGTTCAAATCTCAATAATATGATTTTAAAATAATAATATTATCTTATTTTAATGTTATTCATTATTATTCAATA
AAAATCAGATTTTAGTCTGACTCTTCTAATCCTTTAATAAAAAAAATATTTTTTTTATTTATAATTTAGTCAT
AAAATTGACTGACAAATTTTGTTACAAAACATCCCTACAAGATTTTATAACTCCAAAATGTTAAACTATTAT
ACCCAGCAATAGCTTGCGAATAGACGTAGTAAACAAATAGAAAACGGCTTCCGTAGTTTTTTTTTTTTTCA
AAGAATTAACAGTTGATCCTTCACGGAATCTTCTCTTTAGACTTTAATTCTTCAGTGATCAAGGAAGGAA
ACAGCATACACAGAGGCACACTACATTTTGGCTTTTGGAAAATATCTATAAATAAGATGCAATACGAGGA
AGCTGCTGCAGATCTCAACCTTATTACACATATAACTTTGTTCTTTAAATTCTTCAACATCTGCAAGGCCAT
ATAGCGCAAGCAATTACGCCTGCTTCAATAGACATTCTCTAGATCTCTCTACATATAAATACTTGGTATCAT
CTCTTGCAAATTTCAAGGTAACCGTCAGCAGATAAAAT

Promoter sequences of HbACS2

AAAAAATTAATAAAAAAAAATAGTGGAACATGACGTCCTCTACATAGGTGCATTGTATTTGTGTGTTGGG
ATTTCTTTTTAAATAAAAATAAGAAGTTAAATATTTCATATTTTAGCTTAGCAGCCGATGAAAAGTATTGAG
TTTGTCACATTTAGATATCTAAATAGAAATTGACTGAATTTATATCAAAACTGTAGTATTTTGCATGTATAAC
TATAGAAAATTAATGTATTCGATTTGTAAAATTTCTGAAAATGTTCATAAAGTTGTTATCAACAAGTTTAGA
TGGTAAATTGCTGTACCCACAAGGAAGTACACCCAATTCAACTGAAGGGTGATGAAGAAGTTTTAATAAA
ATTACCTAGAAGCTAAGTTAAGAGGAAAATACTCAAAACTTTACAAGGAACACACTACCTTTGTTCGTGA
AATATTAATCAGAATGAAATATTTCACTAAAATGCCAGCCCATAGTATTCCCAATTCCCTACTTTATATGGCA
ATAGCCAATAAATAAAGAAAAAGGAGTGCATACCGAATAATTAGTTCATAGGGTACCCTACTCGACCAAG
CTTCCAATTGAAGCTCATGAGTTGGTCTATATTTAAGACAAAGAGGCACAATGCTGGCCTATAAATGGGA
ACAAATTAAGAAATTGTTTTGAACCAGTTTGACACCAGTTGTCGTTTAATCCACTTAGTTGTTAGTAGATA
GTAGTTGCAGCAACTACACAATTGTTAGGTCACATTAGATGGGATAAATACAACAATTCATTTATGTGATG
CCACGGTAACCTACTTCACATTAATTTTATGGGTTTCAAATCTCAATTATACAATTTCAAGATAATAATGTC
ATCTTATTTTAATAAATAATAAATAATTTTTTAAAAAAAGTTTATATAATTTCAAAAACAATTCGTGTGCTAT
TGATTTTAATACCATAAAATCATCTCAAATTTTAAAATATAAATATTATGTTGGAAACATCCATACAAGATTT
AAGAGATTATAATCCCTTATTCTAAGAAGGATTCATTTTTATGTGAGCGAGATTGTGATTAGGAGTATCATG
GAATTTTCCACTCCAAAAGTTTACCATTATACAACAGAATAGACTTAATAATCAACGCTGACAAAGAAAG
CAAGAACGCCCACCGAATCTCACCAATTTTCAAAGAATAGCAGTTGATCCTTCACGGAACTTTCTTAATT
CCTCAGTCATCGACGAAGGAAAGAGCATAGAGGCATAGACACACACCTCACACCTCATCTTGGGATCTAT
AAATATTTATGCAATGTGAGAAGCTCCTGGCAGCTCTCAACCTTACTCCTATATATACTAATTTAATTATTCA
CCAACACCTGCGAGGTCATTAGCGCAAGCAACTACGCCTGCTTCAAGAAACAGCCTCAAAATCTCTCTA
CATATAAGTACTTGATATCATCTCTTTGTGCATTTCTTGGAAAATTATTTAATTCCAAGCTCACGTTCAGAA
CAGAAAAT

Promoter sequences of HbACS3

TATACTTTAAATATGAATTTATTTTATCTGATTAAATTAATTTTCTTCTTTATTTCTATTTATTCTGAAAATGGC
ACTGCTTAATTTGCTTAATTGGCTGAATTTCTTAATTTTAATATAAATAATCTATATTTTGTTAAAATAAAAA
AAATAAGATGTTAGATATTTATATAATCAAAACTAATGAGTATTATGATTCAATATGTACGTAATACAAAAAT
ATTAAAAATTTAAAAAAGAATATTAAAATGGAAAATCTGTCTGAAAAAATTAATTTTACTATGCGAAACAT
AGATGATGTAAAGTTGACACAACTCACCAACCCATAAAAGTTGCATTAATTATATATATATATATGTAGAAA
TAGTCTTTCAAAAGTCAAACAAAATCTACTCAAATTATTTTATTTTTTATAAATAATCATTTTCAAATTAAAT
TTAGACCAGTAGATCTCCTCAGCACACCTAAATTTAAGACTTAAAATATTAAGTAAAAAAATTTAAATTAT
TTTTAAATTAAAATTAGACTTAAAATGGAATTGAATAATAATATAGTTTATAATTCTTTTATGACTGTATTTTT
TTTTAATAATTGTTGACTCTTTTAGTCTTTTTTAACGTGTAAAGTTGGACACTTCATTTACTAAAGCTCAAG
TTATAATCAAAACACATGGGACTAATTTCAAAAATATATCACAATCAAACACTAATTGTTATTGTTAGTTCA
GCTAATCCCATGTTTTTTCAACATTGTTATGAGCAATTAAAATTATCTAAAGTGAGCACAGTTTTTCTCAAA
TTAATTAGTGGAAAATTATTATTAAATTAAATATTTACTATAGATAGTATACTCATTATTTTAATTATGTATCAA
GGGAAATTAATATTATGACGGTCTAATTAATATATAACTATTAATTAATAGACATATCTAATATAAATTCACTT
TATTGAAGATAAATTTAATAATATTAAGTAGTTATATTAATATTTATATAAAATTAATTTAAATATATATAATGA

ATATAAATATTTTATGAGAAATTTTTGTTTGAATCGCATTTATCGTGAATTTAATACATAAATACGTGATAGC
AGTTTATTATTATTATTATTATATAACTAAATGGCTCTGCCCTCTTGAAGGGGACATCACCGTAGTTTAC
AATTTAGTAAGGTTGAAAATTTCAAAATAAACAAGTCTTGTGTTCACACTTTATTAAAATGAAGCTGGCCT
TTTTCTTCCACAGGATTAAAAACAAAGGAAGTAATTTAGATTTATCAACGAGGATTACCCAATTGCATATG
TAATTATTATATATAGAATTCTCTTTTAAAAAAATATTTCATTAATTTAGCAAATCCTTCGTAGAAATAAATAA
TTTTATTCTATGGTAGTCAAATCAAATGCCCAACACAAACTTTGTAGTTCTTGCAGATCCTTGTCCCATTAA
TACTTTAACTCCATCCTCCCTTCCTTATAAATAGACGTCTCGCCTCTCCTCTGCCTCACTCCAAACCTAGCT
AGCTTCAGAATTCTCCGGCATTCCTGACTTGAGAATTCCAGTTTATTTGTATTCGGCATTGTCTGTAGTCTT
TGAGTAGCTTTGCACAGAAATCAAA

