



## Supplementary Materials

# Bile Salt Hydrolases with Extended Substrate Specificity Confer a High Level of Resistance to Bile Toxicity on Atopobiaceae Bacteria

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### >Original sequence (lcBSH)

```
ATGTGCACCGCCGTTTCGCTTAACCGATAAAAAACAACAACCTCTATGTAGGCCGC  
AATTTGGACTGGGGCGTTCCTTTTGGCGAGAAGCCTCTGCTGGTGCCTGCAGATT  
GGACCTGGCAAAGCCGCCACATAGGGGCTATTGCCACTCAGTCGCCCATCATTG  
GTATGGGGCTGCTCATGAAGGACATGCCTCTTTATTTTGACGCCGTGAACGAGGC  
GGGCCTTTACTGCGCCGGCCTTTCCTTTGCCGAGGCTTCGCACATTACAACGATG  
CTGATCCTTCCAAGATCAACGTCACCAGTTTCGAGATGCCCCCTTTGGGTATGCTCC  
GAGTTCACCTACAGTTGCCAGGTGAAGGAAGCTGCTCAGAACCTCAATATCACC  
AACGACACCTTCGATCCTTCGCTTCCTACTTCCGACCTGCATTGGTTCGTCGCCGA  
CAAAGACCAGTCCATTGTCATCGAGCAAACCGCTGAAGGTCTTAAGATCTACGA  
TGACGGCTTTGACGTGTTGACCAATCAGCCGGACTTCCAGTTCCTACTGCAACAAC  
ATGCGCAATTACATTCACCTGGACGGCGACTGGACACCCGAGCGCACCATGCGC  
AACGCTCATCTCACC GCCCTGGGCGTAGGTCCCTCCGTGATGGGTCTTCCAGGCG  
ACCCCTCTGCCATCTCGCGTTTCGTTTCGCGTTGCACTGCTTAATGCAAGCTATCCC  
GACCAAGACGATGACGCTGACAACATCACCCGCCTCTTCAAGACCCTCAATGCA  
GTCTCTATGGTCAAGGGTTACTGCCGTCAGGAGTCTGGCGACTTTGAATACACCA  
TTTACACCGGCGGTTTCGATAGCGCTACTGGCACTTATCGCTACACCACCTACGA  
TGACCCTGCCTATCACACCTTCTCGTTTGCCGACGCTGCTTCTCTCTGCCCCAG  
CCAACCTCAAGTAG
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### >Codon optimized sequence (lcBSH)

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ATGTGCACCGCGGTTTCGTCTGACCGATAAAAAATAACAATCTGTATGTGGGCCGTA  
ATCTGGACTGGGGCGTTCGTTTGGCGAGAAGCCGCTGCTGGTTCGGGCGGATTG  
GACCTGGCAAAGCCGTCACATTGGTGCATCGCGACCCAAAGCCCGATTATCGG  
CATGGGTCTGCTGATGAAAGACATGCCGCTGTACTTCGATGCGGTAAACGAAGCG  
GGTCTGTATTGCGCGGGTCTGAGCTTTGCGGCGGGTTTCGCGCACTATAACGATG  
CGGACCCGAGCAAGATCAACGTGACCAGCTTCGAAATGCCGCTGTGGGTTTGCA  
GCGAGTTTACCACCGTTGCGCAAGTGAAAGAAGCGGCGCAGAACCTGAACATCA  
CCAACGACACCTTCGATCCGAGCCTGCCGACCAGCGACCTGCACTGGTTTGTGGC  
GGATAAAGACCAGAGCATCGTGATCGAGCAAACCGCGGAGGGTCTGAAGATCT
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ATGATGACGGTTTTGACGTTCTGACCAACCAACCGGACTTCCAGTTTCACTGCAA  
CAACATGCGTAACTACATCCACCTGGACGGTGATTGGACCCCGGAACGTACCAT  
GCGTAACGCGCACCTGACCGCGCTGGGTGTTGGCCCGAGCGTTATGGGTCTGCCG  
GGTGACCCGAGCGCGATCAGCCGTTTCGTTTCGTGTGGCGCTGCTGAACGCGAGCT  
ACCCGGACCAGGATGACGATGCGGACAACATCACCCGCTCTGTTCAAGACCCTGA  
