Supporting Information

for

Discovery of unguisin J, a new cyclic peptide from *Aspergillus heteromorphus* CBS 117.55, and phylogeny-based bioinformatic analysis of UngA NRPS domains

Sharmila Neupane, Marcelo Rodrigues de Amorim and Elizabeth Skellam

Spectroscopic and spectrometric data of 1 and 2. Bioinformatic data of the biosynthetic gene clusters

Table of Contents

List of supplementary tables:

List of supplementary figures:

Table S1: DNA and protein sequences of ung" BGC mined from *A. heteromorphus* CBS 117.55.

Gene	Putative DNA sequence	Predicted protein sequence
ungA''	ATGCCGACAGAGAATGGGGAGGTCCAGCACCGGATCGACGGCCTTCAGGATCAGGATACTGTGGAGATATTGCTGGTTACCTTGGAATC ATGGGCCCTGCAGGCTGTGGAGGAGTTCAAAGCCAGCAAGGGCATGCTCGAGATAGGCAGCGTGAGCGACAGATCGAACGATGCCCG TAAGGTGAAGATTGAGCTAGATGGGGGAACTGAGAATATATTGGCGCAATTGCGAGGGGAATGGGTGCGCCAGCTGGTGCACCAGCAC CACGAAGCAGCCAGTAATTTTGCGGCGTCCATAATTTTGGATGGCAGCCCAGAGAGGCTGCTGGTCTTGCGGTTTATGGAAAGGAGGG AAGCCTGGGTGTCGGAGGAGGCGCCTAAGAGCTGGTGCCAGGAAAGGAGGTGTGCACCGTTCCTAGAGATGCATTGCCAGGCTCGCC CAGAAGAGCTGCAATTCCATATCGTCTCGCCTCCTCCTGTTGCGGCGCAAGCATTTGTGCAGCACCTGGATTTGCGGATCCGACAGTCCA TTTCCAATCGCAGTCTCGCAGACGTGCCGGTAGAGACTGTGCCTGCCGCGTCGGACAGCGAGCTCAGGGCCATCTGGGGCTGGAATGG CACGCTTCCTGAGGGAGTGCAGAGATGCGTTCACGATATCATCGCCCAGCAGGCGCGACTGCGGCCACACGCGCCAGCAGTCTCTGCCT GGGACGGCGAGCTGGACTATCAGCAACTGGATCGGATCTCCACTCGATTGGCCCATTACCTGGTGCAGCTGGGTGCTGGCCCAGATGAT ATCATCCCCCTCTGCTTCGAGAAGTCCAAGTGGATGATGGTGGCCATTCTGGCCGTGATGAAGTCAGGGGCTGTCATCGCTGCCCTGGAC CCGACACAGCCCGAGGATCGCCTGCGAAGCATTGTGAAGCAGCTGCAGCCACGCTGGATTCTGACATCGCCGGCCCAGATCGAAGTGG CCGCACGCCTGGAGATCAGCAATGTCATCGCTCTCGACGAAGGCCGCCTACGGCAACTGCCAGACTCCGAAGGAAGACATCTCCCATGC GTTGATCCCTCCCGTAACCTGTACATTGTTTTCACGTCGGGCAGCACTGGAACGCCCAAGGGAGTCATGATCAATCACACCAACTTTAGC AGCGCCATCGCCTACCAGCATGAGGCATTGGGGATGGATAACACCGCGCGAGTGTTCGACTTCGCTTCATACGCCTTTGATCTGGCCTGG GGGAACATCATCCATACCCTCGCGGCGGGGGGGGTGTCTATGCATCCCCAGTGAAAGTGAGCGCCGTGGAAACATCGCCGAGGCAATCC GCAGACTTGGGGTGAACCATCTCCAGCTGACCCCCAGTGTTGCTCGCCTCATCGATCCGCGAGATATCCCCGCAGTGCGATGGATCCTCC TGATCGGAGAGCCAATGACCCAGGCCGATGTTGCTCAATGGACGCCATACTGCAAACTGATCAATTCCTACGGCCCAGCGGAATGCACG GTGGCGGTGACCTTCCAGACAATCCCCCACGGCCGACCTTGGGACTCGAGTATGGGGAAAGGCGTCGCGTGCAGTACCTGGATCGTTG ACGAGGAGCATGGGGAGACACTGGTCCCCCTTGGCCACACAGGCGAGTTGTGGCTGGAAGGACCGCTGGTCGGCCAGGGATATCTAG GAGACCTGGAGAAGAGCGCGGCGAGTTTCATCGATAGCCCTGCCTGGCTGACCCGGGGAATACCAGGGGTCGTCCCCGGCCGGCGAG GCCGACTATATAAAACTAGAGATCTGGTGCGCTACAACCCGGACGGCTCGCTGGTTTACGTGGCTCGCAAGGATACGCAGATCAAGATCC GGGGCCAGCGGGTGGAACTGGGCGATGTGGAATATCACCTGAAGCTTGCACTGCCCGACAAGATTCCATCTGTTGCAGCCGAGGCCAT CACCCCGCGGGGTAGCAGCAGCACCATCCTCGTCGCATACCTGGCCCTCGGCGAAGAAGCAACTGGCGCCGCGGAGAGCACCCGGGA GAGTCTAGCCAGTTGCCTGCATGGGGTGGAAGAGTACCTGGCCGACCGACTGCCTCGCTACATGGTGCCCAGCCTGTATCTTGCAGTCC CCGAGATCCCCATGACTGCCACCGGCAAGACAGACCGGCTACGCCTGCGTGAGATCGGGTCTTCTTTAACCCTGGATCAGCTGGCAGCC TTGCAGCCCTCGCGAGCAGTGGAGATCAAGGCTCCCGAGACCGAGATGGAGCACCGCCTTCAACAGCTCTGGGCGGCAACATTGAATA TCAGCCCGAGCAGCATAGGGACAGGCGACAGTTTCCTCCGAATCGGCGGAGAATCGATGGCAGCCATCCGCCTGGTGCAGCTCGCCCG GAAAGAGGGCATAATCCTGACAGTGGCCGATATTTTCAACCACCCGCGCCTCGGCGATATGGCGCAAGAAGCCCAACGAGAACGGGCC CAGGACGTGACGACCATCCCTCCCTTCTCCCTGCTGCGTAGGGGCCACGACGTAAGAGATGCCTGCGCGTTGGCTGCAGCCGAATGCCG CGTTTCGGCAAACTCCATCGCCGACCTCCTGCCCTGCACCCCGCTGCAGGAAGGGCTGTTGGCCCTGACTGTCAAGCAGGCCGGGGAA TATGTCCGCCAGATGGTATCAGAGCTTCCAGTGGATGTGGATCTGGCGCGCTTCCGCGCTGCCTGGGCCCAAGTGATTCATGAAGCGGC GATTTTGCGAACGCGGATTGTGGACCTGCCCAACGCCGGGCTCCTGCAGGTCGTAGTCGCAGACCAGCCCGAATGGGCCACGGGGAG CGATCTCGGTCATTTCTTGGAGTCAGAGAAAGGAAAGCCCATGGGACTGGGGACGTCGTTGGCGCGGTTTGGTCTGGTGTCGGATCAA GCGCAAGGCAAGGTGCTTTTCGTCTGGACCATCCACCACGCCTTGTATGATGGCTGGTCGCTGCCGGCGATGCTGGAACGGGTGGAAG CCATTTATGCGGGTGGCAGCTGCGATATGCTCCCCTCGTTTGCGGGGTTTGTGAAATATCTGGCGGATGGTACAGTGGAAGATGCGCAG GGTTACTGGCAATCCCAGTTCAATGGGATCCAGGCCGCAGTCTTCCCAGCCTTGCCCTCCCCAGACTACCAGCCCAAGTGTCAGGATCTG