

1/23

MTTASTSQVRQNYHQDSEAAINRQINLELYASYVYLSMSYYFDRDDVALKNFAKYFL  
HQSHEEREHAELMKLQNRGGRI FLQDIKKPDCDDWESGLNAMECALHLEKNVNQS  
LLELHKLATDKNDPHLCDFIETHYLNEQVKAIKELGDHVTNLRKMGAPESGLAEYLF  
DKHTLGDSDNES

FIG. 1

ATGGCTGATATC  
GGATCCCATACATATGACGACCGCGTCCACCTCGCAGGTGCGCCAGAACTACCACCAG  
GACTCAGAGGCCGCCATCAACCGCCAGATCAACCTGGAGCTCTACGCCTCCTACGTT  
TACCTGTCCATGTCTTACTACTTTGACCGCGATGATGTGGCTTTGAAGAACTTTGCC  
AAATACTTTCTTCACCAATCTCATGAGGAGAGGGAACATGCTGAGAACTGATGAAG  
CTGCAGAACCAACGAGGTGGCCGAATCTTCCTTCAGGATATCAAGAAACCAGACTGT  
GATGACTGGGAGAGCGGGCTGAATGCAATGGAGTGTGCATTACATTTGGAAAAAAT  
GTGAATCAGTCACTACTGGAAGTGCACAACTGGCCACTGACAAAAATGACCCCCAT  
TTGTGTGACTTCATTGAGACACATTACCTGAATGAGCAGGTGAAAGCCATCAAAGAA  
TTGGGTGACCACGTGACCAACTTGCGCAAGATGGGAGCGCCCGAATCTGGCTTGGCG  
GAATATCTCTTTGACAAGCACACCCTGGGAGACAGTGATAATGAAAGCTAACCTAGG  
CACCTCGAG