ACGCGGTTAGCATGGTGAAGGGTTACTGCCGTCAGGAAAGCGGTGATTTTCGAGT  
ACACCATCTACACCGGCGGTTTTGATAGCGCGACCGGTACCTATCGTTACACCAC  
CTATGACGATCCGGCGTATCATACCTTTAGCTTTGCGGATGCGGCGAGCCTGAGC  
GCGCCGGCGAACCTGAAATAA

>Original sequence (gfBSH)

ATGTGCACAGCGGTCCGGTTCGCGACCCCGAGGGTCATCTGTACTGCGGTCGTA  
ACTACGACTGGGGCGTCAGCTACGGCGAGGGCCCTGTGGCCGTCCCCGCCGGCT  
GGGAGTGGCGGTCGCGCCACGAGGGCACGTTCAAGACGCGCACCGGCCTGATCG  
GCATGTCCATCGTCGAGGAGGGCATGCCCCTGTTCTTCGACTGCGCCAACGAGGA  
CGGCCTCTATTGTGCCGGGCTCTCGTTTCGCGGGTGGCTTCGGCGTCTACCGCGAC  
CCCGAGGAGGGCAAGACCAACATCGCCAGCTTCGAGATGCCGCTCTGGGTGTGC  
GGGACGTTCTCCTCGGTCGACGAGGTCGAGGAGGCCCTCGCCGATGCCGCGATC  
ACCAACGACAGCTTCTCCTCGGCCCTCGAGCCCTCTTCCCTCCACTGGTTCGTCGC  
CGACGCCGAGCGCTCCATCGTCGTCGAGCAGGACGCCGACGGCCTCAAGGTGAG  
CCACGACGGCTTCGACGTCCTACCAACCAGCCCCGAGTTCAGGTTCCACTGCGA  
GAACATGCGCAACTACGTGCACCTCGACAACGCCTGGACCCCGAGGTCACCCT  
GCGCGAGGAGCACCTACCGCCATGGGCGTCGGTCCCTCGATGATGGGCCTGCC  
TGGCGACCCCTCCGCCATCTCGCGCTTCGTCTGCGTCGCCATCCTCAACGCCCTCT  
ATCCCGACGAGGAGGGGGAGAAGGCCAACGTCGCGCGCCTCTTCAGGACCCTCG  
GGGCCGTCTCGATGGTCAAGGGCCACTGTCGCCAGGAGTCTGGCGACTTCGAGT  
ACACCTTCTACACGGGGGGCTACTCCTCCGCCAGCAAGACGTATTACTACAGCA  
CCTACGAGGACCCGGCTCTGCGCACCGTCACCTTCGACGACTGCAGGGGGGTGCG  
ACGGCCTCGCCAAGGTGGCGGCCGTCTAG

>Codon optimized sequence (gfBSH)

ATGTGCACCGCGGTTTCGTTTTTTCGATCCGGAGGGTCACCTGTATTGCGGTCGTA  
ACTATGATTGGGGCGTGAGCTATGGCGAGGGCCCGGTGGCGGTTCCGGCGGGTT  
GGGAATGGCGTAGCCGTCACGAAGGTACCTTCAAGACCCGTACCGGTCTGATCG  
GTATGAGCATCGTGGAAGAGGGTATGCCGCTGTTTTTCGACTGCGCGAACGAAG  
ACGGTCTGTACTGCGCGGGCCTGAGCTTTGCGGGTGGCTTTGGTGTTTACCGTGAC  
CCGGAAGAGGGCAAAACCAACATTGCGAGCTTCGAGATGCCGCTGTGGGTTTGC  
GGTACCTTTAGCAGCGTTGACGAGGTTGAGGAAGCGCTGGCGGATGCGGCGATC  
ACCAACGACAGCTTCAGCAGCGCGCTGGAACCGAGCAGCCTGCACTGGTTTGT  
GCGGATGCGGAACGTAGCATCGTTGTGGAACAGGACGCGGATGGTCTGAAAGTG  
AGCCACGACGGTTTTGACGTTCTGACCAACCAACCGGAGTTTCGTTTCCACTGCG  
AGAACATGCGTAACTACGTTACCTGGATAACGCGTGGACCCCGGAAGTTACCC  
TGCGTGAGGAACACCTGACCGCGATGGGTGTGGGTCCGAGCATGATGGGCCTGC  
CGGGTGACCCGAGCGCGATCAGCCGTTTTGTGTGCGTTGCGATTCTGAACGCGCT  
GTACCCGGACGAAGAAGGCGAGAAGGCCAACGTTGCGCGTCTGTTCCGTACCCT  
GGGTGCGGTTAGCATGGTTAAAGGTCACCTGCCGTCAGAAAGCGGTGATTTCTGA

GTACACCTTCTACACCGGCGGTTACAGCAGCGCGAGCAAAACCTACTATTACAG  
CACCTACGAAGACCCGGCGCTGCGTACCGTGACCTTTGACGACTGCCGTGGCGT  
GGATGGCCTGGCGAAAGTGGCGGCGGTGTAA