CTCCAATACCACGTCGCGAGTGTCTCCTGGCCCGGGAATGATATCACGGCCTCCACTGCAGTGCGAACAGCATGGGCAATTGTCGCAAG CCGTTATACCCAGTCTCCGGATGTGATCTTTGGGGCCACAGTGTCCGGGCGACAGGCACCGGTCCCGTTCGTTGAACGCATGGCCGGTC CAACCATTGCGACTGTTCCAGTCCGCGTGAATGTGCAGGGGGATGCCACGGTGGCCAGTTTGATGCAGAGCGTTCAGACACAGGCCGT	MPTENGEVQHRIDGLQDQDTVEILLVTLES WALQAVEEFKASKGMLEIGSVSDRSNDARK VKIELDGGTENILAQLRGEWVRQLVHQHHE AASNFAASIILDGSPERLLVLRFMERREAWVS EEAPKSWCQERRCAPFLEMHCQARPEELQF HIVSPPPVAAQAFVQHLDLRIRQSISNRSLAD VPVETVPAASDSELRAIWGWNGTLPEGVQR CVHDIIAQQARLRPHAPAVSAWDGELDYQQ LDRISTRLAHYLVQLGAGPDDIIPLCFEKSKW MMVAILAVMKSGAVIAALDPTQPEDRLRSIV KQLQPRWILTSPAQIEVAARLEISNVIALDEGR LRQLPDSEGRHLPCVDPSRNLYIVFTSGSTGT PKGVMINHTNFSSAIAYQHEALGMDNTARV FDFASYAFDLAWGNIIHTLAAGGCLCIPSESE RRGNIAEAIRRLGVNHLQLTPSVARLIDPRDIP AVRWILLIGEPMTQADVAQWTPYCKLINSYG PAECTVAVTFQTIPHGRPWDSSMGKGVACS TWIVDEEHGETLVPLGHTGELWLEGPLVGQ GYLGDLEKSAASFIDSPAWLTRGIPGVVPGRR GRLYKTRDLVRYNPDGSLVYVARKDTQIKIRG QRVELGDVEYHLKLALPDKIPSVAAEAITPRG SSSTILVAYLALGEEATGAAESTRESLASCLHG VEEYLADRLPRYMVPSLYLAVPEIPMTATGKT DRLRLREIGSSLTLDQLAALQPSRAVEIKAPET EMEHRLQQLWAATLNISPSSIGTGDSFLRIGG ESMAAIRLVQLARKEGIILTVADIFNHPRLGD MAQEAQRERAQDVTTIPPFSLLRRGHDVRD ACALAAAECRVSANSIADLLPCTPLQEGLLAL TVKQAGEYVRQMVSELPVDVDLARFRAAW AQVIHEAAILRTRIVDLPNAGLLQVVVADQPE WATGSDLGHFLESEKGKPMGLGTSLARFGLV SDQAQGKVLFVWTIHHALYDGWSLPAMLER VEAIYAGGSCDMLPSFAGFVKYLADGTVEDA QGYWQSQFNGIQAAVFPALPSPDYQPKCQD LLQYHVASVSWPGNDITASTAVRTAWAIVAS RYTQSPDVIFGATVSGRQAPVPFVERMAGPT IATVPVRVNVQGDATVASLMQSVQTQAVA MIPYEQTGLNQIRRINSDADQATQFQSLLVV QPPSSKTSRRPDECLFRVDLDAGDEFRSINTY

GGCTATGATTCCGTACGAGCAGACGGGATTGAACCAGATCCGGCGGATCAATTCGGATGCAGACCAGGCAACCCAGTTCCAGTCCCTGC	SLMLECHLESDGMRLRMSYDRLVIDAEQVK
TGGTTGTACAGCCTCCAAGCTCGAAGACCTCTCGTCGGCCGGACGAGTGCTTGTTCCGAGTGGATCTGGATGCTGGTGACGAATTTCGC	RIARQFEGVLRQVCSEVNAQELVGTVSAASE
AGTATAAACACTTATTCGCTTATGTTGGAGTGCCATCTCGAGTCCGACGGGATGCGCCTGCGCATGAGCTATGATCGCCTGGTCATCGACG	ADLAQVWAWNATVPQTVQGSVNDLIAQRV
CGGAGCAGGTTAAGAGGATAGCCAGGCAGTTTGAAGGGGTGCTGCGCCAGGTCTGCAGTGAAGTGAATGCGCAGGAGCTGGTGGGC	QQQPDALAICAWDGQLSYQELDTLSTQLALS
ACTGTCTCAGCTGCCAGTGAAGCCGACCTGGCCCAGGTGTGGGCCTGGAATGCAACTGTCCCCCAGACCGTCCAGGGCTCTGTCAACG	LVQQGAGRGSVIPLCFEKTMWTPVAMLAG
ACCTCATTGCGCAACGCGTTCAGCAACAGCCCGATGCCCTGGCGATCTGCGCGTGGGATGGACAGCTGAGCTACCAGGAACTCGATACC	MKAGSTVVTMDPSQPEDRLQSIIQQTQPPLI
CTCTCCACGCAGCTGGCCCTATCGCTCGTGCAACAGGGGGCAGGCCGTGGCTCGGTGATTCCCTTATGCTTCGAGAAGACAATGTGGAC	LTSDTYKPLASRLAGVVIRVNRDTLQALPQHD
GCCCGTGGCCATGCTGGCTGGCATGAAGGCTGGCAGTACTGTGGTTACAATGGACCCCAGCCAGCCGGAGGATCGATTGCAGTCAATC	LDTPDLPTIHPTDGLYIAFTSGSTGNPKGAVM
ATCCAACAGACCCAACCGCCACTCATCCTCACCTCCGACACATACAAGCCTCTGGCATCTCGACTCGCAGGGGTGGTCATCCGCGTGAAT	SHQNIRSAIHHSTGALGFTPTTRVLGFSSYAF
CGGGATACCCTGCAGGCACTGCCACAGCATGACCTTGATACTCCAGATCTCCCAACCATCCACCCGACGGACGGACTCTACATCGCGTTC	DAVWVEFLYAMAVGGCLCIPSDAQRNSGDL
ACCTCGGGGAGCACTGGAAACCCCAAGGGGGCAGTCATGTCCCATCAGAACATTCGCAGCGCAATCCACCACAGTACGGGCGCCTTGG	AGCMEGLRVDLALLTPSTARLLDAEAVPSLKT
GCTTTACGCCTACCACCCGGGTGCTTGGATTTTCCTCCTATGCATTTGACGCGGTGTGGGTGGAGTTTCTCTATGCGATGGCCGTCGGGG	LVLIGEPVTSDDLARWTGNVDLRNGYGPAEC
GCTGTCTGTGTATCCCTTCGGACGCGCAGAGAAACAGTGGTGATCTTGCAGGCTGCATGGAAGGGTTGCGAGTGGACCTTGCTCTCCTG	SAITAAYKFQGPNDQPSIVGHAVGLVAWVVE
ACCCCGTCCACGGCCCGGCTTCTCGACGCAGAGGCAGTCCCCAGCCTGAAAACCCTGGTCCTGATCGGGGAGCCCGTCACGAGCGATG	PSDGASLSPLGAVGELWVEGPLVGKGYHGD
ACCTGGCCAGATGGACCGGCAACGTTGATTTGAGGAATGGGTACGGCCCTGCAGAATGCTCCGCAATAACCGCAGCCTATAAATTTCAG	PEKTAMSFVHDPVWLLQGTLGYPGRPGRLY
GGTCCAAATGACCAGCCCAGTATCGTTGGCCACGCGGTGGGCCTCGTGGCTTGGGTGGTTGAACCATCGGACGGCGCCAGCCTCAGCC	KTGDLVRYTSDGKLVCVGRKDTQVKIRGQRV
CCCTCGGAGCGGTGGGGGAGCTGTGGGTGGAAGGGCCGTTGGTGGGAAAGGGGTATCATGGGGATCCAGAGAAGACAGCCATGAGT	ELAEIEHYIKEATRASVVVDMARPQGSRGPV
TTTGTCCATGACCCCGTCTGGCTGCTCCAGGGAACACTGGGCTATCCTGGGCGGCCAGGTCGACTCTACAAGACCGGCGATCTTGTTCG	LVAYVALGQVAAVGSPEAVRTALRRCIQGVED