FIG. 2

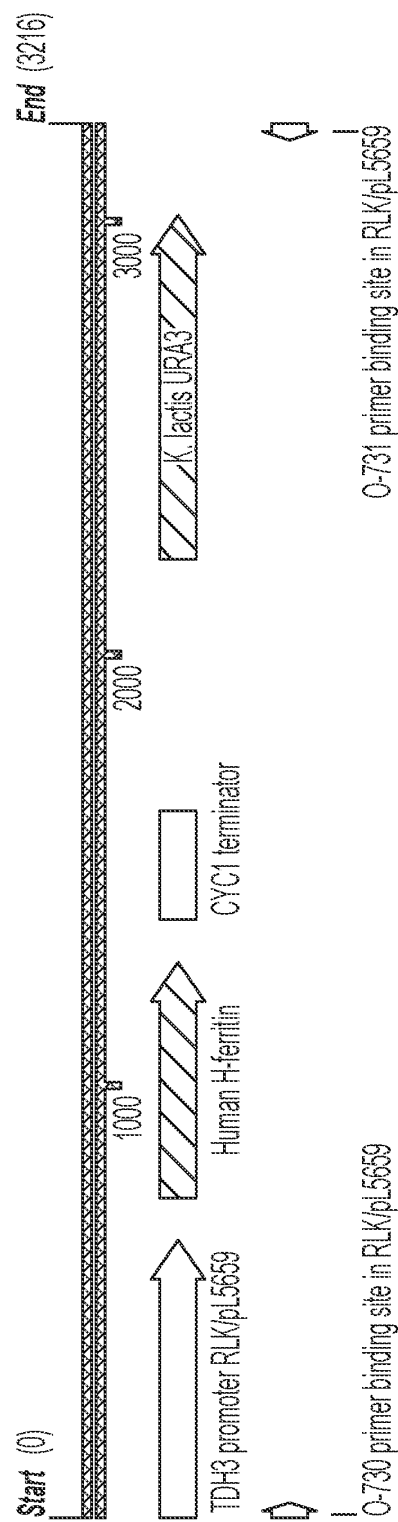


FIG. 3

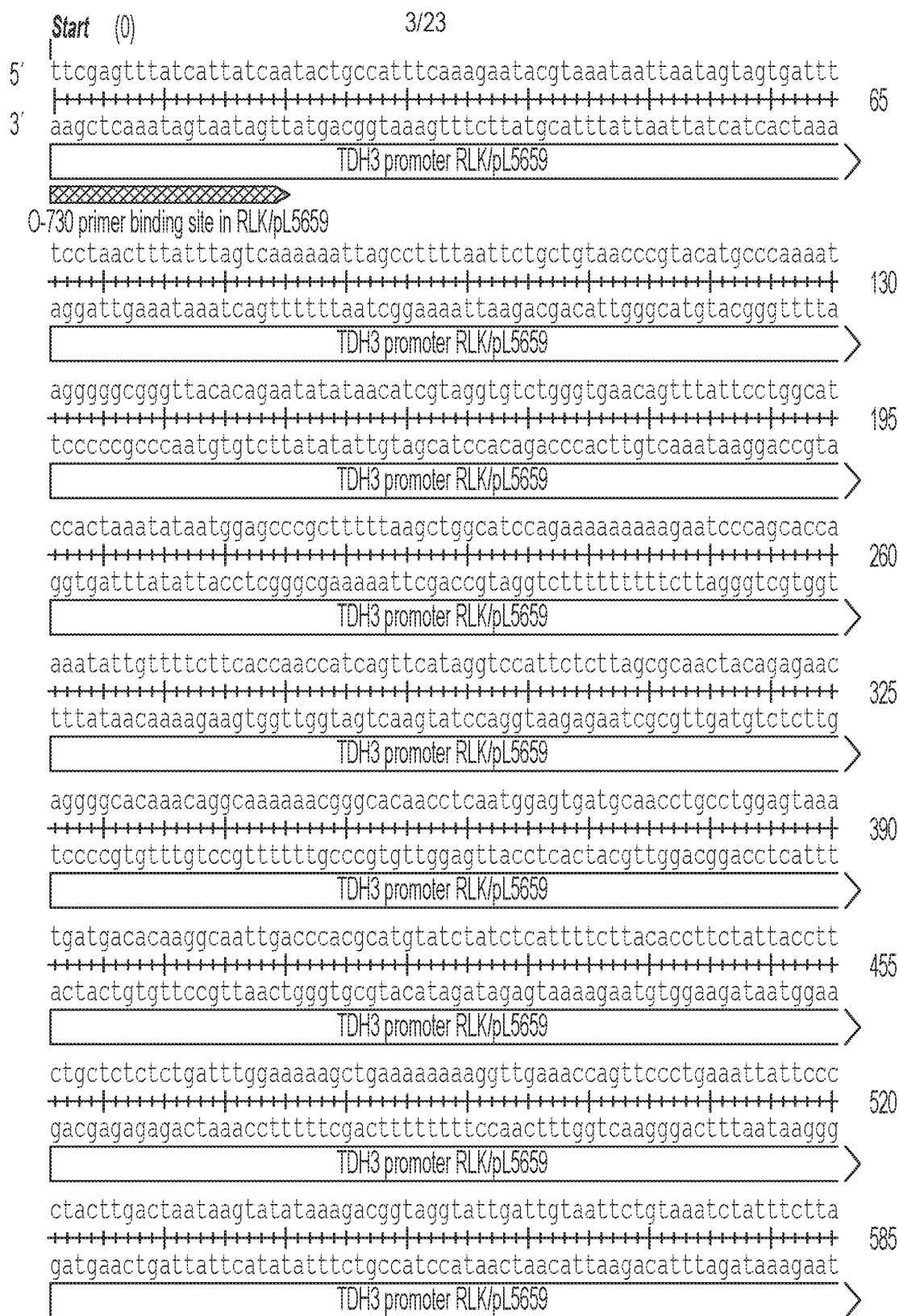


FIG. 4

aacttcttaaaattctacttttatagtttagtcttttttttagtttttaaaacaccagaacttagttt  
 650  
 ttgaagaatttaagatgaaaatatcaatcagaaaaaaatcaaaattttgtggtcttgaatcaaa  
 TDH3 promoter RLK/pl5659  
 cgacggattctagaactagtggtatcccccatacacaagtttGTACAAAAAAGCAGGCTTTAAAGGA  
 715  
 gctgcctaagatcttgatcacctaggggtagtggttcaaaCATGTTTTTCGTCCGAAATTCCT  
 TDH3 promoter RLK/pl5659  
 ACCAATTCAGTCGACTGGATCCATACATATGACGACCGGTCCACCTCGCAGGTGCGCCAGAACT  
 780  
 TGGTTAAGTCAGCTGACCTAGGTATGTATACTGCTGGCGCAGGTGGAGCGTCCACGCGGTCTTGA  
 1 5 10  
 Met Thr Thr Ala Ser Thr Ser Gln Val Arg Gln Asn  
 Human H-ferritin  
 ACCACCAGGACTCAGAGGCCGCCATCAACCGCCAGATCAACCTGGAGCTCTACGCCTCCTACGTT  
 845  
 TGGTGGTCCTGAGTCTCCGGCGGTAGTTGGCGGTCTAGTTGGACCTCGAGATGCGGAGGATGCAA  
 15 20 25 30  
 Tyr His Gln Asp Ser Glu Ala Ala Ile Asn Arg Gln Ile Asn Leu Glu Leu Tyr Ala Ser Tyr Val  
 Human H-ferritin  
 TACCTGTCCATGTCTTACTACTTTGACCGCGATGATGTGGCTTTGAAGAACTTTGCCAAATACTT  
 910  
 ATGGACAGGTACAGAATGATGAACTGGCGCTACTACACCGAACTTCTTGAAACGGTTTATGAA  
 35 40 45 50 55  
 Tyr Leu Ser Met Ser Tyr Tyr Phe Asp Arg Asp Asp Val Ala Leu Lys Asn Phe Ala Lys Tyr Phe  
 Human H-ferritin  
 TCTTCACCAATCTCATGAGGAGAGGGAACATGCTGAGAACTGATGAAGCTGCAGAACCAACGAG  
 975  
 AGAAGTGGTTAGAGTACTCCTCTCCCTTGACGACTCTTGACTACTTCGACGCTTGGTTGCTC  
 60 65 70 75  
 Leu His Gln Ser His Glu Glu Arg Glu His Ala Glu Lys Leu Met Lys Leu Gln Asn Gln Arg  
 Human H-ferritin  
 GTGGCCGAATCTTCCTTCAGGATATCAAGAAACCAGACTGTGATGACTGGGAGAGCGGGCTGAAT  
 1040  
 CACCGGCTTAGAAGGAAGTCTATAGTTCTTTGGTCTGACACTACTGACCTCTCGCCCGACTTA  
 80 85 90 95  
 Gly Gly Arg Ile Phe Leu Gln Asp Ile Lys Lys Pro Asp Cys Asp Asp Trp Glu Ser Gly Leu Asn  
 Human H-ferritin

FIG. 4 Continued

GCAATGGAGTGTGCATTACATTTGGAAAAAATGTGAATCAGTCACTACTGGAACGGCACAAACT  
 100 105 110 115 120  
 Ala Met Glu Cys Ala Leu His Leu Glu Lys Asn Val Asn Gln Ser Leu Leu Glu Leu His Lys Leu  
 Human H-ferritin  
 GGCCACTGACAAAAATGACCCCCATTTGTGTGACTTCATTGAGACACATTACCTGAATGAGCAGG  
 125 130 135 140  
 Ala Thr Asp Lys Asn Asp Pro His Leu Cys Asp Phe Ile Glu Thr His Tyr Leu Asn Glu Gln  
 Human H-ferritin  
 TGAAAGCCATCAAAGAATTGGGTGACCACGTGACCAACTTGCGCAAGATGGGAGCGCCCCGAATCT  
 145 150 155 160  
 Val Lys Ala Ile Lys Glu Leu Gly Asp His Val Thr Asn Leu Arg Lys Met Gly Ala Pro Glu Ser  
 Human H-ferritin  
 GGCTTGGCGGAATATCTCTTTGACAAGCACACCCTGGGAGACAGTGATAATGAAAGCTAACCTAG  
 165 170 175 180  
 Gly Leu Ala Glu Tyr Leu Phe Asp Lys His Thr Leu Gly Asp Ser Asp Asn Glu Ser  
 Human H-ferritin  
 GCACCTCGAGATATCTAGACCCAGCTTTCTGTACaaagtggatgggctgcaggaattcgata  
 1365 1430  
 CGTGGAGCTCTATAGATCTGGGTGAAAGAACATGtttcaccactaccgcagctccttaagctat  
 tcaagcttatcgataccgtcgacctcgagtcagtgtaattagttatgtcacgcttacattcacgcc  
 agttcgaatagctatggcagctggagctcagtacattaatcaatacagtgccaatgtaagtgcgg  
 CYC1 terminator  
 ctccccccacatccgctctaaccgaaaaggaaggagttagacaacctgaagtctaggtccctatt  
 1495  
 gaggggggtgtaggcgagattggcttttccctcctcaatctgttggacttcagatccagggataa  
 CYC1 terminator  
 tatttttttatagttatgttagtattaagaacgttatttatatttcaaatttttcttttttttct  
 1560  
 ataaaaaaaaatcaatacaatcataattcttgcaataaatataaagtttaaaaagaaaaaaaga  
 CYC1 terminator

FIG. 4 Continued

6/23

gtacagacgcgtgtacgcatgtaacattatactgaaaaccttgcttgagaaggttttgggacgct  
 ++++++  
 catgtctgcgcacatgcgtacattgtaatatgacttttggaaacgaactcttccaaaaccctgcga  
 ++++++

CYC1 terminator

cgaaggctttaatttgCGGCCGcataggccactagtggatctgatATCACCTAATAACTTCGTAT  
 ++++++  
 gcttccgaaattaaacGCCGGCgtatccggtgatcacctagactaTAGTGGATTATTGAAGCATA  
 ++++++