Promoter sequences of HbACS4

GTATTCTTACTTTTGATTTCTGTTTTATTTTAATATTTTTTTTAATTTATAAGTCAAACCAAACATTAATTTAC
CTACGATTTTCTATTTTTAAGTAGGTTTAATCGACTTATGAGTTAAACTAAAAACATTCTTAATTATTAAGTA
TTTCTATTTTGAATAAATTAGATTTAGAACTGTGCGTATTAATAGTATATATATAACGTGTTTTCAACTGTGA
TATAAAGTTGAAATTAAGTTGAAAATTAGTTTATCATCTTCAAATGGAATATATACCAAATTTATAAATCTTT
TCCTTGAAAATTATTTTAACACTACATGGAAGATTTCCATATATTGCCAAGCAATCGAGAGGAGAATTAAG
TTGGTTAATCATGTGAAAGAAGAAGGAAAATATAAACGATTTTGGTAAGGTAACAACGTGGTATAATAAA
TCACATGGAGTTTTGTTTTGTTCAGAAGCAAAAGGAGAAGATTGTCAATCTTTAGACATGATACACGTTC
AAGTACCATATGCATTAATTTCGTTTCAATCAGAAATTTCGAAGCTCTGCCACCTTAATAGGAAATAAAAG
ACTTTATATACTCGGCAACAAAAACACTTAGCACGTTTTCCATGGTTAACTCTGCACCGAAAGCTTAGAG
CAAAAGGGAAAAAGAGGAAGAACTAAAAAACCCACATCAAACGCGCATATAATATGGCAAATTTAGCAT
GGAGAGGTAGAGTTAGATTGGTATTCTATGCAGTCGTTTTAGATGAATTTTAATTAGTTATTAGGGTATCTC
TTAAATCTTATCAGATCAAGTATTTCCATAACAAGGAAGGGGGATCTATCAAAATATGTGGTAGCTAGAGA
TTAAAGGGTTAACCCAGTAAGTGGAAACCAGAAGAAGAAAAATGCGTGGACCCTGAGACTAATCCATTT
CCACCACTTTGGCACCGGAGGTCACTCTGAATCTTGCCACATAATGTAAACTTCCTAGAAAGAGCAAACA
CATCTCAATTTTTTTCAAACCGCATATGGATATATCTCCTGGTTCGCACTTCCTGGGAAAGTTCTTGATTGT
ACTGAATAGTTTTATTTTCTATGGAATAACTTTCCGAGCAGAAATTAACGATATACCTAACCCAGGACAGC
CTATACATAAGCAGTAACATAAATTTCCATAAATATAGTGAAAAATCTAAGAATCCCACCGGACATTCTCTC
TTCTCTTGGGTTTTTTTCCCTCACACGTGCTTCTTGGTGATATCATTATCAACACGCAAGCCGTTACGATTG
ACTGACAATAGATTTAAACTTAATTTATGTTATTTCCAATTCCTTTCAATTCTCAACATTTGAAACTTTGAA
ACATACTTCTAATAGCTTTGTTCCTTCAATACTTAACTCCATCAGGCACTTATATAAATAGCCGTCTCCTCCC
TTCTCTGCCTCACTTCAAACCTAGCTAGCTTCAGAATTATTCACGAGTATTCCCTACTTGAGAAGTCCTCC
CTGTATAACTTGTATTCTGCACTGTTTGCAGTCATTAACTAGCTATAGCTTTAGACAGTAACAAA

Promoter sequences of HbACS5

TTTTTTAATATGTAACTTTATTTGTTGTAGAACAGAGATTTTATGACCAACCAATCTCCACCGTCCATCCGT
AGCATAGCATTATCTATTGGCATTTTCTATTGAAATAATTGCTATCGGCCCACCAGTTGATTGAGAATTTTGT
TATATGTTAACTATACAACTAGAAAGGCAATCAAGGGAAATGAAAAATACCTACATCAACCTAGTTATTGC
ATAATATATGAATTAATCATTTACATCCTCCCATATGTTTATTAAAAATGATCTAAATTATTACAAAAAATTAT
TAAAATTTCATGTTAGTAATACGTGTGATGAATATCAGTTGATATAAGAACTTTTCATATTAAATTTTTTGAC
TTCAGTATTTTCATGCTTAGATCGAGAGTGTTATTCAAGCTCAATAAGGATGACTTCAAAATTTGAATCATA
ACTTTGTAGCTAAAGTTTACCTGGATTAGTTGATATAAGAATTTTTCATATTGAATTTAATGAAATAATGTAA
ACTCATATATATGCCTTTAATTAAGAAAGAAATATATTGCCTGAACAAGATCTCATACACCTAATTAAGATAT
TAATTATACCCCATTATTAATTTGTTCCCACTTGAGATTTTGATGGTTTGACTTCAAAATCAAAAAGGGTTC
GTTCGCTTTTTTTTTTTTTTTTAATTACAAAAGCAAAAATTCAAAATTAAAGGAAAGAAGAATCAAATAAG
GCGTTTGGAATATATTGTTGTAGGTGCATAGAAATACAAAATAATAATAATAATAAAAAAATAGAAGCAAA
TTAAAGGAGTAATGTTAAAGAGGGAGAATCAAGAATGTGGCCGACATGGCTTGGATATTGGGTTGAAGA
GACAGGAAGCACATAGGACCCTCGTGTGGAACCATGGCTTGAGTTCAAGTTTAGCCATTGGAGTTCATGT
AGGTCATGTAAGGCCATTTTCTTTAAGATTTGCTGTCGGAGAGGCTTTTAAACACTACTGTTATACTACTG
CAATCTCTTTCCTTTATAAGTCAATTATTTGTTTTCTACTTACTACATGATTCTGTTATAATTGAATTAAATTA
AAAATTTCTTAAATCTCTTGAATAACTCCACTCGAGTTTTGGAGTTGGTGGATTGCACCTTTCAATCAAGA
AATGAAGAAATGGTTATGGTGGTGGTATTAAGAGTAATGTGCAAATGTTGCAAACGAAAATCAGCATAGA
AATGTGCAATGTCGAATGGGAAAGCGCGTATAAGTATGATTTGTCCTATAATATAAATAATTATTAAACAAA
ACAAGCCCTGTCTCTATGGTCAAATTTGCCTTTGTGAATCTGTCGCGGTAAGCCGGCCGGGATCATGCTAT
AACTTCCCCTATATATATCTAATGTTTGCTATGGACCTCTCCACAACACCAACCCCATTCTTCTTCTTCTTCA
ATACTCTTCAATCTACTCATCTATAAAATTCTTTCTGTTTCCCTGTGCATCTCTTTTATTTGTCTGCGTATATA
TTTTTGCCTGTTAATTAATCTCAGCTTGATTATACCTCATCTATTTGTTCAAGAAAATACCAAAA

Promoter sequences of HbACS6

AATTAATTCTAAGTTTTTAGATATAAATAAATATTTTATATTTTATATTATTAATAAAAAAATATTTTAACAAA
GTTAAAAATACATTAATTAAAATGTTAAAATTATAAATAAAAAATAAAAATATTAATAATATTAATTTTTAAGT
TAAATAAAAAAGATAACATGATCAAAATAAAAAATAAAATCAAATCAGCTATCAGCCGATGAGAAATAAC
TCTAAAAATAGAGCTGAGATAAACTGCAGCTGATGGATATTATCAGTTGTCTATCAGCTATCAGCTTTATTT
TTTTAAATTTATCAAACACTATAATTTATCTGTTTAAGTGTTTAATAACTATCAACTGTATTCAATAAATAAA
TTAAACACCTATTTAATATGATTTTTAAATAATAATTAATTAATTAATATGATTTTAATGACATATACGCACAA
GAAAAACAGGGAAAGATAAGAAGAGCGTGACATTTAGGTAAGATAGCCATTTATAATTGCCTTTTTTTTCT
CTACCAAATTTTGACCAACGAAATTTAAGAAAATAAAAGGTTTTTGTCTATTGCTTTAAGAAATAAAAAGT
GTATGGATTTTAATTTTATATATAAAAATGAGTGTAATAAGTTTTAATTTAAATATTTATATTTAAATTTATATA
AAATTAATTAAATTATACACAATTGAAATAATAAATAATAAATTAAAAACAAATCCCTGGACCCTGTTTATT
TAGGTAGGAATAAAAATTAAAAAAAATGTTCGTAGATTCTGATTGGCGCCAAGTTGTCAAAAATGAAGGC
GTAATAATTAAATACCAAAAAATTTAATGAATAAAGGGTAATTTAGTAAAAGCGAACATACCCAGGCTCTC
AAAAAATCGCAACGACAAGATCCAAGGCCAATCCCTCCCTCAAGCAAGCAACGGCGTACAATATCACAC
TTCAAAAAATACAAAAATAATAAATTTATAAAACATAAATATTCCCAAAATTAAAAAAAAAATCTCAACGC
CAAGAGCTTCACGCTAGCTCTTTCCCCTCCTCCGCCACCATCGCCGAGAGCTTCTTTAACCCATAAGTAG
CCAACTGCATGTCCATGACTCTCATGTTTCAGAA