ATATACCTCCGATGGCAAGCTGGTTTGCGTGGGGGAGAAAGGACACGCAGGTCAAGATCCGCGGCCAGCGGGTCGAACTGGCCGAGAT	HLSKHLPRYMVPSFYIPVVDIPLTATGKTDRR
CGAGCATTATATCAAAGAGGCCACCAGAGCTTCCGTCGTGGTGGATATGGCCAGGCCCCAGGGCAGCAGAGGCCCCGTGCTGGTGGCC	ALRNTGSSFAIDQLAELQPSGGQKRTLPQSE
TATGTGGCTTTAGGGCAAGTTGCAGCCGTGGGCTCCCCCGAGGCAGTGAGGACGGCACTTCGGCGCTGCATCCAGGGGGTTGAAGATC	MERSLQQLWAEVLNINPSQIGMDESFFLLG
ATCTGAGCAAGCACCTGCCCCGGTATATGGTGCCGAGTTTCTATATCCCCGTGGTCGATATCCCATTAACAGCCACGGGCAAGACCGACC	GDSISAMQVSAKSRARGVRVTVPDIFKFKTIA
GACGGGCATTACGCAATACCGGATCCTCCTTCGCCATCGACCAGCTGGCAGAGCTGCAGCCCTCTGGAGGCCAGAAGCGCACCCTGCCC	RLARREIQIDDLAIDDREMLDTPFALSPIQQF
CAGAGTGAGATGGAGCGGAGCCTGCAGCAGCTCTGGGCGGAGGTGTTGAACATCAATCCCTCTCAGATCGGCATGGATGAGAGCTTTT	FFDAQKDKQGHFNQSFLVRTTKPQQPDAVL
TCCTGCTCGGGGGGGGACTCTATCTCGGCCATGCAGGTCTCTGCCAAATCTCGCGCGAGGGGGGTTCGCGTCACAGTGCCAGATATCTTC	RAVQFIVARHSMLRARFHRGTDGVWTQQIT
AAAATTCAAGACAATTGCGCGTCTAGCACGACGCGAGATCCAGATCGATGACCTGGCCATTGACGACCGAGAGATGCTCGACACCCCCTT	SRADESYACRHHRLASVEDAVPVLNSSQRSL
TGCCCTATCTCCCATCCAACAGTTTTTCTTCGACGCCCAGAAAGACAAGCAGGGTCACTTCAATCAAAGCTTCCTCGTGCGCACTACCAA	DVQAGPIFAVDLIDTPPDCQYLFLTAHHLVVD
GCCCCAACAGCCCGACGCTGTACTGCGCGCCGTGCAATTCATTGTTGCCCGACACTCGATGCTGCGTGCTCGCTTCCACCGGGGCACCG	LVSWRIILEELEEYLLTGTVAGSSAPLSFQTWC
ATGGGGTGTGGACGCAACAGATCACCTCGCGTGCTGATGAATCCTATGCTTGCCGTCATCATCGCCTGGCTTCGGTGGAGGACGCCGTTC	RLQERHAQDHLTPGTAFPFDIQPPCEAYWGL
CGGTGCTGAATAGCAGCCAGCGGTCCTTGGACGTCCAGGCTGGCCCCATATTTGCGGTTGATCTGATCGACACTCCTCCAGACTGTCAGT	SPELNTHDAIQEAGFTLSKKTTSILLGPANHAF
ACCTGTTTCTCACGGCGCACCATCTCGTTGTCGACCTTGTCTCCTGGCGGATTATCCTGGAGGAGCTGGAGGAGTACCTGTTGACTGGCA	QTQPIELFLAALLHSFMDSFTDRDPPTIFNEG
CTGTTGCTGGTTCCTCTGCGCCACTCTCATTCCAGACCTGGTGCCGGCTTCAGGAGAGACACGCGCAGGACCATCTGACCCCCGGTACT	HGREPWNSAIDLSRTVGWFTTLAPISVEAGS
GCCTTCCCGTTCGATATTCAGCCCCCGTGTGAGGCGTACTGGGGACTATCGCCGGAGCTCAATACGCACGATGCTATCCAAGAGGCCGG	HHLSIPQFVRYIKDRRRQIPHNGWSYFTSRYL
GTTTACCCTCAGCAAGAAAACGACCAGCATACTCCTGGGACCAGCGAACCATGCGTTCCAAACTCAGCCCATCGAACTGTTCCTAGCCGC	NTEGKTVFSRHACPEVTFNYFGLYQQLERSD
GCTGCTGCACTCTTTCATGGACAGCTTCACTGACCGGGATCCTCCTACCATCTTCAACGAGGGGCACGGTAGAGAGCCATGGAACTCAG	ALFQSCPSLQDRVLDVADRMARFALIDVSAE
CAATCGACCTATCCCGGACGGTTGGCTGGTTTACCACCCTGGCGCCAATCTCAGTGGAAGCGGGCTCCCATCACCTTAGCATCCCCCAGT	VTQDCLQFRFLSSQRMQKQDALARWIAACE
TCGTCCGTTACATCAAGGATCGCCGGCGACAGATTCCTCACAATGGGTGGTCGTACTTCACCTCACGGTACTTGAACACCGAGGGGAAG	RLLEATAVQLLDMQPSYTLADFPLLPPTDAT
ACGGTCTTTAGCCGCCATGCCTGCCCTGAGGTTACGTTCAACTACTTTGGCCTCTATCAGCAACTGGAGAGGAGCGACGCGCTCTTCCAA	WKQLETLPRLGLAYGDVEDIYPCSPLQQGILL
TCGTGTCCCAGTCTGCAGGACCGAGTGCTGGATGTTGCAGACCGCATGGCCCGGTTTGCCCTGATTGATGTTTCTGCCGAGGTCACGCA	SQAKSPEMYWTRVRWVVRSSTGASSPVDA
AGACTGCCTGCAGTTCCGGTTTCTTTCCAGCCAGCGCATGCAGAAGCAGGACGCCCTGGCTCGGTGGATTGCGGCGTGCGAGCGTTTG	DRLERAWRKVVARHAALRTRFSDSPFSDGYS
TTAGAAGCCACAGCCGTGCAGCTGCTAGATATGCAACCCAGCTACACGTTGGCCGACTTCCCATTGCTGCCCCCTACAGATGCAACGTGG	YQIVLKDPPPTIHTIQAADPMDAVVEYRAAS
AAGCAGCTGGAGACGCTCCCCACGGCTTGGCCTTGCCTACGGTGACGTGGAGGATATCTATCCATGCTCGCCCTTGCAGCAGGGGATTCT	GSQVRPVHSLVLCPMASGDLVCDLQINHAII

GTTGAGTCAGGCAAAAAGCCCGGAGATGTATTGGACCCGAGTGCGTTGGGTTGTCCGGTCCAGTACGGGGGCATCATCTCCGGTTGAT	DAISIRVLKRELCAAYDDALPADPGPRYSDYIS
GCAGACCGACTGGAACGTGCCTGGCGGAAGGTCGTCGCACGCCATGCTGCACTCAGGACTAGATTCTCTGACAGCCCCTTCTCAGATGG	HLQSLPTTEAKEYWQTQLAGAQPCIFPTLNE
ATATAGTTACCAGATAGTCTTGAAAGACCCTCCCCCCACTATTCACACCATCCAGGCTGCGGACCCGATGGACGCCGTTGTCGAGTATCGA	PIAEPKDAAAVTSLPISPETDQALRQFCRSHA
GCAGCCAGCGGGTCGCAGGTCCGGCCAGTGCACTCTCTGGTCCTTTGCCCTATGGCCAGCGGAGACCTCGTGTGTGACCTGCAGATCA	LTPANVFSLAWMLVLRSYTSSESVCYGYLISGR
ACCACGCCATCATCGATGCCATATCCATCCGGGTTCTGAAACGCGAGCTGTGTGCCGCGTACGACGACGCCCTCCCTGCGGACCCAGGG	DVPIHQVDRAVGPFINMVVNHVEIDSNRTLL
CCCCGGTACAGTGACTATATCAGCCATCTCCAGTCCTTGCCGACGACGGAGGCGAAAGAATACTGGCAGACGCAGTTGGCTGGCGCTCA	AMLQEVQAGYLGSLKYNQYPLAEILHDLSTE
GCCATGCATCTTCCCTACCCTGAATGAGCCCATCGCCGAACCCAAGGACGCGGCCGCCGTTACATCTCTGCCGATCAGCCCGGAGACGG	GQPFFNTVLSVQSGGRADSAQPPDTPTITLE