CYC1 terminator

AGCATACATTATACGAAGTTATATTAAGGGTTcTCGAgagctcggttttatttaggttctatcgag  
 ++++++  
 TCGTATGTAATATGCTTCAATATAATTCCCAAgAGCTctcgagcaaaataaatccaagatagctc  
 ++++++

gagaaaaagcgacaagaagagatagaccatggataaatgattatgttctaaacactcctcagaag  
 ++++++  
 ctctttttcgctgttcttctctatctggtacctatttactaataacaagatttgtgaggagtcttc  
 ++++++

ctcatcgaactgtcatcctgcgtgaagattaaaatccaacttagaaaatttcgagcttacggagac  
 ++++++  
 gagtagcttgacagtaggacgcacttctaatttttaggttgaatctttaagctcgaatgcctctg  
 ++++++

aatcatatgggagaagcaattggaagatagaaaaagggtactcggtacataaatatatgtgatcc  
 ++++++  
 ttagtataccctcttcgttaaccttctatctttttccatgagccatgtatttatatacactaag  
 ++++++

tgggtagaagatcggtctgcattggatgggtggaacgcatttttttacacacattacttgccctcg  
 ++++++  
 acccatcttctagccagacgtaacctaccaccattgcgtaaaaaaatgtgtgtaatgaacgggagc  
 ++++++

agcatcaaattggtggttattcgtggatctatatcacgtgatttgcttaagaattgtcggtcatgg  
 ++++++  
 tcgtagtttaccaccaataagcacctagatatagtgcactaaacgaattcttaacagcaagtacc  
 ++++++

tgacacttttagctttgacatgattaagctcatctcaattgatgttatctaaagtcatttcaact  
 ++++++  
 actgtgaaaatcgaaactgtactaattcgagtagagttaactacaatagatttcagtaaagttga  
 ++++++

atctaagatgtggttggtgattgggccattttgtgaaagccagtagcgcagcgtcaatacactccc  
 ++++++  
 tagattctacaccaacactaaccggtaaaacacttttcgggtcatgcggtcgcagttatgtgaggg  
 ++++++

gtcaattagttgcaccatgtccacaaaatcatataccagtagagctgagactcatgcaagtccgg  
 ++++++  
 cagttaatcaacgtggttacaggtgttttagtatatggtcatctcgactctgagtacgttcaggcc  
 ++++++

1 5 10 15  
 Met Ser Thr Lys Ser Tyr Thr Ser Arg Ala Glu Thr His Ala Ser Pro  
 // K. lactis URA3 //