Promoter sequences of HbACS7

AGCTTCTAGGGTGCTTCCCATAGATGTGCTGTTATGCAGTTGGAATCCACTTGGGAAACTTTATATGCTAG
TTCTAACTTGCCTGATCATGACATTTGCTCTTGTAATTGTCTTGGCTACTTAAACTAACACACTTAAAGCAC
TGACTTAATTAAAATATATCATTTCAGCTTAAACTGCTTCTGGTCTGGTGATTCTGACACTACTTGCTTAAT
TTATCATTAACATATGATTCACTTAATAAAATATACTTAGTATAACTGCTTAAACAAGAAATTATCAAATACC
CAATTCTTCTTTCTTTATTATAAGTTAAAGAAAGCAGTAAAATTTTAATTTTCCTTTTGTCTTGAACTTGAG
ATCCTCCAATTTAAGATACGCTTCAATGTCACCGAATTAAAGTAAAACTTGAATAAATGAAACTGAATTTA
ACTCAGTCTGATGAATTTGAAAAGAAAAATTCCTATATAGTTGTACTGCAGTGAGTGCCTAAAAGAAATT
AATCCTCCATATCTGGGGAAGAGCATTGGTTGATATTTGTCTGTCTGTTACAGACAAAAGCCGATGAACA
ATCGTTATGGACCACTCATTTCACGCTCTCAATTTTGCATTAAAATGCAATCTAATCCATCTAATATCTATTA
AAATTGCAAAATCTTGTGCCTTCGGCGGCAAGATCTGTTGAATTTTGATGATGAGTTTCTCGCACATGGAT
ATTTATCGAGCCCCACGTCGATGATTTATACTTATAAACAAGCATATATTCTCCTAATTTCTTATTGATTAAAT
TTTGCTTTGTTCTTTGGTTCTGTTTCCTCTTGGATGTTGTTTATTCTCTAGGTTTCTTAGTTGAAATCCTACC
CAAAACAACACAATCTCGACAGTATCTTAAGTCTTACATGTAGCATGCAAATTGTCAACCAAACCTAGCA
CATTATAGATATGCATCTTTGAACATCAGTACATGCATGCATTTTGTGTTGTGTACCTAAGAGATAATCCCT
CAAGTGATTAAGCCACTAATCCAGCAATTAGTGACCTTAAACGAGGCTAATCGAGCTCGCTAGAGCGTGC
AAATTTGACTTCAAGTGCGCAGAGTACTTAACTAGGCCTAAGCCATAATAATTAAGGAGAACCTCGATTAT
TAACTGGGATGCTTAAGGACTAATGATGTTATAAATTCTGTTGCTTGGAGTTAATGCAGAAGTGGGGTCAT
AAGATCTTCTCAAAGCCTCTATTTTGTCTTAATTATGTTCCCAAATCAGAATCTTAATCTTGTGTAAATTGG
TATCTTTGTCAGATCATCAGAGCTTAACTACTTGTAGATTTCTTGAAATATTTTGCATGCTTCAGCTCTTCT
GTATTGATCTGATTTCATGCATGATTTTGGTTTCAGTAAGGAAAAATTACGGCTTAAATGAAAAAGGATTT
TGTTCAAGAAAAGGATTTGATCAGTCATAGGTTTGAAGAGACAACACACCCACCATTGATTAATCAAAAC
AAGAAAAATTAAATTAAGCAAATTAAGAGAGGTATTATGATAGGATCACATTTGAGGAACTGGAAATGAA
GTAATAAAAAAACAAATTAACACCCACCCCGGCCCCTATCAACTACCATATTCTTTTCTAGATCTTATGAA
GATTGAGATAAAGAAAGCCTTGAGATAATGACAGAAACGAACAGTTGGCAAGTGGAGATTAAAATTTCA
TCTGTAAAAAGGTGAGATTTTTTATAGTGTTTACATTACAGAGAATCATTTTTTTTTTTTTTAAATTCCCAAT
ACCAGGCAACTTGCGGGTCCCTTTTTAATGTCAAAGCTCTCAGACTTGGTGCTATATATAAGAGGGTTATT
GCATGGGTTTCACTCATCAATTCTCAAACAGCTTATCTTCTTTCTCTATCTCGCTTTCCATACACAAGAGCT
AGAGCAAGCTTTCTTTAATGGCAAAAGCCCTATTATTATTTGTAAGACGAGCTTTTTTTTTTCTATGATCAA
AATTTGCAAGACAATCTTAACTCTAGCTAATCTTATA

Table S1. The nucleotide/amino acid identities of *HbACS* genes. The identity among nucleotide sequences and amino acid sequences of *HbACSs* are given at upper right and bottom left of the diagonal, respectively.

	Nucleotide Identity (%)								
	HbACS1	***HbACS2***	***HbACS3***	***HbACS4***	***HbACS5***	***HbACS6***	***HbACS7***	***HbACS8***	***HbACS9***
Amino acid identity (%)									
HbACS1	–	90.73	66.53	67.42	55.33	56.59	56.25	39.95	38.50
HbACS2	90.64	–	68.84	67.55	54.22	56.01	55.60	39.20	38.38
HbACS3	69.12	69.94	–	89.51	53.55	54.25	54.63	38.97	37.94
HbACS4	68.30	67.83	89.69	–	54.40	53.84	54.83	37.82	38.00
HbACS5	51.14	50.62	50.51	77.57	–	56.29	56.15	41.46	40.00
HbACS6	54.56	54.66	51.12	51.74	55.18	–	93.12	43.14	42.86
HbACS7	53.73	53.83	50.72	51.53	54.55	93.86	–	43.99	42.62
HbACS8	33.91	34.02	31.51	31.51	32.69	37.06	37.24	–	65.10
HbACS9	33.22	32.83	31.22	31.05	32.53	36.93	37.05	59.82	–