ACCAGGCCTTGCGCCAGTTCTGCCGAAGCCATGCCCTGACCCCGGCCAACGTGTTCAGTCTCGCGTGGATGTTGGTCCTACGCAGCTAC	NETWHDPNEYDIAASVLLLDDNPRITLNYSR
ACCAGCAGCGAGTCCGTCTGCTACGGCTATCTGATCTCTGGCCGGGATGTGCCCATACACCAGGTAGATCGAGCGGTTGGACCGTTCATT	HLLSERQASAVGATFVEALANIVRHPDRNLC
AACATGGTGGTCAACCATGTCGAGATAGACAGCAACCGAACCCTCCTAGCAATGCTGCAAGAGGTTCAGGCAGGGTACCTAGGAAGTCT	DLETTISPQDLATIWDWNAKVPATLSSSVPEL
GAAGTACAACCAATATCCGCTGGCCGAGATCCTGCATGACCTCAGCACCGAGGGGCAGCCCTTCTTCAATACGGTTCTGTCGGTGCAGA	FSRWVKQQPDAQAVCAWDGDLTYRQLDEG
GTGGCGGCAGGGCCGACTCAGCCCAGCCCCCAGACACACCCACCATCACCCTCGAGAACGAGACGTGGCACGATCCGAACGAATACGA	SSRLAHHLLARGVRPQSILPLCFEKSRWVPVA
CATTGCCGCATCGGTCCTGCTGCTGGACGACAATCCCAGAATCACGCTGAACTACTCCCGCCATCTGCTTTCGGAGCGACAGGCCAGTGC	MLGVLKAGCAVVTMDPEQPVERLQLVVQKT
CGTCGGGGCGACGTTTGTGGAAGCCCTGGCCAATATCGTCCGCCATCCGGACAGAAACCTCTGCGATCTGGAGACGACGATCAGTCCCC	QGVILTSPACQGLASQLRPEAVVVDGRSLER
AGGATCTCGCCACCATCTGGGACTGGAATGCCAAGGTTCCCGCGACCTTGTCCAGCTCGGTGCCCGAGCTGTTCTCCCGATGGGTGAAG	MPQPDPLSLPTIHPTDRLFLVFSSGTTGTPKG
CAACAGCCTGATGCGCAGGCCGTCTGTGCCTGGGATGGAGACTTGACCTATCGTCAACTCGACGAGGGGTCGTCCCGGCTGGCTCACC	SVMSHQNACSAVHHQQARLGLPPAARMID
ATCTGCTGGCTCGGGGTGTCCGCCCGCAGTCAATACTGCCCCTGTGCTTCGAGAAATCCCGGTGGGTGCCCGTGGCCATGCTGGGGGTG	CLSYAFDAPWFNFLHAFSSGGCLCVPSDQQR
CTCAAGGCAGGCTGCGCGGTAGTCACGATGGATCCGGAACAGCCCGTGGAGCGCCTACAGCTCGTGGTGCAGAAGACTCAAGGGGTG	KDNLAGCIESLKANYALLTPSIARVLDPAAVPG
ATTCTGACATCGCCAGCCTGTCAGGGCCTAGCATCCCAGCTACGTCCTGAGGCTGTCGTCGTGGATGGGCGATCGCTTGAGAGGATGCC	LETLAFGGEAIRAEDISRWHEVKLMGYYGPS
TCAACCAGACCCGCTGTCTCTGCCCACGATCCATCCCACGGACAGGCTCTTTCTGGTGTTTTCCTCCGGCACCACAGGGACCCCCAAAGG	ECTVVSTIHQFESKTEEPRMLGYSSGLTAWVV
GTCTGTGATGAGCCATCAGAACGCATGCTCGGCAGTTCACCACCAGCAGGCACGTCTTGGGCTGCCGCCCGCAGCCCGAATGATCGATT	DPLQGRRLAPLGATGELCVEGPLVGQGYIDE
GCCTCTCATACGCGTTCGACGCTCCCTGGTTCAACTTTTTGCATGCCTTTAGCTCAGGCGGTTGTCTGTGTGTTCCGTCCGATCAACAGCG	PQKTAASFVEDPSWLLRGGGPDFPGRRGRV
GAAGGACAATCTGGCGGGCTGTATCGAGAGCCTCAAGGCCAACTACGCGCTTCTTACGCCCTCGATTGCCAGAGTCCTGGACCCTGCAG	YKTGDLVRFRPDGSLLYVGRKDTQVKIRGQR
CGGTGCCTGGCCTGGAGACACTTGCATTCGGCGGGGAGGCTATACGCGCGGAGGATATCAGTCGATGGCACGAGGTCAAGCTGATGGG	VELGEVEHHIRQTLPAGVDVPVVVELVHPHA
GTATTATGGTCCCTCGGAGTGCACTGTCGTCTCAACCATCCACCAGTTCGAGAGCAAAACAGAGGAACCCAGAATGCTCGGTTATTCTTC	SANPVLVAFLPVGKEAAGSSESMRAVLDRYT
TGGGCTGACAGCCTGGGTGGTGGACCCGTTGCAGGGGAGACGCCTGGCACCGCTTGGTGCGACAGGAGAGCTCTGTGTCGAGGGTC	HGVEDRLMARLPSYMVPRMYIPVPAIPFTTT
CGCTTGTCGGACAAGGGTATATCGATGAGCCCCAGAAGACTGCGGCCAGCTTTGTGGAAGATCCCAGCTGGCTTCTCCGTGGTGGAGG	GKTDRRSLQRVASSYTLEQLAALQPSRDTRR
GCCAGACTTCCCTGGACGTCGGGGCCGGGTGTATAAAACAGGAGATCTCGTCCGATTTCGTCCCGATGGATCGCTCCTGTATGTCGGGC	APTTAMERRLQGMWATILDIDAVTIAATDSF
GCAAGGATACTCAAGTGAAGATCCGGGGCCAGCGGGTGGAGTTGGGCGAGGTTGAGCATCACATCCGCCAGACGCTGCCAGCCGGCG	LRIGGDSIGAIRLVRLAAEQDILLTVAAIFKSPIL
TGGATGTGCCGGTGGTTGTGGAACTGGTCCACCCCCATGCAAGTGCGAATCCGGTGCTGGTGGCCTTTTTGCCCGTGGGAAAGGAAGC	CDMAQVATLGSTSGPHDIPPFSLLKQDVDIS
TGCTGGGTCATCCGAGTCAATGCGTGCAGTCCTGGACCGCTATACGCACGGGGTGGAGGACCGCCTGATGGCCCGACTGCCCAGCTATA	QARLQVAAWCELSPSAVEDILPCTPLQEGLLS
TGGTCCCTCGCATGTACATCCCCGTGCCAGCGATCCCATTCACGACGACGGGGAAGACAGACCGGCGCAGCCTGCAACGGGTCGCGTC	LTVKNQGAYVNRQVLQLRDEVDLGRFQTAW
TTCGTATACCCTGGAGCAGCTGGCAGCGCTTCAGCCCTCGCGGGACACTCGTCGTGCGCCCACAACGGCGATGGAGCGGCGTCTGCAA	NQVAMATSILRTRIVDLPGQGLVQVVTSEVP
GGGATGTGGGCTACTATCCTGGATATCGATGCAGTGACCATCGCGGCCACCGACAGCTTCCTGCGGATTGGAGGTGACTCAATCGGAGC	RWNHGRSLDALVQDDLQRPVTLGTPLATFG
CATTCGACTCGTGCGACTGGCTGCAGAGCAAGACATTCTGCTCACGGTGGCAGCCATCTTCAAATCTCCCATTCTGTGTGACATGGCGCA	LVDAGDVGGDRQRYFLLTLHHALYDGWSLSL
GGTGGCGACACTGGGATCGACTTCCGGACCTCATGACATCCCCCCATTTTCACTGCTCAAGCAAGACGTGGATATCTCGCAGGCGCGATT	LLDEVSKAYHGTASDGLVSFKTMIKYVTELGA
GCAGGTGGCGGCGTGGTGTGAGCTCAGCCCGTCTGCTGTCGAGGATATCCTTCCGTGTACACCTCTCCAGGAAGGTCTGCTTTCTCTGA	EADSYWQGSLDGLVAEPFPALPSPMYQPRA
CGGTCAAGAATCAGGGCGCCTATGTGAACCGCCAGGTCCTGCAACTTCGAGACGAGGTAGACCTTGGACGCTTCCAAACCGCCTGGAA	QDILEHNVLGLRWLQNHHITPATTLRAAWAI
