

*Bacillus sphaericus* strain 2362: identification and nucleotide sequence of the 41.9kDa toxin gene

Colin Berry and John Hindley

University of Bristol, Department of Biochemistry, Medical School, University Walk, Bristol BS8 1TD, UK  
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Oligonucleotide probes designed on the basis of the known N-terminal 40 amino-acid sequence of the *B.sphaericus* 2362 larvicidal toxin (1) were used to identify an EcoRI-HindIII fragment containing the entire coding sequence. Sequence analysis showed an ORF of 1110 nucleotides corresponding to a 41.9-kDa protein, in agreement with an estimated 43-kDa by gel electrophoresis (1). Features of note are (i) an additional four amino-acids at the N-terminus which are not found in the purified toxin, (ii) homology of the tetrapeptide with that deduced for the N-terminus of *B.thuringiensis* var. *israelensis* and *morrisoni* (2), i.e. MRNL and MENL respectively, (iii) Cys replacing a reported Ser at residue 31 (no.27 in ref.1), (iv) extensive homology in the upstream control regions to *B.t.* subsp. *kurstaki* and *israelensis* (overlined). The putative Shine-Dalgarno sequence is boxed and a downstream inverted repeat underlined.

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ACCTATAACTAATCCACTAGGCTAACAAACATACAATTATTCGATGTGAAAAATAGTTACGATOGACACATATTTAAACACCTTTAATCTTTAAAAATGGTGAAGTTATGTA AAAAC
120
GAATGAAGAATTAATACCTAAAATTAACCGATGACTTTAACTTCAAAATATTCATACCATGTTATTTAAAAATAGTNGATGATGAAATAAATGATATATATANGACAACAATTAAT
240
M R N L D F I D S F I P
TTTGACACATAAGATAATTTTAAATGTATAAATAGTATTTAGAGTGTATTCGCAATATATTTTTGAAAGGAGCTAAAGACATGAGAAATTTGGATTTTATGATCTTTTATACC
360
T E G K Y I R V M D P Y N S E Y P F C I H A P S A P N G D I M T E I C S R E N H
CAGAGAAGAAAGTCAATTCGGCTATGATTTTATATAAGCGAGTATCCTTTCGTATACATGCACCTCAGCCCTAAATGGGATATCATGACAGAAATCTGTAGCAGAGAAATAA
480
Q Y F I F P P T D D G R V I I A N R H N G S V F T G E A T S V V S D I Y T G S P
TCAATATTTTATTTTTTTCCTACTGATGATGGTGGAGTAATATTCGCAATAGGCCATAATGGGTCGTTTTTACCGAGAAGCCACAAGTGTAGTATCAGATATCTATACTGTGATGCC
600
L Q F P R E V K R T M A T Y Y L A I O N P E S A T D V R A L E P H S H E L P S R
ATTACGTTTTTTAGAGAGGTCAAAGAACTATGGCAACTTATTTATTTAGGATACAAAATCCTGAATCCGCAACAGATGTGAGAGCTCTAGAACCGCATATCCCATGAGCTGCCATCTCG
720
L Y Y T N N I E N N S H I L I S N K E Q I Y L T L P S L P E N E Q Y P K T P V L
CTTTTATACACTAACATATGAAAAATATGCAACATATTAATTTCTAATAAGGACAAATATATTTAACCTTGCCCTCAGTCCAGAAAACGAGCAATACCCCTAAAACCTCGATATT
840
S G I D D I G P N O S E K S I I G S T L I P C I M V S D F I S L G E R M K T T P
AGCGGTATGATGATATAGCACTAATCAATCAGAGAAATCAATAATAGGAGTACTTTATCCATGATAAATGGTTTCGGATTTTATAGTITTCGGGAGAGAAATGAAAACCACTCC
960
Y Y Y V K H T Q Y W Q S M H W S A L F P P P G S K E T K A K T E K S G I T D T S Q I S M
ATATATATGTAAGGACACTCAATATGGCAAGCATGTGTCGCGGCTCTTTCACCGCCCTCTAAAGAGA CA AAAAATCAGGATATCAGTATCACTGACACTTCTCAAAATAGTAT
1080
T D G I N V S I G A D F G L R F G N K T F C I K G G F T Y D T K T Q I T H T S Q
GACTGACGGGATTAATGTTCAATGGGAGCAGATTTGGATTAAGGTTTGGAAAATAAAGGTTTGGAAATTAAGGGGGGTTCACTATGATACAAAGACTCAAATAACTAATACCTCCA
1200
L L I E T T Y T R E Y T N T E N F P V R Y T G Y V L A S E F T L H R S D G T Q V
ATTTGTAATAGAACCAACTTACTAGAGAAATACAAAATACAGAAAATTTCTCTGTAGATATACAGGCTAIGTTTATAGGTCAGAAATTTACTTTACATGCTAGTATGGAATCGAGT
1320
N T I P W V A L N D N Y T T I A R Y P H F A S E P L L G H T K I I T D D O N *
TAATAGCATCCATGGTGTCTTAAAGCAACTATACAAATACAAAGATATCCACATTTTGAAGTCAACTTTACTAGAAATACAAGATTAATACAGATGATCAAACTAAAT
1440
TTAAACAATTTCTGACAACTATGATGTTAAATAGAACAAATTAATAACAATTTAAGTACTTTGGATATAGTGAAGGACCTATAGCATAGCTTTTAGGTCCTTTTAGTCTTT
1560
TTTTGGTTTTTGAAGATGATAGATGGCTACACTACACTAAGTTGCACAGATAAAAATAGGGGTTGTAACCTTAGACTATTA AAAAAGGAGAGTCTACTACTATGACAGCTCAACATCGA
1680
    
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REFERENCES. (1) Baumann, P., Unterman, B.M., Baumann, L., Broadwell, A.H., Abbene, S.J. and Bowditch, R.D. (1985). *J. Bact.* 163: 738-747.  
 (2) Earp, D.J. and Ellar, D.J. (1987). *Nucleic Acids Res.* 15: 3619.

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