The nucleotide and amino acid of *HbACS1*

ATGGTGTTCAAGTTGAACAATCAGTTGTTGTCAAAGATAGCAACTGGTAATGGACACGGTGAAGACTCA
CCGTATTTTGATGGATGGAAAGCATACGATGAAGATCCATATCATCCCACCAAGAATCCGAAAGGAGTTAT
CCAGATGGGTCTTGCAGAGAATCAGCTTTGCTTCGATTTGATTCAAGAATGGCTCAAGAACAACCCAAA
AGCTTCCATTTGCACTCCTGAAGGAGCGGAGGAGTTCAGGGATATAGCTATCTTTCAAGATTACCATGGCT
TGCCAGAATTCAGAAATGCTGTTGCAAAGTTCATGGCCAAAGGCAGAGGGAATAGAGTAACATTTGACC
CTGACCGCATTGTTATGAGCGGAGGAGCCACCGGAGCTCACGAAATGGTCGCCTTCTGCTTGGCTGATCC
CGGCGAAGCATTTTTGGTGCCTACTCCTTATTATCCAGGATTTGATCGAGACTTGAGATGGAGAACAGGA
GTTCAACTTATCCCAGTTGAATGTGAAAGCTCTAACCAGTTCAAGGTTACAAGAAAAGCCTTGGAAGAC
GCTTATGATACAGCACAATTAGACAACATCAGAGTAAAGGGCTTGCTCATAACCAATCCATCAAATCCTCT
AGGTACAATCTTAGACAGGGAAACACTAAAAAGTATTGTCAGCTTCGTTAATGAGAAGAACATCCATTTA
GTCTGCGATGAGATATATGCAGCCACAGTTTTTAGCCAGCCTGATTTTGTTAGCATCTCAGAGATAATAGA
GGAAGAGGTGGAGTGCAATCTTGATCTCATCCACATTGTTTACAGCCTCTCCAAGGACATGGGGTTCCCT
GGATTTAGAGTAGGCATTATTTACTCTTACAATGATGCAGTTGTGAGCTGTGCTCGCAAGATGTCGAGTTT
TGGATTAGTGTCATCGCAGACTCAACACCTGATTGCTTCAATGTTATCAGATGATGAATTTGTGGAAAAGT
TCATCATGCAAAACAAGAAGAGATTAGCTACAAGGTATAGTAGCTTTACTAACGGACTTGCTCAAGTAGG
GATTAAGTGTTTGAAGACAAGCAATGCAGGCCTGTTTGTATGGATGGATTTGCGTAGACTTCTCAAAGAA
CAGACAGTTGAAGGAGAGATAGCACTCTGGAGGGTGATAATCAACAATGTTAAGCTGAATGTTTCGCCA
GGTTCTTCTTTCCGTTGCACTGAACCAGGGTGGTTTAGAGTTTGCTTTGCAAACATGGATGACCAGACCA
TGGAAGTTGCTTTGTCAAGAATCAAGACATTTATTCTTAAGAGTAAGGAAGCCAAGATGTCAGTGAAGA
AATTATGCTGGCAAGGCAGCCTTAAACTCAGCTTTTCCTCTCGAATATACGACGAAATCATCTCTCCCCAC
TCTCCTATACCCCATTCGCCTCTCGTTCGAGCCAGAACTTGA

MVFKLNNQLLSKIATGNGHGEDSPYFDGWKAYDEDPYHPTKNPKGVIQMGLAENQLCFDLIQEWLKNNPK
ASICTPEGAEEFRDIAIFQDYHGLPEFRNAVAKFMAKGRGNRVTFDPDRIVMSGGATGAHEMVAFCLADPGE
AFLVPTPYYPGFDRDLRWRTGVQLIPVECESSNQFKVTRKALEDAYDTAQLDNIRVKGLLITNPSNPLGTILD
RETLKSIVSFVNEKNIHLVCDEIYAATVFSQPDFVSISEIIEEEVECNLDLIHIVYSLSKDMGFPGFRVGIIYSYND
AVVSCARKMSSFGLVSSQTQHLIASMLSDDEFVEKFIMQNKKRLATRYSSFTNGLAQVGIKCLKTSNAGLFV
WMDLRRLLKEQTVEGEIALWRVIINNVKLNVSPGSSFRCTEPGWFRVCFANMDDQTMEVALSRIKTFILKSK
EAKMSVKKLCWQGSLKLSFSSRIYDEIISPHSPIPHSPLVRART

The nucleotide and amino acid of *HbACS2*

ATGGTGTTCAAGTTGAACAACCAGTTGTTATCAAAGATAGCAACCGGAAAAGGACACGGGGAAGACTCA
CCGTATTTTGATGGATGGAAGGCATATGACAACGATCCATATCATCCCACCAAGAATCCAGATGGAGTTAT
CCAGATGGGTCTTGCAGAGAATCAGCTTTGCTTCGATTTGATTCAAGAATGGCTCAAGAACAACCCAAA
AGCCTCCATTTGCACAACTGAAGGAGCAGAGGAATTCAGGGACATAGCTATCTTTCAAGATTACCATGGC

TTGGAAGAATTCAGAATTGCTATTGCAAAGTTCATGGCAAAAGGAAGAGGGGATAGAGTAACGTTTGAC
CCTGACCGCATTGTCATGAGCGGAGGAGCCACCGGAGCTCATGAGATGATCGCCTTCTGCTTGGCAGATC
CCGGCGATGCATTTTTGGTGCCAACTCCTTATTATCCTGGATTCGATCGAGACTTGAGATGGAGAACAGG
AGTTCAACTTTTTCCAGTTGACTGTGAAAGCTCTAACTACTTCAAGATTACAAGAGAAGCCTTAGAATAC
GCTTATGAGATGGCACAATTAGACAACATCAGAGTAAAGGGCTTGCTCATAACCAATCCATCAAATCCTTT
AGGTACAATCTTAGATAGGGAAACGCTAAAAAGCATTGTCAACTTCATCAATGAGAAGAACATCCATTTA
GTCTGCGATGAGATCTACGCGGCCACAGTTTTCAGCCAGCCTGAATTTGTTAGCATTTCAGAGATAATAGA
GGAAGAGGTGGAGTGCAATCTTGATCTTATCCACATTGTTTACAGCCTCTCTAAGGATATGGGATTCCCTG
GATTTAGAGTAGGAATTGTTTACTCTTATAATGATGCAGTTGTGAGCTGTGCTCGCAAGATGTCAAGCTTC
GGATTAGTGTCGTCGCAGACTCAACACTTGATTGCTTCAATGTTATCAGATGATGAATTTGTAGACAATTT
CATCATGCAAAGCAAGAAGAGATTAGCTTCAAGGTATAGTAGCTTCACTAAAGGGCTTGCTCAAGTAGGG
ATCAAGTGTTTAAAGACGAGCAACGCGGGCCTTTTTGTATGGATGGATTTGCGTAGGCTTCTCAAAGAGC
AGACCGTTGCAGGGGAGCTTGCACTATGGAGAGTGATAATTAACGATGTCAAGCTCAATGTTTCGCCAGG
TTCTTCTTTCCATTGCACAGAGCAAGGGTGGTTTAGAGTTTGCTTTGCAAACATGGATGACCAGACAGTG
GAAGTTGCTTTATCAAGAATTAAGACATTTATGCTCAAGAACAAGGAAGCCATGATGCCAGTGAAGAAAT
TACGCTGGCAGGGCAGCCTCAAACTCAGCTTCTCCTCTCGAATATATGATGATTTCATCATGTCTCCCCAC
TCTCCTTTTCCTCAATCTCCTCTTGTTCAAGCCAGAAATTGA

MVFKLNNQLLSKIATGKGHGEDSPYFDGWKAYDNDPYHPTKNPDGVIQMGLAENQLCFDLIQEWLKNNPK
ASICTTEGAEEFRDIAIFQDYHGLEEFRIAIAKFMAKGRGDRVTFDPDRIVMSGGATGAHEMIAFCLADPGDA
FLVPTPYYPGFDRDLRWRTGVQLFPVDCESSNYFKITREALEYAYEMAQLDNIRVKGLLITNPSNPLGTILDRE
TLKSIVNFINEKNIHLVCDEIYAATVFSQPEFVSISEIIEEEVECNLDLIHIVYSLSKDMGFPGFRVGIVYSYNDAV
VSCARKMSSFGLVSSQTQHLIASMLSDDEFVDNFIMQSKKRLASRYSSFTKGLAQVGIKCLKTSNAGLFVW
MDLRRLLKEQTVAGELALWRVIINDVKLNVSPGSSFHCTEQGWFRVCFANMDDQTVEVALSRIKTFMLKNK
EAMMPVKKLRWQGSLKLSFSSRIYDDFIMSPHSPFPQSPLVQARN