TCAAGTCGCCATGGCCACGTCGATCCTGCGAACCCGCATCGTGGACCTTCCGGGGCAAGGGTTGGTGCAAGTCGTTACCAGCGAGGTG	LTTHYTQSADVLFGSTVTGRQAPIHRVGLVEG
CCACGGTGGAACCATGGCCGTAGCCTCGACGCACTCGTGCAAGACGATCTGCAACGTCCGGTAACCCTTGGTACCCCCTTGGCCACATT	PTIATVPVRIAIQEKATLAGLLDQVQEQSVDM
TGGCTTGGTGGACGCCGGTGACGTTGGTGGGGATCGGCAACGGTACTTCCTGCTAACGCTTCATCATGCGCTCTATGACGGATGGTCTCT	IPYEQVGLQRIRRLSADTERACQFQTLLVVQP
GTCGCTGCTGCTGGACGAGGTCAGCAAGGCCTACCACGGGACCGCGAGCGACGGCCTTGTCTCCTTCAAGACAATGATCAAGTATGTG	APEPSATDGPSALFHAEDDTLSQAALSSFNSY

ACAGAGCTGGGTGCCGAGGCGGACTCCTACTGGCAAGGCAGCCTGGATGGTCTGGTGGCCGAGCCATTCCCTGCCCTGCCCTCTCCCAT GTACCAGCCACGCGCGCAAGACATCCTGGAGCACAACGTATTAGGGCTACGGTGGTTGCAAAACCACCACATCACACCGGCAACCACTC TTCGCGCGGCCTGGGCCATTCTCACAACCCACTACACCCAATCTGCGCGATGTCCTTTTTGGATCGACCGTGACTGGACGGCAGGCTCCCA TTCACCGCGTGGGACTGGTCGAAGGGCCGACAATTGCAACTGTGCCGGTCCGCATTGCCATCCAGGAAAAGGCTACCCTGGCAGGCCT ACTCGACCAGGTCCAAGAGCAGTCTGTCGATATGATTCCCTACGAACAGGTCGGGTTGCAGCGAATCCGGAGGCTCAGCGCCGACACC GAGCGAGCTTGTCAGTTCCAGACGCTCCTGGTGGTGCAGCCAGCCCCGGAACCGAGCGCCACAGATGGACCCTCTGCACTGTTCCATG CAGAAGATGACACTCTCAGCCAGGCGGCTCTCAGCAGCTTCAATTCATACGCTCTCTTGCTGCAATGCCAGCTGACGGCCACGGGGGTG TCCATGCAGATGAGCTACGACTCGCATGTCATGGCACAACCGCAGGTGCAACGGCTGGCCCGGCAGTTCGAGCATCTAGTACGACTCCT TTGCGATGAGTCTCAGCACTCATCCTCTGTTGCTCACATAGATGCGGTCTGCGAGGATGATCTGCGAAGGATCTGGGCGCTGAACTCCCC GCCCCCGGCCAGAGTGGACGCCTGCATGCACGACTTGATCACCGAGCAGGCCCAGCGGCGGCCAGTCTCACAGGCCGTCGCTGCATG GGATGGAGAGCTCACGTATCGCGAGCTGGACGAGCTCTCCACCCAGTTGGCATATGGCCTCGTCAACTTGGGGGTCGGCCCCCATGCG GTGGTCGCTCTGTGCTTTGAGAAATCAATGTGGATGCCCGTGGCAATGCTTGGAGTCATGAAAGCCGGCGGTGCATCGGTGGCCATGGA TATCACGCAGCCAGAGGACCGGCTTCGCACGGTAGTGCAGCAGGTACAGCCTCCTCTGGTCCTGAGCTCCCTGGAGGCAGAGGACCTG GCACGGCGTCTGAGCGATAGGCCGGTGCACGTTGTCTCTCAAGACAGACTGCAGACGACGTCGCTGGGCAGCGGCCAGGGCGGCCAA TTGCCCCCAGTTCAGCCGACAGACAGGCTGTATATTGCCTTCACCTCAGGTAGTACGGGGGTCCCGAAAGGCGCGGTCATGTCCCACCA GAACTTCACCAGTGCCGTGCACCACCAAACCGCGCTCGAGTTTACTGCGTCGGCCAGGGTGTTTGACTTTTCGTCCTACGCGTTCGATGC TTGCTGGCTGAACTTTCTCCATACGATGGCGGCGGGTGCCTGTCTCTGCATCCCCTCCAAGAGGAGCGCAAGAGCGACATCACTGGCT GCATGCGCCGCCTGGCCGTGACTTATGCGAACCTCACGCCATCCACCGCACGTCTGATCGATCCGACGTCCGTCCCCAGCCTCCAGACCC TCGTTCTGGTCGGAGAGCCGGTGGCACAGCAGGACATCACTCAGTGGAAAGCCCACGTCCAGCTGAAGAACGGTTATGGCCCTGCGG AATGCAGCGCCATCTCCACCACGTTCGATCTCGGGCAAAGTGACCACGACCCGGCAACCATCGGCGCCGGCAGAGGAATGGTGACCTG GGTGGTTGAGCCGACCGAAAGCCGACATTTGTCGCCGTACGGGGCTGTGGGCGAGCTGTGGGTGGAAGGTCCTCTGGTTGGATTAGG GTATCTCGGCCGTCCGGATCTCAGTGCTGCAAGCTTCGTCGACAACCCCCCATGGCTGCTGCGCGGGGGACCCCAGGGGTTCCCAGGTC GACATGGCCGGCTTTACCGCACCGGTGACCTGGTGCGGTATAATCTGGACGGCACCCTGGTCTGTATTGGCCGCAAAGATGCCCAGGTC AAGATCCGCGGACAGCGCGTGGAGCTGGCCGAGGTCGAGCATCATCTGCACCAGGCCTTACCTTCGGCCGCCGTGGACGTCTCTGTGG CAGTCGAGGTCATCACCCTGCAGGGCAGTGCCAATCCACTGCTAGTCGCCTTTGTGGCGATGGGGGAGGCGGCCCTGGGCCCGCGGG AGACTGTCCGAGCAAAGCTGGCTCTTTACAGCCAGGGGGCCAGGGAGCGCATGGCAGACCAGCTGCCCGTCTACATGGTGCCCAGTCT GCTTCTTCCGGCGGTTGAAATTCCCACGACGGCCACGGGCAAAAGAGATCGACGGCGGCTGCGTGAGATGTGGGCCTCCAAGTCCCTG GAGGAACTGGCCGAGCTGCAGCCGACCAAGGGCAACCACCAAGCACCGACGACAGACGTCGAACGGCGGATTCTGCAACTGTGGGC CGAGTGCTTGAATATCAGCGCATCGAAGATCAGCATTCACGATAGCTTCTTCGCCCTTGGCGGGGACTCAATCTCCGCCATGCAGCTCTC GGCAAAGGGCCGCTCCATCGACCTCCAGATGACTGTAGGGGACATTTTCAAGTACAAGACAATCGCTCGACTGGCTCTCAGCATCTCCC CAGCAGTGGAATCGGCCGTGTTACATGCCCCAGAGGGCCAGGGTGCCTCCTTTGCCCTGTCTCCTATCCAGCAGATGTTCGCTGACATGC AGCAGGGGGTTAGCAACCATTTCAACCAAAGCTTTTTCGTGCAGGTACGTCGACCGGTCACCCTGCCTCAGATCCAGGCCGCTGTGGAT GCCCTGGTCGCCCATCATGGCATGTTGCGCGCGCGTTTCAAGTGCAGCAGGGAGAATATCTGGAGCCAGTGGATTCTGCCCCCGGGGA CCACAGGAAGCTATCGCGTTTGCCAGCATGAGGTTGCGGGTCTTCAGGCAGCCTCGGCGGTGATCAATCACAGCCAGGAGTCGCTAGA CATCCAGAACGGTCGGCTCATGGCGGTCGATCTGATCAATGCAGACGAGGGCCAATACCTTTTCTTGGTGGTCCACCACATGGTCGTCGA CCTGGTGTCTTGGAGAATCATCCTGGCTGATCTGGAAGAGCACTTGACCACCGCATCCCTCTCCGGGTTCACCTCGATGTCCTTCCAGAC CTGGTGCCAGTTGCAGGCTGACCACCACGCCGAGAGCCCCTTCGAGCTGGAGGCTGTCCTGCCAAACGGGGCTCCGCCTCCGCTGCTG