FIG. 4 Continued

7/23

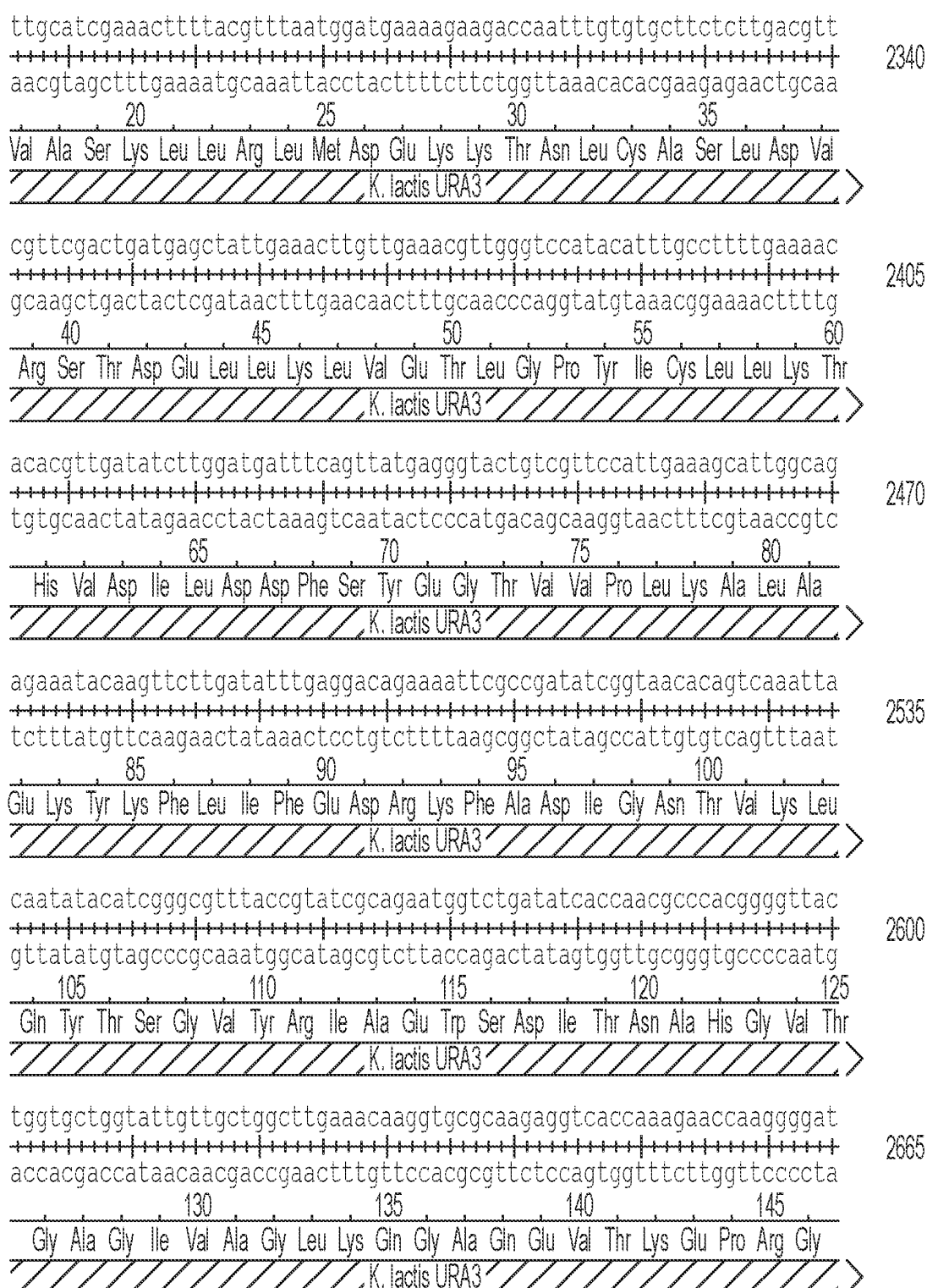


FIG. 4 Continued

8/23

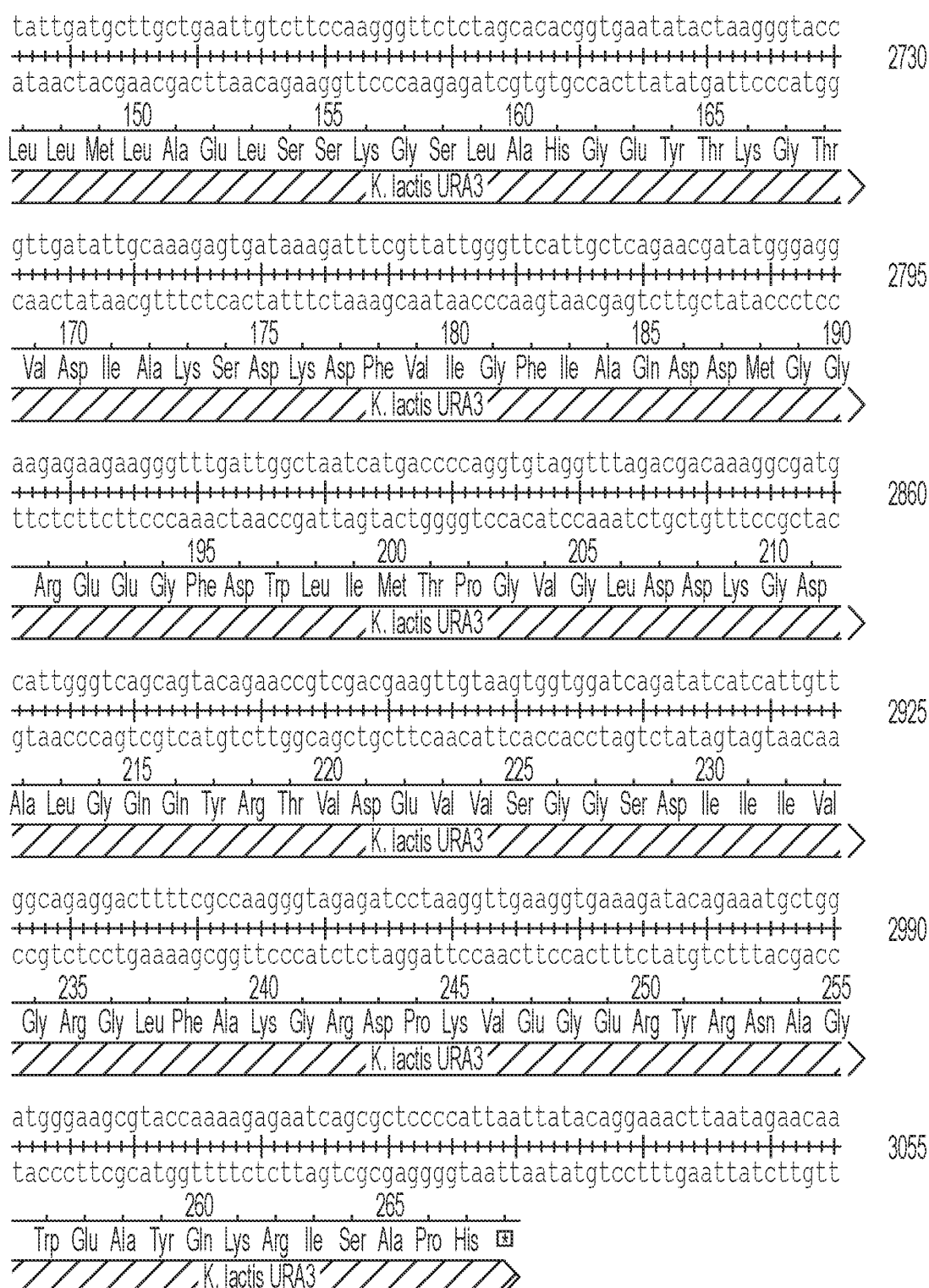


FIG. 4 Continued

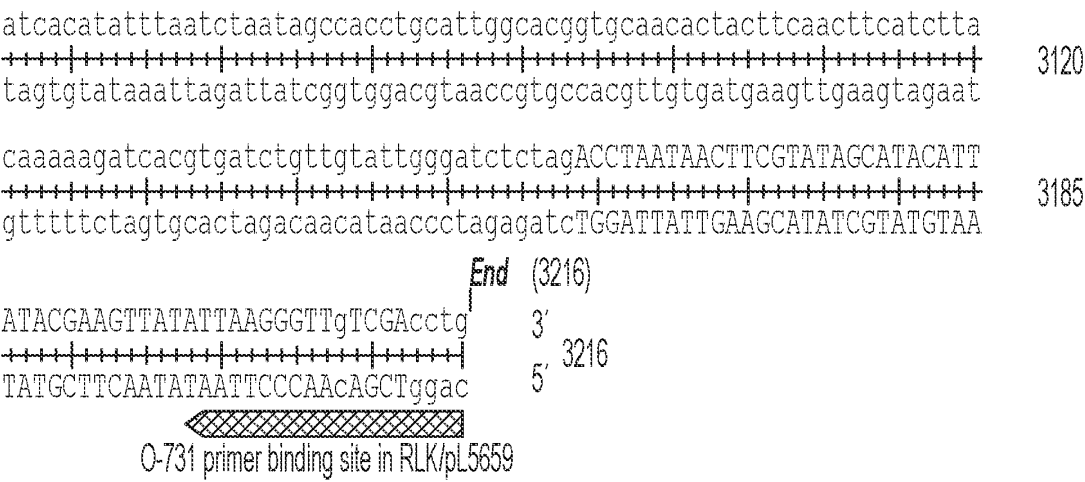


FIG. 4 Continued

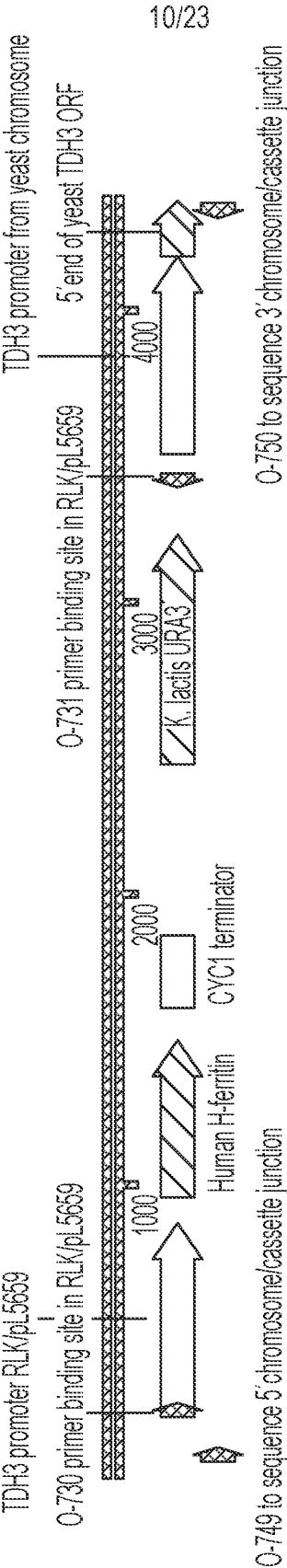


FIG. 5

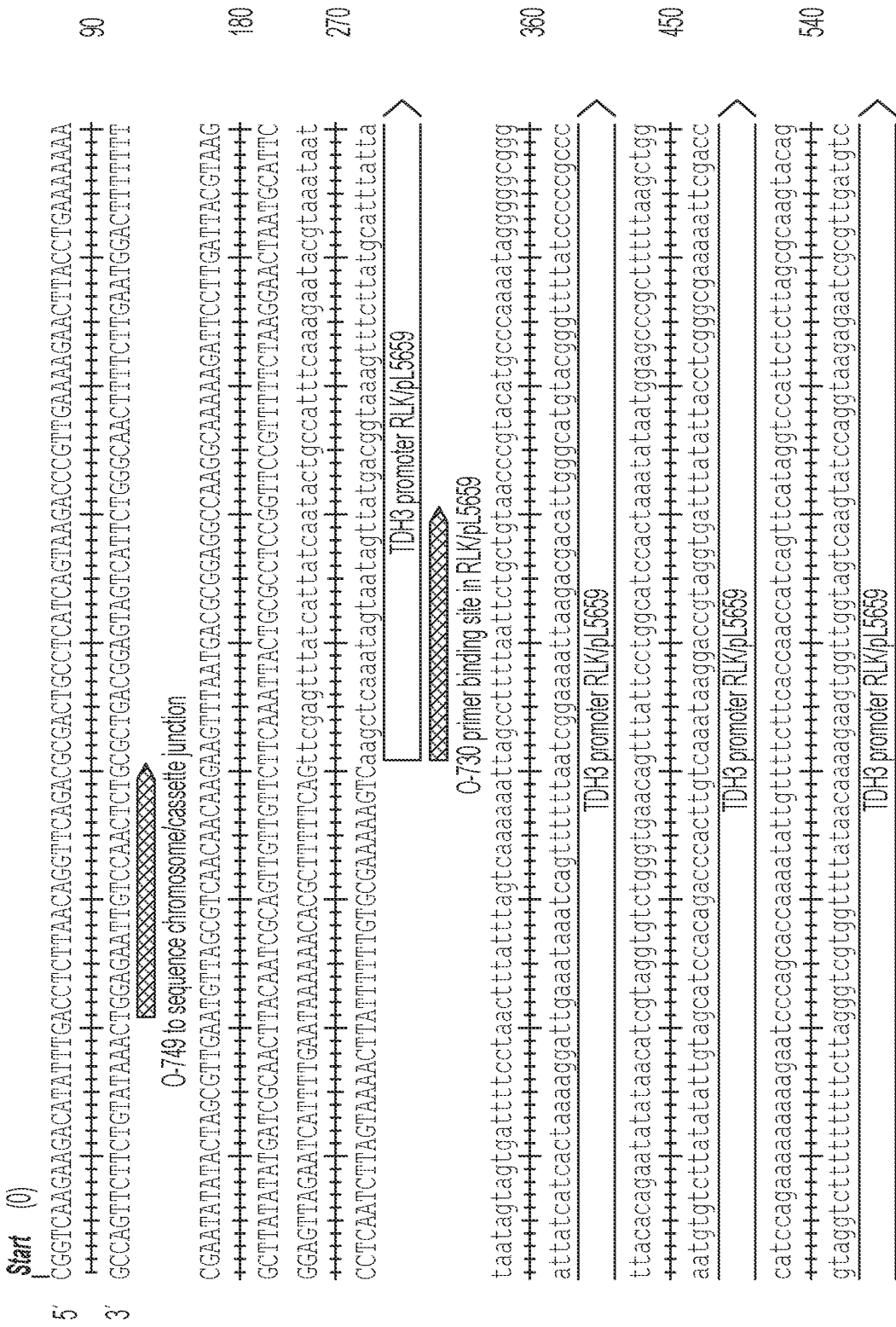


FIG. 6

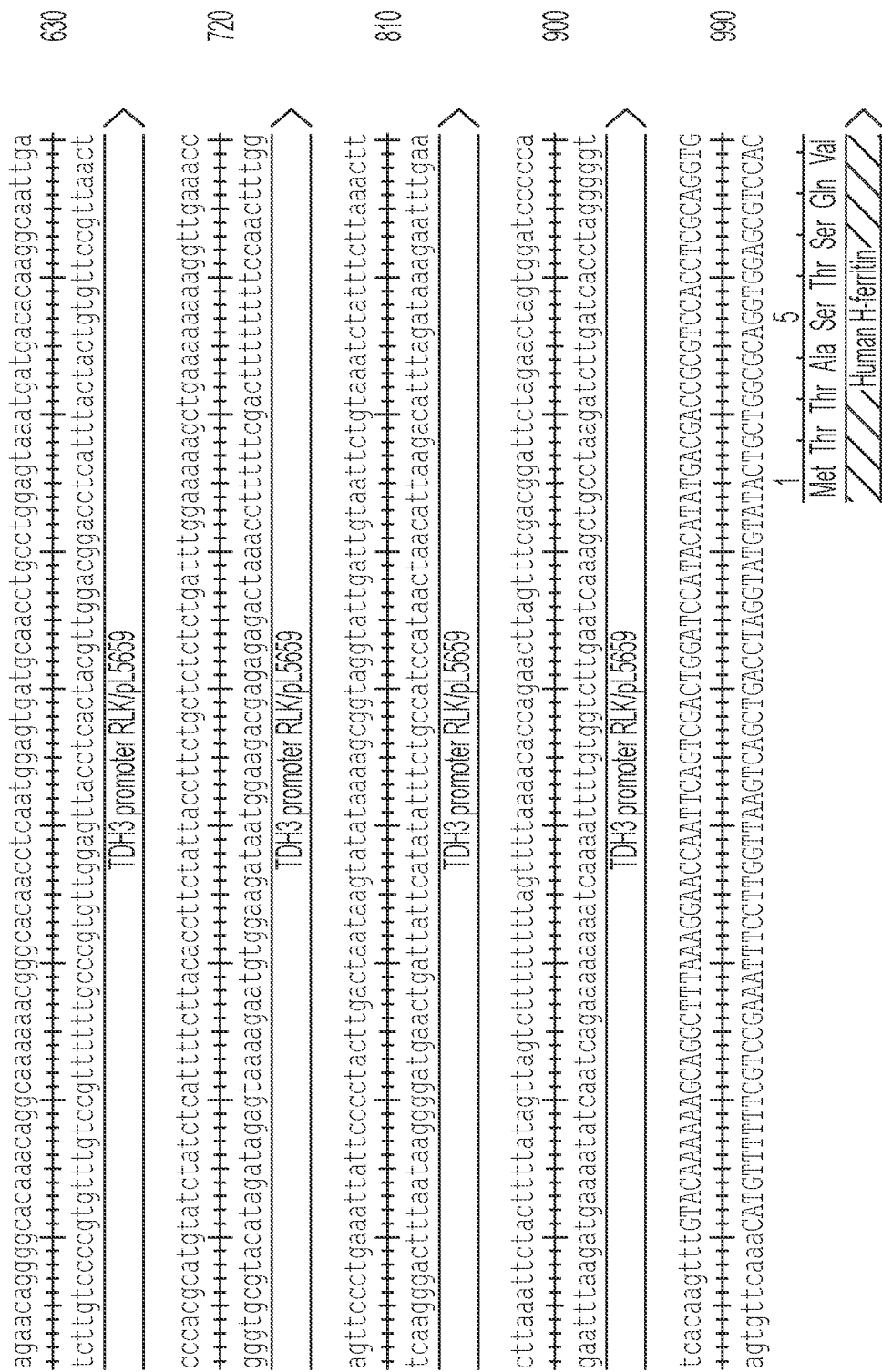


FIG. 6 Continued

FIG. 6 Continued

1440

155

Human H-ferritin

1530

180

Human T-ferin

1920

CYC1 terminator

17

CYC1 terminator

11

CYC1 terminator

FIG. 6 Continued

1880

gtaacattatactgaaaacaccttgcttgagaagggttttggagcgtcgaaggctttaatttggccgcgcgcatagccactagtggtatgat  
+-----+  
cattgtaatatgacttttggaaacgaactcttccaaaacccctggagcttccgaaaattaaacGCCGGCgtatccggtgatcacctagacta  
+-----+  
CYC1 terminator