The nucleotide and amino acid of *HbACS3*

ATGGTTAGTGGCCAGCTTTTGTCTAGGATCGCAACCAATGAGGGACATGGGGAGAACTCCCCTTACTTCG
ATGGATGGAAGGAATACGATGGGAACCCCTTTCACCCAACTGATAATCCCGATGGAGTCATCCAAATGGG
CCTTGCAGAAAATCAGCTTTCCTTTGATTTGATTACAGATTGGATTAAGCAAAATCCAGAAGCCTCCATTT
GCACTGCTGAAGGAGTTGATAAGTTCAAAGATATTGCCAACTTCCAGGATTATCACGGTTTGCGGGAATT
CAGAGAGGCTATTGCCAAGTTTATGGGGATGGTTCGAGGCGGTAAGGTAACTTTTGATCCGGATCGTGTA
GTGATGGGTGGAGGAGCCACCGGAGCGAACGAGCTGATAATGTTCTGCTTGGCTGATCCTGGGGATGCT
TTCCTCGTTCCCTCACCTTACTATCCAGCATTCGACCGTGACCTGACATGGCGAACTGGTGTCCAGATTAT
TCCAGTTGATTGCTACAGCTCCAACAATTTCCAGGTAACAAAGGATGCACTTGAATCAGCATATGATAAA
GCCCAAGATGCCGGTATTAATGTCAAAGGCTTGATCATAGCCAACCCATCGAATCCACTGGGCACCATTTT
GGACAGGGAGACCTTAAAAGACTTGGTGAGCTTCATCAATGAGAGAAACATTCACTTGGTCGCAGACGA
AATATATGCAGCTACCATCTTCAGCTCCCCTAGCTTCATAAGCGTCGCTGAGATTATCCAGGAGATGGATT
GCAACCGTGATCTTATCCACATTGTTTATAGCTTGTCTAAGGACATGGGACTCCCTGGCTTCAGAGTTGGC
ATCGTTTATTCCTATAACGATGCAGTCGTGAACTGCGGTCGCAGGATGTCAAGCTTTGGGTTAGTCTCTTC
TCAGACTCAATATATGCTGGCTTCCATGCTTTCGGATGAGGAGTTTGTGAAGAATTTTCTTGCGGAAAGCT
CAAGAAGGCTAAACAAAAGGCACAATATGTTCACAAAGGGACTGGAACAAGTAGGGATCAGTTGTTTAA
AAGGCAATGCTGGTCTCTATGTTTGGATGGACTTGCGCCATCTCCTTAAAGAACCAACGTTCGAAGGGGA
AATGGCTCTGTGGAGGGTGATTATTTACCAAGTGAAGCTCAATGTTTCGCCGGGCTCTTCTTTTCACTGCA
AGGAGCCTGGTTGGTTTAGGGTGTGTTTTGCCAATATGGACGATGAAACTGTGGAAGCTGCACTTAAAA
GGATACGGGCATTTGTGTGTAAGGGAAAGGAAGATCAGGAAATGCCAACCAAGAGTAGCAAGCGATGG
CAAAAAAATCTCCGACTCAGCTTCTCAGCTAGAAGATTTGAAGAAGGAGTCATGCTGTCACCCCACATG
ATGTCTCCTCACTCCCCAATTCCTCACTCTCCGCTTGTTCGTGCTAAGTAA

MVSGQLLSRIATNEGHGENSPYFDGWKEYDGNPFHPTDNPDGVIQMGLAENQLSFDLITDWIKQNPEASICT
AEGVDKFKDIANFQDYHGLREFREAIAKFMGMVRGGKVTFDPDRVVMGGGATGANELIMFCLADPGDAFL
VPSPYYPAFDRDLTWRTGVQIIPVDCYSSNNFQVTKDALESAYDKAQDAGINVKGLIIANPSNPLGTILDRETL
KDLVSFINERNIHLVADEIYAATIFSSPSFISVAEIIQEMDCNRDLIHIVYSLSKDMGLPGFRVGIVYSYNDAVVN
CGRRMSSFGLVSSQTQYMLASMLSDEEFVKNFLAESSRRLNKRHNMFTKGLEQVGISCLKGNAGLYVWMD
LRHLLKEPTFEGEMALWRVIIYQVKLNVSPGSSFHCKEPGWFRVCFANMDDETVEAALKRIRAFVCKGKED
QEMPTKSSKRWQKNLRLSFSARRFEEGVMLSPHMMSPHSPIPHSPLVRAK

The nucleotide and amino acid of *HbACS4*

ATGGTGAGTGGTGGCCAACTTTTGTCTAAGATTGCAACTAATGAGGGACATGGAGAGAATTCCCCTTACT
TCGATGGATGGAAGGCCTACGATAGGAACCCTTTTCACCCAACTGATAACCCTGATGGAGTCATCCAAAT
GGGTCTTGCAGAAAATCAGCTTTCCTTTGATCTGATTAGGGATTGGATTAAGCAAAATCCTGAAGCCTCC
ATTTGCACTGTTGATGGAGTTCATAAGTTCAAGGATATTGCCAACTTCCAGGATTATCATGGCTTGCCAGA
GTTTAGAAAGGCTATTGCCAAATTTATGGGGATGGTTAGAGGTGGTAGGGTTACATTTGATCCGGATCGTG
TTGTCATGGGTGGAGGAGCTACCGGAGCCAACGAGTTGATCATGTTCTGCTTGGCTGATCATGGAGATGC
TTTCCTCGTTCCTACACCTTACTATCCAGCATTCGACCGCGACCTGACATGGCGAACTGGTGTCCAGATTA
TTCCGGTTGATTCCTGCAGCTTCAACAAGTTTCAGGTAACAAAGAATGCGTTAGAAGCAGCGTATGATAG
AGCCCAAGGAGCTGGCATCAATGTCAAAGGCTTGATTATAGCCAACCCATCAAATCCACTGGGCACCGTC
TTAGAAAGGGAGACCCTAAAAGACCTGGTGAGCTTCATCAATGAGAGAAACATTCACTTGGTCGTAGAC
GAAATCTATGCAGCTACCATATTCAGCTCCTCAAGCTTCATAAGCGTCGCTGAGATTATCGAAGAGATGGA
TTGCAACCGCAATCTCATCCACATTGTTTACAGCTTGTCTAAGGACATGGGGCTCCCCGGCTTCAGAGTT
GGCATCGTTTATTCATATAACGATGAAGTCGTCAGGTGCGGTCGCAAGATGTCAAGTTTTGGTTTAGTCTC
TTCGCAGACTCAATATTTGCTGGCTCGCATGCTTTCTGATGAGGAGTTTGTGAAAAATTTTCTTGCGGAGA
GCTCGAGAAGGCTAAACAAAAGGCACAGTATGTTCACAAAGGGGCTGGAACAAGTGGGGATCAATTGT
CTAAAAGGCAATGCTGGTCTTTATGTTTGGATGGACCTACACCATCTTCTTAAAGAACCAACATTCGAAG
GGGAAATGACTCTGTGGAGAGTGATTATTGACCAGGTTAGGCTCAATGTTTCGCCGGGCTCTTCTTTCCAT
TGCAAGGAGCCTGGTTGGTTTAGGGTGTGCTTCGCCAATATGGACGATCAAACTGTGGAAGCTGCACTG
AAAAGGATACGAGCATTTGTGTGTAAGGGAAAGGAAGATCATCAGGAAATGCCAACCAAGAATAAACAG
CGATGGCAAAGAAATCTCCGCCTCAGTTTCTCAGCTCGAAGATTCGAAGAGGGAGTCAAGTCACCCCAT
GTGATGTCTCCTCACTCCCCAATTCCTCACTCGCCGTTAGTTCGTGCTAAGTAA

MVSGGQLLSKIATNEGHGENSPYFDGWKAYDRNPFHPTDNPDGVIQMGLAENQLSFDLIRDWIKQNPEASIC
TVDGVHKFKDIANFQDYHGLPEFRKAIAKFMGMVRGGRVTFDPDRVVMGGGATGANELIMFCLADHGDAF
LVPTPYYPAFDRDLTWRTGVQIIPVDSCSFNKFQVTKNALEAAYDRAQGAGINVKGLIIANPSNPLGTVLERE
TLKDLVSFINERNIHLVVDEIYAATIFSSSSFISVAEIIEEMDCNRNLIHIVYSLSKDMGLPGFRVGIVYSYNDEV
VRCGRKMSSFGLVSSQTQYLLARMLSDEEFVKNFLAESSRRLNKRHSMFTKGLEQVGINCLKGNAGLYVW
MDLHHLLKEPTFEGEMTLWRVIIDQVRLNVSPGSSFHCKEPGWFRVCFANMDDQTVEAALKRIRAFVCKGK
EDHQEMPTKNKQRWQRNLRLSFSARRFEEGVKSPHVMSPHSPIPHSPLVRAK