CCACAGCTAGACTACTGGGGTCAGGTCCGCAGCTTAAACACATTCGATAACATGATCAAGGATGGCGTGGTTCTCGGCAGGCAGGACAC AGAGACCTTGCTAGGGCCTGCGAATGCGGCATTTGACACACAAATGGTGGAGCTCCTCCATGCGGCCATCCTACATTCCTTTGCCAATGT CTTCCACGACCGGGCACCTCCGACGGTATTCAGCGAAGGCCATGGTCGGGAGCCCTGGAGGTCTGCAATCGATATTTCACGCACGGTCG GGTGGTTTACCACGATGTTCCCTGTGGTCGCCACAGCCAAGAAGGGAGATAGTATTGCCAGCATTGTGCGCCATGTCAAGGACCGTCGA CGCCAGATACCCGATAATGGCCGGCCATACTTTGCAAGCCGCTTCCTCACTCCGGCTGGCAAGCGGGCGTTCCAGGTCAATGGCCCTGTC	ALLLQCQLTATGVSMQMSYDSHVMAQPQV QRLARQFEHLVRLLCDESQHSSSVAHIDAVCE DDLRRIWALNSPPPARVDACMHDLITEQAQ RRPVSQAVAAWDGELTYRELDELSTQLAYGL VNLGVGPHAVVALCFEKSMWMPVAMLGV MKAGGASVAMDITQPEDRLRTVVQQVQPP LVLSSLEAEDLARRLSDRPVHVVSQDRLQTTS LGSGQGGQLPPVQPTDRLYIAFTSGSTGVPK GAVMSHQNFTSAVHHQTALEFTASARVFDF SSYAFDACWLNFLHTMAAGACLCIPSEEERK SDITGCMRRLAVTYANLTPSTARLIDPTSVPSL QTLVLVGEPVAQQDITQWKAHVQLKNGYGP AECSAISTTFDLGQSDHDPATIGAGRGMVT WVVEPTESRHLSPYGAVGELWVEGPLVGLGY LGRPDLSAASFVDNPPWLLRGGPQGFPGRH GRLYRTGDLVRYNLDGTLVCIGRKDAQVKIRG QRVELAEVEHHLHQALPSAAVDVSVAVEVIT LQGSANPLLVAFVAMGEAALGPRETVRAKLA LYSQGARERMADQLPVYMVPSLLLPAVEIPT TATGKRDRRRLREMWASKSLEELAELQPTKG NHQAPTTDVERRILQLWAECLNISASKISIHD SFFALGGDSISAMQLSAKGRSIDLQMTVGDIF KYKTIARLALSISPAVESAVLHAPEGQGASFAL SPIQQMFADMQQGVSNHFNQSFFVQVRRP VTLPQIQAAVDALVAHHGMLRARFKCSRENI WSQWILPPGTTGSYRVCQHEVAGLQAASAV INHSQESLDIQNGRLMAVDLINADEGQYLFL VVHHMVVDLVSWRIILADLEEHLTTASLSGFT SMSFQTWCQLQADHHAESPFELEAVLPNGA PPPLLPQLDYWGQVRSLNTFDNMIKDGVVL GRQDTETLLGPANAAFDTQMVELLHAAILHS FANVFHDRAPPTVFSEGHGREPWRSAIDISR TVGWFTTMFPVVATAKKGDSIASIVRHVKDR RRQIPDNGRPYFASRFLTPAGKRAFQVNGPV EVIFNYLGLYQQLERSDALFHMREMPDGVD DMADISGSLFRFALVDISASVTDGCLHVDFM YNRHMQHQASIRAWIKECRQSLHAAAQELP LIQPSYTLCSFPLLRMTDPALAILQQRLTELDL AYGQVEDIYPCSPLQDGILMSQIKNPDLYRTR IRWMAQSAQGSTAVDTNRLKHAWQQVVD RHPALRTIFVDSISGRGLKDQVVVRNLRADV HIVQSADEASIEDMSPTKGKTSSVLTLSTTNS

| GAGGTGATTTTCAACTACCTCGGGCTGTACCAGCAACTCGAGCGGTCGGACGCCCTCTTCCACATGCGCGAGATGCCGGACGGGGTGG ATGACATGGCTGATATCTCGGGGAGCCTGTTCCGATTTGCTCTGGTGGATATCTCGGCATCGGTGACGGATGGCTGTTTGCATGTTGACTT CATGTACAATCGGCACATGCAACACCAGGCCTCCATCCGCGCGTGGATCAAGGAATGCAGGCAGTCCCTCCACGCCGCAGCGCAGGAG CTTCCTCTGATACAGCCAAGTTATACCCTCTGCAGCTTCCCGCTGCTGCGCATGACAGACCCGGCATTGGCAATCCTGCAGCAGAGGCTG ACGGAGCTGGACCTCGCATACGGGCAGGTCGAAGATATCTACCCCTGCTCGCCGCTCCAGGATGGAATCCTCATGAGCCAGATCAAGAA CCCAGACCTCTACAGGACACGCATCCGGTGGATGGCACAGTCTGCACAGGGATCAACAGCAGTTGATACCAACCGGCTCAAGCACGCG TGGCAGCAGGTGGTAGACCGCCATCCAGCCCTGCGCACCATCTTCGTCGACAGCATCTCGGGCAGGGGACTGAAGGATCAAGTGGTGG TGAGGAATCTCCCGGGCAGACGTCCACATCGTCCAGTCCGCGGACGAAGCAAGTATCGAGGACATGTCCCCAACAAAAGGCAAAACCAG CTCAGTGCTCACTCTGTCGACGACGAACTCGGGCGTCCTGTGCGAGCTATCGATCAGCCATGCGCTCATCGACGCCTTTACCTTGGGAAT CCTCAAGCAGGAGCTGTGTGCCGCATATACTGGCCTCCTTTCCTCTTCCCTGGCACCCCTGTATAGCGACTACATCCACTTCATCCAGTCCC TGCCCGCTGGGTCAGCCGCGGCATACTGGCAGGAGCATCTCCAGGAGGTCAAGCCCTGTCTATTTCCATCCTTGGGCGGTCTAAATACG GAAGGCCGGCGGTCGCAAGCTCACATCCCTATTACCTTCGAGCGAGAGCTACACCTGGCATTGCGCATCTTTTGCATGGAGCATGGACT GACGGTGTCTAATATCTTCCATGTCGCTTGGGCCCTGGTCCTGCGGGCTTATACTGGTTTGGATACTGTCTGCTTTGGCTATCTCACATCAG GCCGAGATATTCCTCTGCAAGGGGCTGACGGAACCGTTGGTCCATTTATCAATATGCTTGCCAGCCGCGTGGACCTGGGCAGTAAGGAC TCGCTGATGACCCTGGTACAGAGGGACCAGGAGCAGTATCTCAACAGTTTGGAGTTTCAGCATTACCCGCTGGCCAAGATCTTCCACTT GATTGATACGCCCGAGAAGGGGCTTTTCAACACCGCCATGTCAGTCCAAGCTAGTGACTCTGGTCCCAAGGACTGCCAATCGGCTATATC GCTTGTAGATGAAGGAGGAGATGATCCCACCGAGGTAAGAAAGATAAGAAGACTTTTTCCTTTGTGTGACTGCGCTAATGCGAGACTCA GTATGATATCATGATAAACATTGGCGTCGGAGACGAGGACACCGGATGCAACTTTACCTTTAACGAATCGGTGATATCTGACCGCTATGCA AAGAGTGCCATCGACCTGTTCTTGCACGCCGTCTCACATATTGTTCAGCACGCGGACCAGACGGCCCAGGAAGCCAATTTCATCAGCAA GCAAGACCTGCAATCGATCTGGCAGTGGAATGCCGCCGTAGCAACGCCTCTGGACTGGTGTGTTCATGAACTTATCATAGAGCAGGCAG AGAAACAACCAGCGGCGGCTGCCATCTGCGCGTGGGATGGTAATCTCACGTATAAGCAACTCAACGATCTGTCCACGCAGCTGGCATGC CACATCCGACAACTGGGTGTTGGGCCAGGGGTTAATGTCCCGTTGCTCTTTGAGAAGTCGCGGTGGATGTCGGTTGCCAGTCTGGCGGT