1890

ATCACCTAATAACTTCGTATAGCATACATTATACGAAGTTATATTAAAGGTTcTCGAgagctcggtttatttaggtttatatcgaggagaa  
+-----+  
TAGTGGATTATTGAAGCATATCGTATGTAATATGCTTCAATATAATTCCCAAgAGCTctcgagcaaaaataatccaagatagctcctctt  
+-----+

2070

aaagcgacaagaagagatagaccatggataaatgattatgttctaacaactcctcagaagctcatcgaactgtcctcctgcgtgaagatt  
+-----+  
tttcgctgttcttctatatctgtgtacctatttactaataacaagatttgtgaggagtcttcgagtagcttgacagtaggacgcacttctaa  
+-----+

2160

aaaatccaacttagaaaatttcgagcttacggagacaatacatatgggagaagcaattggaagatagaaaaaagggtactoggtacataaata  
+-----+  
ttttaggttgaatctttaagctcgaatgcctctgttagtataccctcttcggttaaccttctatcttttttccatgagccatgtatttat  
+-----+

2250

tatgtattctgggtagaagatcggctctgcattggatgggtgtaacgcatttttttacacacattacttgccctcgagcatcaaatggtgg  
+-----+  
atacactaagaccatcttctagccagacgtaacctaccaccattgcgtaaaaaatgtgtgtaatgaacggagcgtcgtagtttaccacc  
+-----+

2340

ttattcgtggatctatatatcacgtgatttgctttaagaattgtcgttcattggtgacacttttagctttgacatgattaagctcatctcaatt  
+-----+  
aataagcacctagatatagtgcaactaaacgaattctttaacagcaagtaccactgtgaaaatcgaaaactgtactaattcagtagagtttaa  
+-----+

2430

gatgttatctaaagtcatttcaactatctaaagatgtggttgattgggccattttgtgaaagccagtagccagcgtcaatacactccc  
+-----+  
ctacaatagatttcagtaaagttgatagattctacaccacactaacccggtaaaacacttccggtcatgcggtcgcagttatgtgaggg  
+-----+

FIG. 6 Continued

g t c a a t t a g t t g c a c c a t g t c c a c a a a t c a t a t a c c a g t a g a c t g a g a c t c a t g c a a g t c o g g t t g c a t g c g a a a c t t t t a c g t t t a a t  
 c a g t t a a c a c g t g t a c a g g t g t t t a g t a t a t g g t c a t c t c g a c t c t g a g t a c g t t c a g g c c a a c g t a g t t t g a a a a t g c a a a t t a  
 1 5 10 15 20 25  
 Met Ser Thr Lys Ser Tyr Thr Ser Arg Ala Glu Thr His Ala Ser Pro Val Ala Ser Lys Leu Arg Leu Met  
 K. lactis URA3

gggatgaaagaagaccaatttgctgtcttctcttgacgttcttgactgatgagctattgaaacttgttgaaacgttgggtccatacat  
ccctacttttctctgttaaacacagaagaagaactgcaagcaagctgactactcgataaactttgaacaactttgcaaccaggtagta  
30 35 40 45 50 55  
Asp Glu Lys Lys Thr Asn Leu Cys Ala Ser Leu Asp Val Arg Ser Thr Asp Glu Leu Leu Lys Leu Val Glu Thr Leu Gly Pro Tyr Ile  
K. lactis URA3

tttgccctttgaaaacacacggttgatatcttggatgatttcagttatgagggtactgctgtcttccattgaaagcattggcagagaaatacaa  
aacggaacacttttgtgtgcaactatagaacctactaaagtcaatactactcccatgacagcaagtaactttcgtaacgctctctttatgtt

60 65 70 75 80 85

Cys Leu Leu Lys Thr His Val Asp Ile Leu Asp Asp Phe Ser Tyr Glu Gly Thr Val Val Pro Leu Lys Ala Leu Ala Glu Lys Tyr Lys

*K. lactis* URA3

gttcttgatatttgaggacagaaaaattgccgatatcggtaacacagtcacaaattacaatatcatcggcggtttaccggtatcgcagaattg  
caagaactataaaactcctgtcttttaagcggctatagccattgtgcagtttaattgttatgtagcccgcaaaatggcatagcggtcttac  
Phe Leu Ile Phe Glu Asp Arg Lys Phe Ala Asp Ile Gly Asn Thr Val Lys Leu Gln Tyr Thr Ser Gly Val Tyr Arg Ile Ala Glu Trp  
K. lactis URA3