The nucleotide and amino acid of HbACS5

ATGAGGCTCTTGTCTAGGAAAGCCACGTGCAATACTCACGGCCAAGATTCTTCTTACTTCCTAGGATGGG
AGGAATACGAGAAAAACCCATACGATGAGATCAAGAATCCAACAGGGATCATTCAGATGGGTCTTGCAG
AGAATCAGCTCTCCTTTGATCTTCTTGAGTCATGGCTAGCCAATAACCCTGATGCTGCTGTGTTCAAGAAA
GATGGGCAATCCATATTTAGAGAGCTTGCACTCTTTCAAGATTATCATGGCCTCCCTGCTTTCAAGAAAGC
ATTGGTGGATTTCATGGCAGAAATAAGAGGAAACAGAGTGACTTTCGATCAAAACAAGATAGTTCTCACC
GCTGGTGCAACTTCTGCAAATGAGACCCTCATGTTTTGCCTTGCTGAACCCGGCGAAGCCTTCCTTCTTC
CAACTCCATACTACCCTGGATTTGATAGAGATCTCAAGTGGAGAACTGGGGTTGAGATTGTACCAATTCA
GTGTGCAAGCTCAAATGGCTTCCAAATCACTGCACCAGCTCTTGAAGAAGCTTATCTAGAAGCACAAAG
ACGCAACCTAAGGGTCAAGGGTGTCTTGGTCACAAACCCATCAAATCCATTAGGCACAACAATGAGCCG
AAGTGAATTGAACCTTCTTGTAAACTTTATTACTGCCAAAGGCATTCATCTTATAAGCGATGAAATTTATTC
GGGTACTGTGTTCAGTTCACCAGGCTTTATAAGTATCATGGAGGTTTTGAAAGATAGGAAATGCGAGAAC
ACTGAAGTTTGGAAAAGAGTTCACATTGTGTACAGCCTTTCGAAGGATCTTGGCCTCCCTGGTTTTCGAG
TTGGTGCAATTTACTCCAACGATGAGATGGTAGTATCCGCAGCAACTAAAATGTCTAGCTTCGGTTTAGTT
TCTTCTCAAACACAATATCTTCTCTCTGCTCTTCTCTCCGATAACAAGTTCACCAAGAACTATATTTCAGA
GAATCAGAGAAGGCTTAAACAGCGACAAAAATTGCTGGTCAAGGGCCTCGAAAAAGCCGGTATCAGCT
GCCTCAAGAGCAATGCTGGCTTGTTTTGCTGGGTTAACATGAAGCATCTATTGAGGTCCAACACATTCGA
AGCAGAAATGGAGCTCTGGAAAAAGATTGTTTATGACGTTAATCTAAATATCTCTCCTGGTTCTTCTTGCC
ATTGCACCGAGCCAGGGTGGTTCCGAGTCTGCTTCGCAAACATGTCAGAAGAAACACTAAAACTGGCTA
TGGACCGATTGAAGTCATTTGTGGACTCCATTAGCAAGACGACCAGCCACCAGATGGTGAAAAATTCAA
GAAAGAAATATCTCACCAAGTGGGTTTTCCGGCTATCGTTTCACGACCGTGGGCCAAAAGAACGGTAG

MRLLSRKATCNTHGQDSSYFLGWEEYEKNPYDEIKNPTGIIQMGLAENQLSFDLLESWLANNPDAAVFKKD
GQSIFRELALFQDYHGLPAFKKALVDFMAEIRGNRVTFDQNKIVLTAGATSANETLMFCLAEPGEAFLLPTPY
YPGFDRDLKWRTGVEIVPIQCASSNGFQITAPALEEAYLEAQRRNLRVKGVLVTNPSNPLGTTMSRSELNLLV
NFITAKGIHLISDEIYSGTVFSSPGFISIMEVLKDRKCENTEVWKRVHIVYSLSKDLGLPGFRVGAIYSNDEMV

VSAATKMSSFGLVSSQTQYLLSALLSDNKFTKNYISENQRRLKQRQKLLVKGLEKAGISCLKSNAGLFCWVN
MKHLLRSNTFEAEMELWKKIVYDVNLNISPGSSCHCTEPGWFRVCFANMSEETLKLAMDRLKSFVDSISKTT
SHQMVKNSRKKYLTKWVFRLSFHDRGPKER

The nucleotide and amino acid of HbACS6

ATGGCCATAGAGATTGAGCAACCTACTGTTGGGCTATCAAAAGTTGCAGTTTCTGAAACTCACGGAGAG
GACTCTCCATACTTTGCAGGCTGGAAAGCATACGATGAAGATCCTTACGATGAATCGGAAAATCCTTCAG
GAGTCATACAGATGGGACTCGCAGAAAATCAAGTTTCATTTGACTTGCTAGAAGAGTACTTGGAAAAGC
ATTCGGAAGCATCTACCTGGGGAAAAGGAGCACCTGGATTCAGAGAGCATGCCTTGTTTCAAGATTATCA
CGGGCTAAAATCTTTCAGACAGGCAATAGCAAGTTTCATGGAACAGATTAGAGGGGGAAGAGCAAAATT
TGACCCCGATAGAGTAGTGCTAACTGCAGGCGCAACTGCAGCTAACGAGTTGCTGACCTTCATTCTTGCT
GACCCTGGGGATGCTTTGCTCGTTCCAACTCCATACTATCCTGGATTTGACAGAGATTTGAGGTGGAGGA
CTGGTGTGAAAATTGTACCAATTCATTGCGACAGCTCAAACAATTTCCAGGTCACTCCTCAAGCCTTGGA
AGCTGCATATAAAGATGCAGAAGTCATGAACATCAAAGTGAGAGGAGTGCTTATAACCAATCCTTCCAAC
CCATTAGGTGCCACAATCCAACGCTCAGTCCTGGAAGAGATTCTTGATTTCGTCACACGGAAAAACATCC
ATCTTGTTTCTGATGAAATCTATTCAGGATCCGCCTTCTCATCATCTGAATTCGTAAGCATTGCAGAAATTC
TCGAAGCTCGCGGATATAAAGATTCAGAAAGAGTTCACATTGTTTACAGTCTTTCAAAAGATCTTGGTCT
TCCAGGTTTTCGAGTTGGAACCATATACTCCTACAATGATAAGGTTGTTACAACTGCAAGAAGGATGTCTA
GCTTCACCTTAATTTCCTCGCAAACACAACATCTCTTAGCTTCCATGTTGTCTGACCAGGAATTCACCAAG
AATTATATTAAGATAAATAGAGAGAGACTGAGGAAGAGGTATGAAATGATCATTGAAGGGTTGAGAAATG
CTGGGATAGAGTGTTTAAAAGGTAATGCGGGGTTGTTTTGCTGGATGAATTTAAGTCCTTTGTTGAAGAC
ACAAACCAGGGAAGGCGAATTGACTCTATGGAAGTCTATTATCCGTGACTTGAAGCTGAATATATCTCCTG
GCTCTTCTTGTCATTGCTCTGAACCAGGCTGGTTTAGAGTGTGTTTTGCCAACATGAGCGAGCAAACGCT
AGAAGTTGCACTGAAGAGGATACATAACTTCATGGATCAAAGGAAAACAGAAACCAATTAA