CATGAAGGCTGGTGGAACCATGGTGGGCTTGGATCCTGGTCAGCCTGCAGGGAGACTACGAAGTATCATCGATCAAGTCCAGCCTTGTC TCATTTTGACTTCGGCCGGAAATAGCAACAGCGCGGCAGCTTTTGCATCCTGCCATGTTGTCCGGGTGGATGACGCCAGTTTGGCCCAG CTGGCCACGCCGTGCAATGCTCTGTTACCCCCGGTTGACCCTGCCAGCAGCCTATACCTGGTATTCACCTCTGGGAGTACAGGCGTGCCA AAGGGTGTGGCCATCAGCCATTCGAACCTCAGCACCGCGATTACTCACCAAAAGCGCATCTTGAAACTTTCTGTCGCGTCGAGGGTACTT GAATTCGCTTCATATGCATTCGATGTCTCCTGGGGTACAATCCTTCACACCCTTGCGGCTGGTGGCTGCGTCTGCGTGCCTGAAGAGTCG AACGCCGCGGAGATATCAGTGCCGCAATGCGTCGGATGGAGGTAAACTACGCGCATCTTACTCCATCTGTTGCGCGTCTTCTGAACCCT TCCAATGTGCCGCTCCTCCAAACCCTCGTCTTGAGTGGAGAAGCCGTATCGCGAGCGGATATGGAGCAGTGGAGCCGGCACGTCCATCT GATCAACGCGTACGGCCCTGCTGAGGCCGCCGTATGGGTGATATTCGCACACCTCGACTCAGCATTGTCCATGCCCTCCATCGGAAAGGG GGGTGGCTGCACCACGTGGATTGTTGACCCTAGTCGACCCGACCAATTAGCCCCAGTGGGCTGCACGGGTGAGCTCTGGCTGGAAGGT CCACTAGTGGGACGTGGCTATCTTCACGACCCCGAACGAACAGCAGCCGCGTTCATCGAGAACCCGCGATGGTTGCTCCAAGGAGCAG GAGGGGCCCATGGCCCTGGCCGACAGGGACGGCTTTATCGGACTGGAGACTTGGCCCGGTATACACCCGACGGTTCGATTGTTTATATT GGGAGAAAGGATAACCAGATCAAGATCCACGGTCAAAGGGTGGAGTTGGAAGAGGTAGAGAAATATATTGAGCAAGCCATGCTAAACA GCGCCGCAGCACCAGCAGTCCCTGTGGTAGCAGCGGTCGTCACCCCTCAAGGAAGCAAGAAGGCAATTCTGGCAGCTTATCTGGCTCT GGGTGAGCCGGCCACGGGCTCTGTGGAAATTGTGCGCAAATCTCTCAGCAGGTACACTGGGATCATCAACCCGGCCTTGGAAGAGAGC CTGCCGACCTATATGAGGCCGAGCATCTACATCCCCGTGGCGGAGATCCCCACGACTACCAATGGAAAGGCTGACCGCAGCAAACTCGC AACCATGGCATCCAGTCGCACTCTGGCTGAATGGGCTGGCCTTCAGACCTCTGAGGGCAAATGGCGCCCTGTATCGTCTCCGGGGGAGC TGGGGCTGCAGAGACTGTTTGCTGAAGTGCTGAATATGGACCAGAGCCTAGTAGGCATGGACGACAGCTTCTTCTCGCTCGGCGGTGAT TCCATTACCGCGATGCAGCTGTCGGCCAAGTCCCAATCCAGCCTTCTCTATATCACGGTGGGCGATATATTCAAGCACAAGACCGTCGCAC AACTGGCAAGCAATGCAAGGCAGACAGCGAGCACCTCCGTGCAGCTCCCGGAAGTCCCCAACAGCTTGTTCGAGCTGTCCCCGATCCA GCAGCTATTCTTTGCCTCGCAGGACAAGGGCAAGAACCTGTTTAACCAGTCCTTCCTGGTCCGCGTTTCCCGCTCCCTGAATCCCAACGA | GVLCELSISHALIDAFTLGILKQELCAAYTGLLS SSLAPLYSDYIHFIQSLPAGSAAAYWQEHLQE VKPCLFPSLGGLNTEGRRSQAHIPITFERELHL ALRIFCMEHGLTVSNIFHVAWALVLRAYTGLD TVCFGYLTSGRDIPLQGADGTVGPFINMLAS RVDLGSKDSLMTLVQRDQEQYLNSLEFQHYP LAKIFHLIDTPEKGLFNTAMSVQASDSGPKDC QSAISLVDEGGDDPTEYDIMINIGVGDEDTG CNFTFNESVISDRYAKSAIDLFLHAVSHIVQHA DQTAQEANFISKQDLQSIWQWNAAVATPLD WCVHELIIEQAEKQPAAAAICAWDGNLTYKQ LNDLSTQLACHIRQLGVGPGVNVPLLFEKSR WMSVASLAVMKAGGTMVGLDPGQPAGRL RSIIDQVQPCLILTSAGNSNSAAAFASCHVVR VDDASLAQLATPCNALLPPVDPASSLYLVFTS GSTGVPKGVAISHSNLSTAITHQKRILKLSVAS RVLEFASYAFDVSWGTILHTLAAGGCVCVPEE SERRGDISAAMRRMEVNYAHLTPSVARLLNP SNVPLLQTLVLSGEAVSRADMEQWSRHVHLI NAYGPAEAAVWVIFAHLDSALSMPSIGKGGG CTTWIVDPSRPDQLAPVGCTGELWLEGPLV GRGYLHDPERTAAAFIENPRWLLQGAGGAH GPGRQGRLYRTGDLARYTPDGSIVYIGRKDN QIKIHGQRVELEEVEKYIEQAMLNSAAAPAV PVVAAVVTPQGSKKAILAAYLALGEPATGSVEI VRKSLSRYTGIINPALEESLPTYMRPSIYIPVAEI PTTTNGKADRSKLATMASSRTLAEWAGLQT SEGKWRPVSSPGELGLQRLFAEVLNMDQSL VGMDDSFFSLGGDSITAMQLSAKSQSSLLYIT VGDIFKHKTVAQLASNARQTASTSVQLPEVP NSLFELSPIQQLFFASQDKGKNLFNQSFLVRV SRSLNPNELQKAIGVLAARHSMLRARFVQSA DGVWQQKIVNDSAGCYTFRSHHITTLQDME PLLHSSQELLDIVQGPILAVELIDSSHDGQYLF MTAHHLVVDLVSWRILLGDLEEFIRSGTITGF PPFSFQSWSQLQANYARDHLPPKIALPFKVS PPRHEYWGLVPGHDANTLSDSGRGSFTMN KRLTDILMGTANSAFDTQPVEILHAALLYAFA QTFQDREAPPLFTEGHGREAWDSGIDLSRTV GWFTTIFPVAASITQNHSLPEVVRRVKDTRR QTPRNGWSYFTSRYLNTDGRQAFQIKGPVEI IFNYMGLYQQLERPDSLFQQCDIAVTAPPAA |

GCTCCAGAAGGCGATTGGAGTTTTGGCAGCACGCCATTCCATGCTCCGGGCTCGGTTCGTGCAAAGCGCGGACGGCGTCTGGCAGCAG AAGATTGTAAACGATTCAGCTGGCTGCTATACATTCCGCAGCCACCACATCACCACGCTGCAAGTATGGAGCCCCTCCTCCATAGCAGCC AGGAGTTGCTGGATATTGTCCAGGGTCCCATCCTGGCCGTGGAACTGATTGATTCGAGCCACGATGGGCAGTATCTCTTCATGACAGCCC ATCATCTCGTGGTGGACCTTGTCTCATGGAGAATTCTGCTGGGCGATCTGGAGGAGTTCATCCGCTCGGGCACAATCACCGGATTCCCTC CATTCTCATTCCAATCATGGAGTCAACTGCAGGCGAACTATGCGCGAGACCATTTGCCTCCAAAGATCGCGCTGCCTTTTAAGGTCAGTCC GCCCCGGCATGAGTACTGGGGACTGGTCCCTGGGCACGATGCAAACACCCTGAGCGATTCCGGTCGAGGCAGCTTCACGATGAACAAG CGCCTGACCGACATTCTCATGGGCACGGCCAACTCGGCCTTTGATACGCAGCCGGTTGAGATCCTCCACGCAGCCCTGCTGTATGCGTTT