FIG. 6 Continued

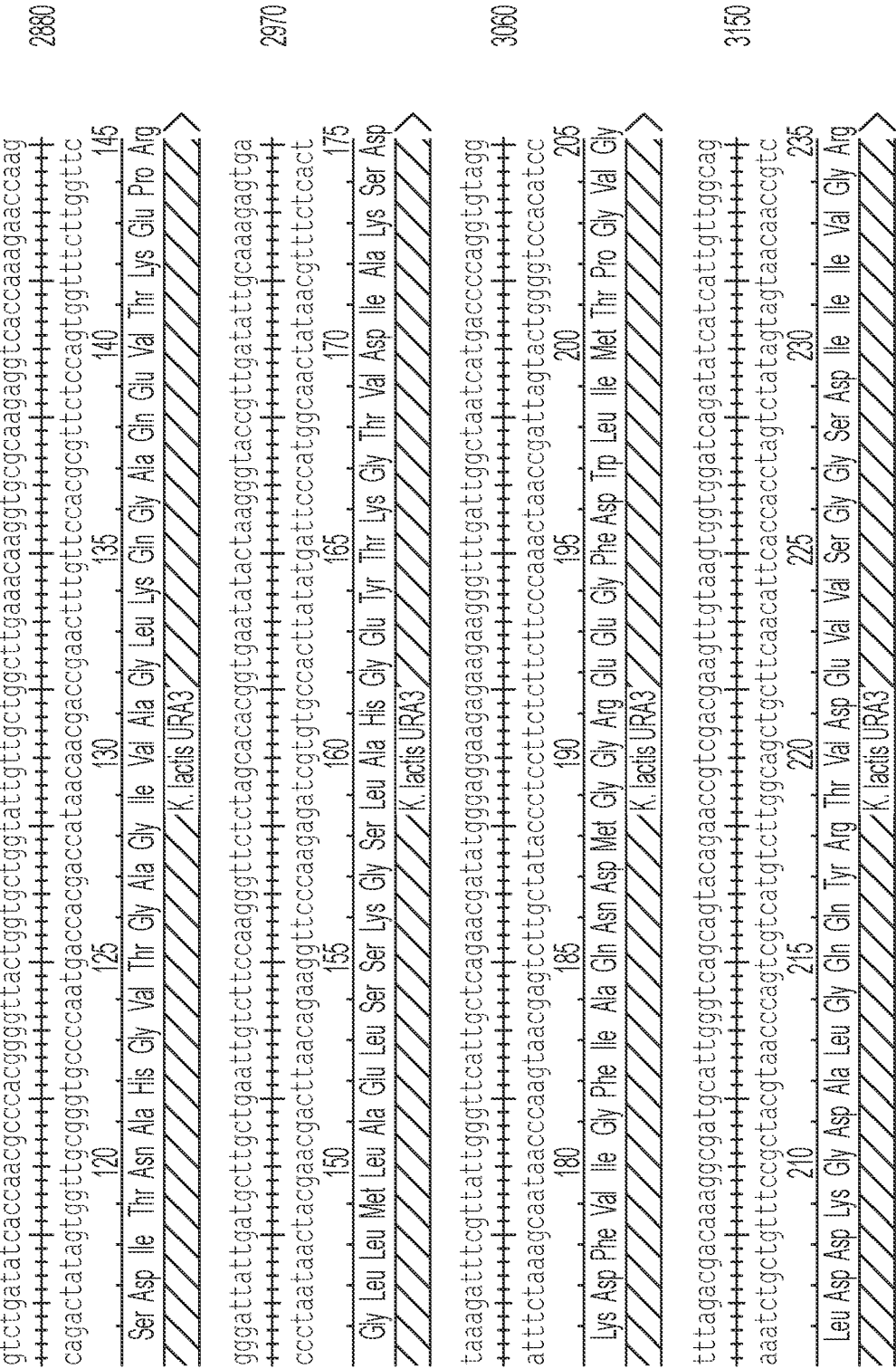


FIG. 6 Continued

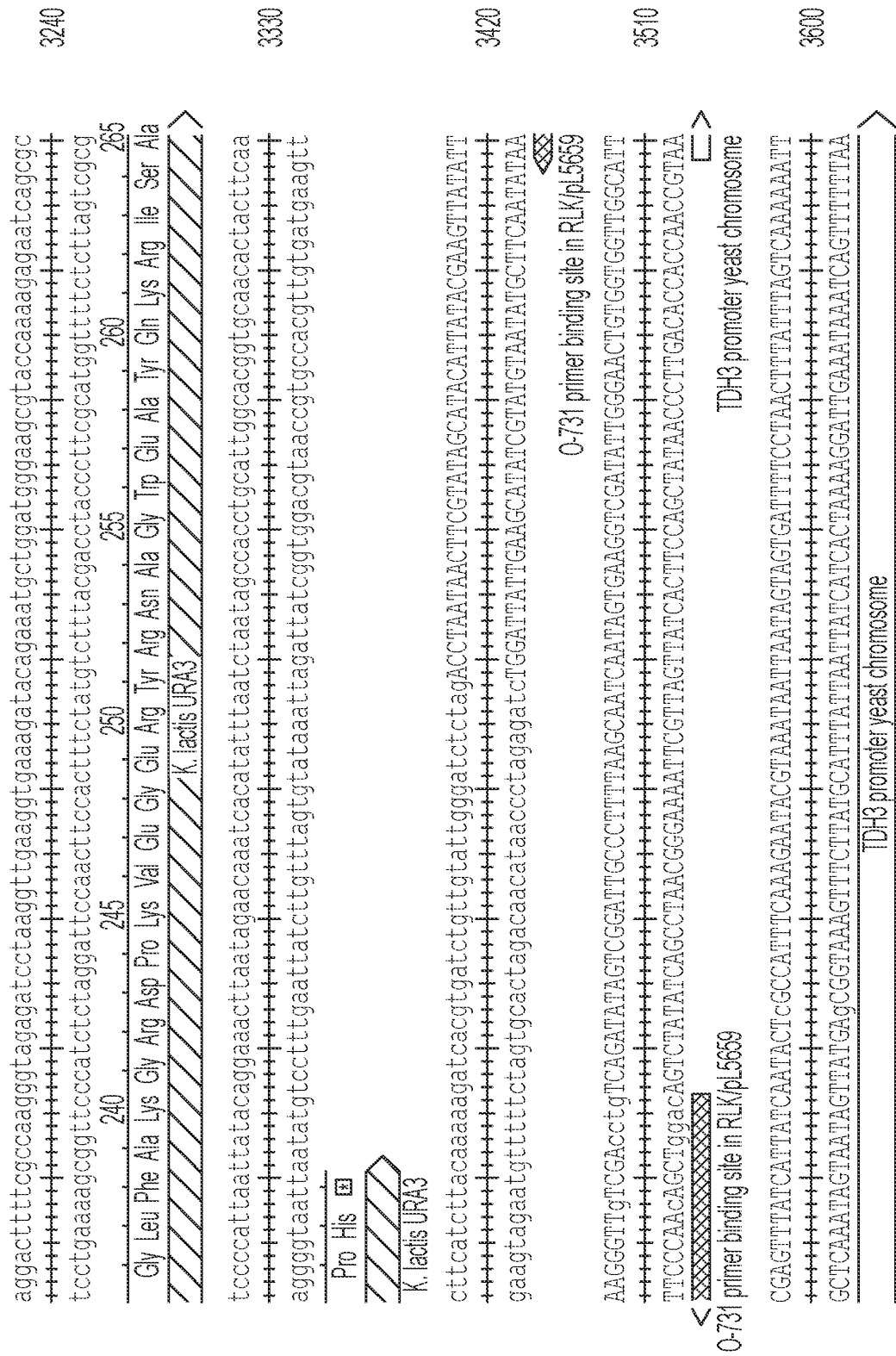
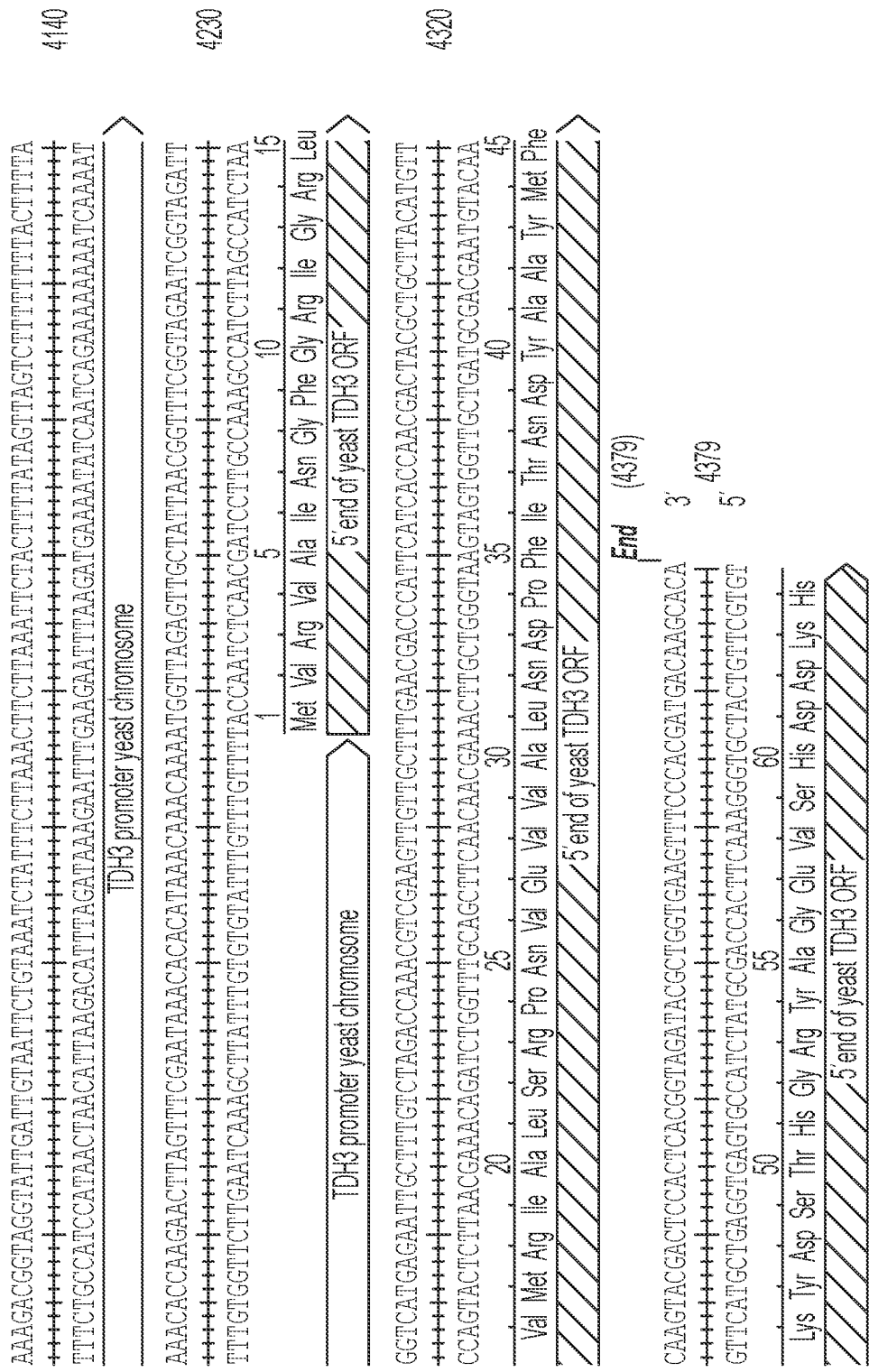