MAIEIEQPTVGLSKVAVSETHGEDSPYFAGWKAYDEDPYDESENPSGVIQMGLAENQVSFDLLEEYLEKHSE
ASTWGKGAPGFREHALFQDYHGLKSFRQAIASFMEQIRGGRAKFDPDRVVLTAGATAANELLTFILADPGDA
LLVPTPYYPGFDRDLRWRTGVKIVPIHCDSSNNFQVTPQALEAAYKDAEVMNIKVRGVLITNPSNPLGATIQR
SVLEEILDFVTRKNIHLVSDEIYSGSAFSSSEFVSIAEILEARGYKDSERVHIVYSLSKDLGLPGFRVGTIYSYND
KVVTTARRMSSFTLISSQTQHLLASMLSDQEFTKNYIKINRERLRKRYEMIIEGLRNAGIECLKGNAGLFCWM
NLSPLLKTQTREGELTLWKSIIRDLKLNISPGSSCHCSEPGWFRVCFANMSEQTLEVALKRIHNFMDQRKTETN

The nucleotide and amino acid of HbACS7

ATGGGCTTAGAGATTGAGCAACCTACCGTTGGGCTATCAAAAGTTGCAGTTTCTGAAACTCATGGAGAGG
ACTCTCCATACTTTGCAGGCTGGAAAGCGTACGATGAAGATCCTTATGATGAATTAGAAAACCCCTCAGG
AGTCATACAGATGGGACTCGCAGAAAATCAAGTTTCATTTGATTTGCTAGAAGAGTACTTGGAAAAGCAT
TCTGAAGCATCTACCTGGGGACAAGGAGCGACTGGCTTCAGAGAGAATGCCTTGTTTCAAGATTACCATG
GACTGAAATCTTTCAGACAGGCAATGGCAAGTTTCATGGAACAAATTAGAGGGGGAAGAGCAAAATTTG
ACCCCGATAGAGTAGTCCTAACTGCAGGCGCAACCGCAGCTAACGAGTTGTTGATCTTCATTCTAGCTGA
TCCCGGGGATGCTTTGCTAGTTCCAATTCCATACTATCCAGGATTTGACAGAGATTTAAGGTGGAGGACTG
GTGTAAAAATTGTACCAATTCATTGCGACAGCTCAAACAATTTCCAGGTCACTCCTCAAGCCTTGGAAGC
TGCTTATAAAGATGCAGAAGCCATGAACATCAAAGTGAGAGGAGTACTTATAACCAATCCTTCAAACCCA
TTAGGTGCCACAATCCAGCGTTCAGTCCTGGAAGACATTCTTGACTTCGCCACACAAAAAAACATCCATC
TCGTGTCTGATGAAATCTACTCAGGATCCACCTTCTCATCATCTGAATTCGTAAGCATTGCAGAAATTCTG
GAAGCTCGTGGATATAAAGATTCAGAAAGAGTTCACATTGTTTACAGTCTTTCAAAAGATCTTGGTCTCC
CAGGTTTTCGCGTTGGAACTATATATTCCTACAATGACAAGGTTGTTACAACTGCAAGAAAGATGTCTAGC
TTCACCTTGATTTCCTCGCAAACACAACATCTTTTGGCTACCATGTTGTCTGACAAGGTATTCACCAAGAA
TTATATTAAGATAAATAGAGAGAGACTGAGGAAAAGGTATGAAATGATCATTCAAGGGTTGAGAAGTGCA
GGGATAGAGTGTTTGAAAGGTAATGCTGGGTTATTTTGCTGGATGAATTTAAGCCCTTTATTGAAGACACC
AACGAAAGAAGGTGAATTGAGTCTTTGGAACTCTATTATTCATGACTTGAAGCTGAATATATCTCCTGGAT
CTTCTTGCCATTGCTCTGAACCAGGTTGGTTTAGGGTGTGTTTTGCCAACATGAGCGAGCAGACACTAGA
AGTTGCACTGAAGAGGATACATAACTTCATGGAACAAAAGAAAACAGAAACCAATTAA

MGLEIEQPTVGLSKVAVSETHGEDSPYFAGWKAYDEDPYDELENPSGVIQMGLAENQVSFDLLEEYLEKHSE
ASTWGQGATGFRENALFQDYHGLKSFRQAMASFMEQIRGGRAKFDPDRVVLTAGATAANELLIFILADPGD
ALLVPIPYYPGFDRDLRWRTGVKIVPIHCDSSNNFQVTPQALEAAYKDAEAMNIKVRGVLITNPSNPLGATIQ
RSVLEDILDFATQKNIHLVSDEIYSGSTFSSSEFVSIAEILEARGYKDSERVHIVYSLSKDLGLPGFRVGTIYSYN

DKVVTTARKMSSFTLISSQTQHLLATMLSDKVFTKNYIKINRERLRKRYEMIIQGLRSAGIECLKGNAGLFCW
MNLSPLLKTPTKEGELSLWNSIIHDLKLNISPGSSCHCSEPGWFRVCFANMSEQTLEVALKRIHNFMEQKKTETN

The nucleotide and amino acid of HbACS8

ATGACCCTTACCCAAATCCGAACCCAATCTAAAGAACCCGAGCATCCTCCTCGCAAACCCACCGGAGCC
ACCGGAATGAGACTTATAGTGCCACTTCAAGGTGTTGTCCAAGGCAGAGGAGGCCTAATATTAGGTTCTC
TAATCCCTTGCGCTCTCTTCTACTTTTTTCACCTCTACCTTAAACGGCATCGTTCTGCAAATCCGTCTTCGA
ACCCTCCGTCGCCTTCCGCTTCATCTCCAAACCTTGCGGATATCCCCAGGACGGCTTCGCGCTCTAACTTA
TCCAGCCGGGGATCATTTGGCCCGGGTCGGGCATCTATATCGACCCGGGCGATGTCCATTGCGAAGCCTA
ATGATTCTCCCTACTATATTGGGCTGGATAAGGTCTCGGGAAATCCTTATGATAGAACGAGTAATCCCGATG
GGATTATTCAGCTTGGGTTGTCTGAGAACAGACTGTGTTTAGATTTGATTGAGAAATGGATGGCGAAGAA
CCTGAGGGATTCTATAGTGGGAACAGACGGTGATGATCTGAATATTAATGGTATCACGACATACCAGCCGT
TCGATGGATTGATGGAGTTAAAAGTGGCTATGGCAAATTTCATGTCTCGGGTTGTGGGAAAAGTGGTCTC
ATTTGATGCATCACAGATGGTATTAACTGCTGGTGCAACTCCTGCAGTTGAGATTTTATCTTTCTGCTTGGC
AGACCATGGAAATGCATTTCTTGTTCCAACACCATATTACCCTGGATTTGATAGAGATATGAGATGGCGAA
CAGGAGTAGAGCTAGTACCTGTTCACTGCCGCAGCACTGACAATTTCATATTAAGTGTCACTGCCCTTGA
ACAAGCTTACAATCATGCTAGAAAACGAGGTTTAAAAGTTCGTGGACTATTGATTTCTAACCCTTCAAATC
CTGTTGGCAATTTACTGCCGCGAGAAAGACTCTTTGATATACTAAACTTTGCTCAAGAGAAAAACATCCA
CATTATTTCTGATGAAATATTTGCTGGGTCAGTGTATGGAGAGGATGAATTTGTGAGCATGGCACAAATTC
TTGAAGAAGAAGATTTTGACAAGAACAGGGTTCATATAATATATGGTCTCTCAAAGGATCTTTCTCTTCCA
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TGAGAAAGGGGAACTTGACTTGTGGGATAAGCTGTTGAATATTGCCAAGATCAATGTGACTCCTGGATCA
GCCTTCCACTGCATAGAACCAGGATGGTTCCGGTGCTGTTTTACTACTTTAACTGAAGATGATATTCCTGT
AGTCATAGAACGGATTCGTAAAGTTGCAGAAACTTGTAAATCTCCTGGTTGA

MTLTQIRTQSKEPEHPPRKPTGATGMRLIVPLQGVVQGRGGLILGSLIPCALFYFFHLYLKRHRSANPSSNPPS
PSASSPNLADIPRTASRSNLSSRGSFGPGRASISTRAMSIAKPNDSPYYIGLDKVSGNPYDRTSNPDGIIQLGLSE
NRLCLDLIEKWMAKNLRDSIVGTDGDDLNINGITTYQPFDGLMELKVAMANFMSRVVGKVVSFDASQMVL
TAGATPAVEILSFCLADHGNAFLVPTPYYPGFDRDMRWRTGVELVPVHCRSTDNFILSVTALEQAYNHARKR
GLKVRGLLISNPSNPVGNLLPRERLFDILNFAQEKNIHIISDEIFAGSVYGEDEFVSMAQILEEEDFDKNRVHIIY
GLSKDLSLPGFRVGAIYSYNENVLTAAKRLTRFSSISAPSQRLLASMLSDASFIEEYIETNKKRIGNIYGLFVEG
FRRLGIRCMESSAGLYCWADMGKLIPSYSEKGELDLWDKLLNIAKINVTPGSAFHCIEPGWFRCCFTTLTEDD
IPVVIERIRKVAETCKSPG

The nucleotide and amino acid of HbACS9

ATGACCCGAACCCGGTTCTTTCGGAGCCGGACCGCCGAACCCGACGAGGACACTATACCAACCACTTAT
CGCAGTGGTGGAGGAGGAACCGCCATGAGAATTATAGTACCGCTACAAGGCGTGGTTCAAGGCAGAGGT
GGCCTTTTCTTAGGCTCAGTGATACCTTGTGCTCTTTTCTACTTCTTTCAGCTTTATTTAAAACGCAACCGT
AATGACCAGGCTGACTCAGATGATTCGAATTCCCAGAATCAGGCGCCACCATCTCGGTCGGGATCAGAG
GGGCAGCTGAACGAACTTTCTGTGTTTACTCGGTCTACTTCTCGGAATCTCGTCTCACCAAGAAGTCCTA
GTGGAAGGGCTTATGTGTCGAGTAGGGCCAATGGGATAGTGAAGAGTGGCGATTCGCCTTACTTCGTTGG
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GCCGAGAACAAGTTAACATTGGATTTGGTGGAGGAGTGGCTTGTTGAGAATGCAAAGCCAGCAATACTG
GGTGGTGGAGGGGAGGAGTTGAATATCAGTGGGATTGCTACTTACCAGCCTGTTGATGGATTAATTGAGT
TAAAAGTGGCTGTGGCAGGATTTATGTCTCAAATAATGGAAAATGCAGTTTCCTTCAATCCCTCACAGATA
GTGTTGACAGCAGGTGCAACTCCTGCAATTGAGACGCTTATCTTCTGTTTAGCAGATGCTGGAAATGCAT
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GCAAAGAAACGTGGTCTTAAAGTTCGTGGGGTAATAATTTCAAACCCCTCAAATCCTGTGGGCAATCTGC
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CAGACAGGGACAGAGTGCATATAGTATATGGTCTATCAAATGATCTGTCTCTGCCAGGTTTCAGGGTGGG
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CTCCAACCCAGCGTCTACTTATCTCCATGCTTTCAGATACGAAATTTGTTCAAATTTTCATTCGGATTAATA

GGGAGAGGCTGCAAAATATGTATGTTAAATTTGCATTGGGATTGAAGCAACTGGGCATAAAGTGCACGAA
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GCTTGAGCTATGGGAAAAATTGTTGAATACAGCTAAGCTCAATTCAACTCCTGGATCTTCCTGTCATTGTA
TTGAACCTGGATGGTTCAGATTCTGTTTTACCACATTAACTGAAAGAGACATTCCTGTTGTTATGGACAGA
ATTCAGAAAATTGCTGAAACCTGTAAATCTTGCAGCTGA

MTRTRFFRSRTAEPDEDTIPTTYRSGGGGTAMRIIVPLQGVVQGRGGLFLGSVIPCALFYFFQLYLKRNRNDQ
ADSDDSNSQNQAPPSRSGSEGQLNELSVFTRSTSRNLVSPRSPSGRAYVSSRANGIVKSGDSPYFVGLRKVIE
DPYDESANPNGVIQLGLAENKLTLDLVEEWLVENAKPAILGGGGEELNISGIATYQPVDGLIELKVAVAGFMS
QIMENAVSFNPSQIVLTAGATPAIETLIFCLADAGNAFLVPTPYYPGFDRDVKWRTGVEIVPVPCRSADNFSLSI
TALDRAFNQAKKRGLKVRGVIISNPSNPVGNLLDRETLYSLLDFAREKNIHIVCNEIFAGSTHGSEEFVSMAEL
IDLEDSDRDRVHIVYGLSNDLSLPGFRVGVLYSSNENVLAAAKKLTRFSSISAPTQRLLISMLSDTKFVQIFIRI
NRERLQNMYVKFALGLKQLGIKCTKGSGGFYCWADMSELISSYSEKGELELWEKLLNTAKLNSTPGSSCHCI
EPGWFRFCFTTLTERDIPVVMDRIQKIAETCKSCS

Table S2. Primers used in this study.

Description of Primers	Forward (5'–3')	Reverse (5'–3')
Primers used for isolation of *HbACS*	ACSF1-TCTCTAGAACGTGACGTCGGCAC	ACSR1-TAAACAGGCTCAAGTTCTGGCT
	ACSF2-CAGAACAGAAAATATGGTGTTCAA	ACSR2-ACTAAACATGCTCAATTTCTGGC
	ACSF3-GAAATCAAAATGGTTAGTGGCCAG	ACSR3-TGTGCATGCCTTTTACTTAGC
	ACSF4-ACAAAATGGTGAGTGGTGGCC	ACSR4-CATGCCTTTTACTTAGCACGA
	ACSF5-TATAGTCTTATTATGGCCATAGA	ACSR5-GGAAAACAGAAACCAATTAAAT
	ACSF6-AATACCAAAAATGAGGCTCTTGTC	ACSR6-GAGATTTAATTGGTTTCTGTT
	ACSF7-CTAATCTTATAATGGGCTTAGAGA	ACSR7-AAACATATTTAATTGGTTTCT
	ACSF8-CGCCAAACCAATGACCCTTACCCA	ACSR8-AAGTTTACAATTCAACCAGGA
	ACSF9-CTCATGTTTCAGAAATGACCCGAAC	ACSR9-TCTTGCAGCTGAAACGTTCAGT
Primers used for qRT-PCR	qACSF1-GGGTGGTTTAGAGTTTGCTTTG	qACSR1-CTGACATCTTGGCTTCCTTACT
	qACSF2-CCCTGGATTTAGAGTAGGCATT	qACSR2-TGAGTCTGCGATGACACTAATC
	qACSF3-AAGGAGCCTGGTTGGTTTAG	qACSR3-TTCCTGATCTTCCTTTCCCTTAC
	qACSF4-GAGAGCTCGAGAAGGCTAAAC	qACSR4-GGTGTAGGTCCATCCAAACATA
	qACSF5-GGTAGTATCCGCAGCAACTAAA	qACSR5-TATCGGAGAGAAGAGCAGAGAG
	qACSF6-ACCAATCCTTCCAACCCATTAG	qACSR6-AGAAGGCGGATCCTGAATAGA
	qACSF7-GTTGAGAAGTGCAGGGATAGA	qACSR7-CTTCTTTCGTTGGTGTCTTCAAT
	qYLS8F-CCTCGTCGTCATCCGATTC	qYLS8R-CAGGCACCTCAGTGATGTC
Primers used for amplification of the promoter regions	pACSF1-TTTGAGGAACGGGGCCAATT	P ACSR1-ATTGTTCAACTTGAACACCATA
	pACSF2-TAGTGGAACATGACGTCCTC	P ACSR2-TTGAACACCATATTTTCTGTTCT
	pACSF3-ATACTTTAAATATGAATTTA	P ACSR3-AAAAGCTGGCCACTAACCAT
	pACSF4-ATATAGATAAATCATAAGTA	P ACSR4-GGCCACCACTCACCATTTTG
	pACSF5-AACTTTATTTGTTGTAGAAC	P ACSR5-CTTTCCTAGACAAGAGCCTCAT
	pACSF6-AATTAATTCTAAGTTTTTAGA	P ACSR6-TTCTGAAACATGAGAGTCATG
	pACSF7-AGCTTCTAGGGTGCTTCCCAT	P ACSR7-AGATTAGCTAGAGTTAAGAT