FIG. 6 Continued

4050

TDH3 promoter yeast chromosome



0-750 bp PCR Ferritin::URA3 insert in P3190

FIG. 6 Continued

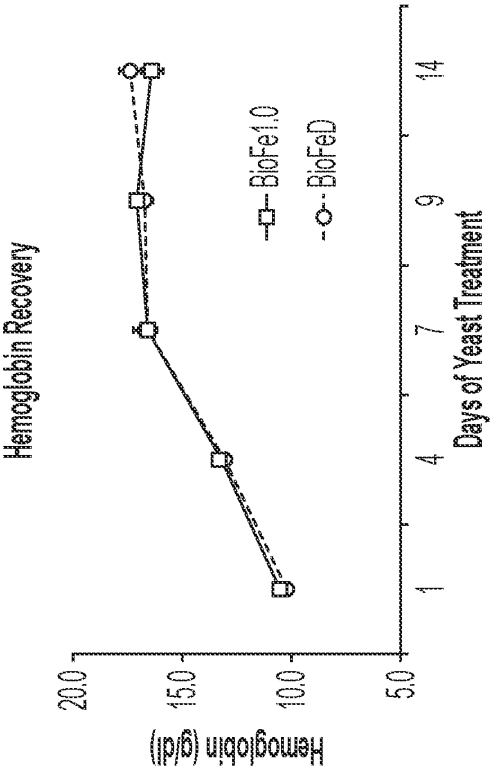


FIG. 7

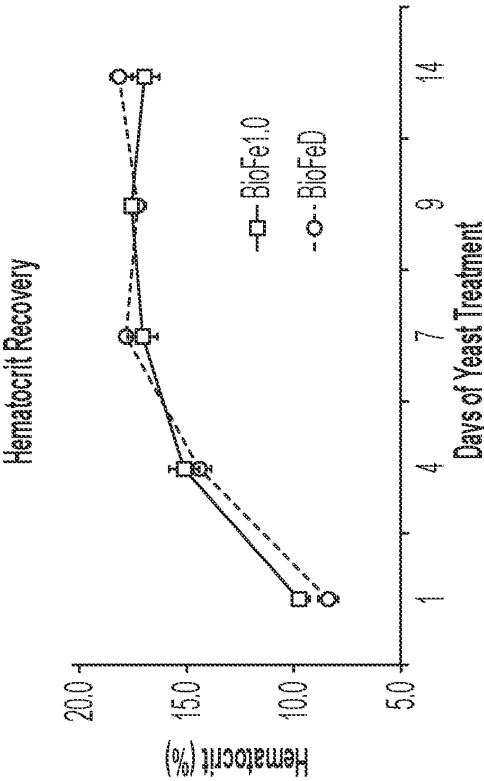


FIG. 8

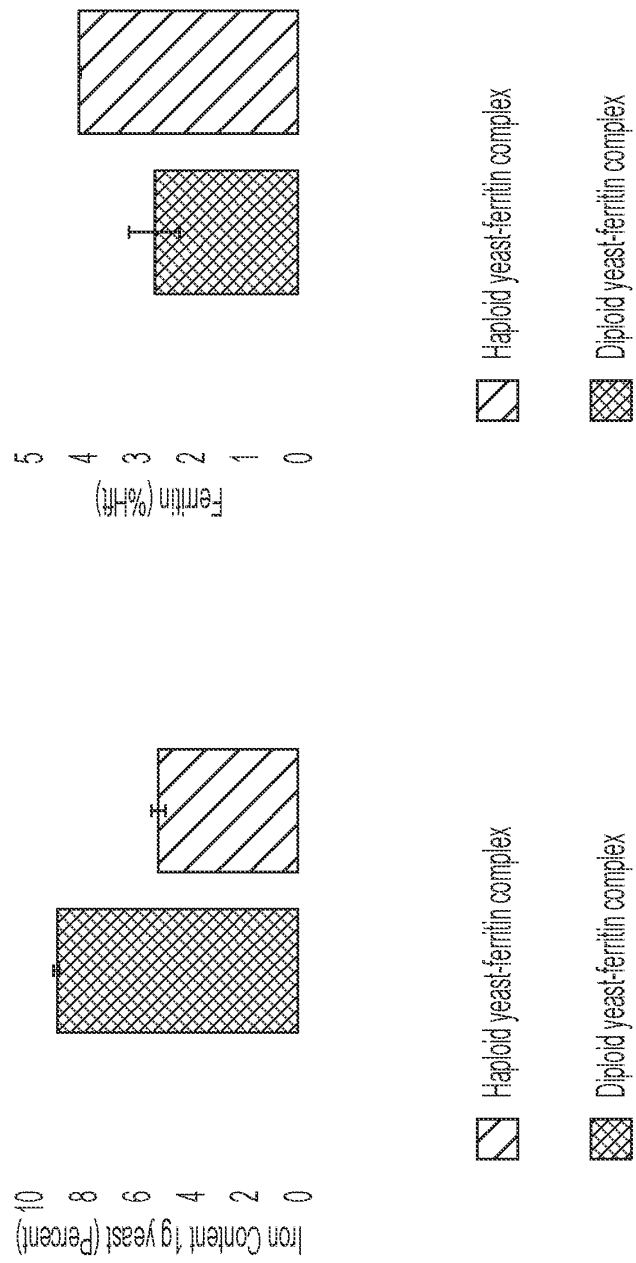


FIG. 9A

FIG. 9B