GCACAGACATTCCAGGACCGCGAAGCACCGCCTCTCTTCACCGAGGGGCATGGTCGAGAAGCCTGGGACTCGGGCATTGACCTGTCCA GAACTGTTGGCTGGTTTACCACCATCTTCCCTGTGGCAGCTTCGATTACGCAAAACCACAGTCTTCCAGAGGTGGTGCGCCGTGTGAAG GATACACGCCGGCAGACACCCACGCAACGGGTGGTCCTATTTCACCTCGCGGTACCTGAATACTGATGGACGGCAGGCCTTCCAGATCAA GGGCCCTGTGGAGATTATTTTTAATTACATGGGCTTATATCAGCAGCTGGAGCGGCCCGATTCCCTGTTCCAGCAGTGTGATATTGCGGTC ACAGCGCCCCCTGCTGCTGCGGCGACTCTCTCGCGGTTTGCCCTGATCGACGTCGCAGCATCTGTTGTGCAGGGTCAGCTGAAGTTCGA GTTCCTATACAACAGGGAGATGAAAGGACAAGACAGGATACTTGAATGGATCAGCAAGACAGAATCCTCACTCAAAGCGGCAGCGGAA GAACTTCTGTTGCAGAGCCCAAGCTATACCATCTGCGACTTTCCCCTGCTCTCTCTCACCGACCAGGGTCTCGACGAGCTTCTCAATAGG GTCCTCCCGGCTGTGGGTCTTTCCTACGGCCAGATCGAAGACATCTACCCCTGTGCGCCGATTCAGGAGGGCATCATCATGAGCCAGGCC AAGAGCCCTGAGCTCTATTGGACTCGAGTGCGGTGGACGGTGCAGTCAACAGGCACGTCGCCAGTCGATCTCGATCGGTTGAGGCGGG CCTGGCAGATGGTCGTGAACCGTCACTCGATTTTACGCACGATATTTATTGACGGTATCGGATCCGGCCAGGTGAAGGACCAGGTGGTCC TCAAGGACTTTCCGGTGGACGTCGAGGTCCTCCATGCCGAGCTGCATCAGCTCGCAGAGCCAGTCACTGGGCGTCAATGGCACACCGAT CTGTCGAGCAGAAGAGACACCCCGCAGCATTCCCTGGTGCTGACGCAAACAGCGTCTGGAGTCGTGTTCTGCGACTTGGAGCTCAACC ATGCGATGGTCGATGCGTATTCTCTAGCCCTTTTGAGGCAGGAGATCTGTGCGGCATATACTGGCTCACTGCCTGCCACACCCGCGCCGG CCTACCAAGCGTATATTGAGCACCTGCAGGGGCTGTCCCTTGTTGAAGGACAACGCTTCTGGCAGACATATCTTGACAACGCTCAGCCCT GTCACTTTCCGGCCCTCGGCCAGCCGGATGTCACAGACGGCTCGAACGCCCGCCGGGCGCTATCCATCTCGTTGGACGCGGCCACTCAT CAAGCCCTGCGTGTCTTCTGCCAGCAGCACGCAGTTACACCCTCGAACGTGTTCTACCTGGCTTGGGGGCTTCTTCTTCGCGCCTACACT GGCTTAGACACAGTGTGTTTCGGCTATCTTACGTCCGGGCGCGATGTCCCTGTCCCAGGGGTCGATAGGATTGTTGGTCCGCTCATTAAC ATGCTTGTCTGTGTTCTGGAATTCAGGACTGGGGCATCGGTGCGATCGGCCATGCAGAAGGTCCAGGAAGACTATCTCGCCGCCCTGCA GTATCAATCTACGCCTCTCAGCAAGATCCTGCAGCTTTCTGGGACGTCCGGTCGGGGCCTATTCAATACCGGCATATCGGTCCAGGGCGG TGCTACTTCCGGCGAACCGGACGAGCATGATATCATAGTGACGGATCAGACAGGGCTGGATTCGCCAGAGGTATGTGTTTTGTTCTTCTT GTCGTGGTCACGATTCCCCTTTGCTCTCCATAGCTGACCCGGTCCCACAGTACGACATTGCCGTTGCTATCTCCCACGATGAGGAGGAGA CGGAGATTGCATTCGACTACATGGCCGTCACCTTGTCCGACCAAGGGGGTCAAAGCCTTGCAGGTCTTTTTGTTCAGGTTGTCGCTGAT GTCATACGTGCTCCGGATCAAACGGTCCAGGCTGTCAATGTGATCAGCAAGGAAGACCTCCAGAGTCTGTGGACCTGGAATCGAACAGT CCCGGAAACCGTACAGGCGTGTGTTCATGATATGATTGGACAAAAAGCCTGTGATAGCCCTGATTCCCCGGCAATCCATGCATGGGATGG CGCGCTTACATATCAAGAGTTGGACCTTCTGTCCACCCGACTGGCCCGGTATCTTATAGATCTAGGGGTCCGGCAGAATACAGCCATCCCT CTATGTTTCGAGAAGTCCATGTGGATGCCGGTAGCTGCACTGGCAGTGATGAAGACAGGCGCTGCATGCGTGGCCATGGATATGACCCA GCCAGAGAAGCGCCTGCAGGCGATTGTGGACCTGGTGCAGCCGGATCTTCTCGTGACATCCGTCGCAAATCGCAAGACCGTCCAGCAA CTGGCAGACACGAAGGCCGTGTTGGCGATTGACCAGGCATTCTTTTCCCAAATCGCACCTCCCACGTCGTCCTGCCTGCCGACAGTCTCC CCATCAAGTCCTCTCTATACCGTCTTTACATCTGGCAGTACCGGCACACCCAAGGGAGCAGTCATCAGCCATGCCAACTTTGCCAGTGCCA TTGTGCATCAAACGGACCTGCTCGCACTGGACCCCGATTCGCGCGTCTTTGACTTTGTCTCGTATGCCTTTGATGTTTCCTGGTCGAACCT ACTCCACACGCTGGCCGCTGGGGCATGTTTGTGCATCCCCTCCGAAGCCATGCGCCGGGACAACCCTGTCGAGGCCATGCAGGCGATG AAAGTGACCCATGCCCAATTTACCCCGTCGATGGCCCGTACAGTGGACCCGGATCAATGCAAGACGCTCAAGGCCTTGATCCTGGGCGG CGAGGCCATGTCCCAGCACGACATCGCTGTCTGGGCACCTTGGGTTGACCTTCGTGTTGCGTATGGTCCCGCCGAGTGTACGGTTGCCG CCGTCATGGACACAGTCCCTGAGCAGTCCGGACATCGGGACTTCGGCAAGATAGGGCGGGGGCTTGGTTCGAACACCTGGATTGTCAG CGTATCGGATGGAGAGCGCCTGGCCCCGGTGGGCACTGTGGGAGAGCTGTGGCTGGAAGGGCCCCTGGTGGGCCTGGGCTATCTTGA	AATLSRFALIDVAASVVQGQLKFEFLYNREMK GQDRILEWISKTESSLKAAAEELLLQSPSYTIC DFPLLSLTDQGLDELLNRVLPAVGLSYGQIEDI YPCAPIQEGIIMSQAKSPELYWTRVRWTVQS TGTSPVDLDRLRRAWQMVVNRHSILRTIFID GIGSGQVKDQVVLKDFPVDVEVLHAELHQL AEPVTGRQWHTDLSSRRDTPQHSLVLTQTAS GVVFCDLELNHAMVDAYSLALLRQEICAAYT GSLPATPAPAYQAYIEHLQGLSLVEGQRFWQT YLDNAQPCHFPALGQPDVTDGSNARRALSIS LDAATHQALRVFCQQHAVTPSNVFYLAWGL LLRAYTGLDTVCFGYLTSGRDVPVPGVDRIVG PLINMLVCVLEFRTGASVRSAMQKVQEDYLA ALQYQSTPLSKILQLSGTSGRGLFNTGISVQG GATSGEPDEHDIIVTDQTGLDSPEYDIAVAISH DEEETEIAFDYMAVTLSDQGGQSLAGLFVQV VADVIRAPDQTVQAVNVISKEDLQSLWTWN RTVPETVQACVHDMIGQKACDSPDSPAIHA WDGALTYQELDLLSTRLARYLIDLGVRQNTAI PLCFEKSMWMPVAALAVMKTGAACVAMD MTQPEKRLQAIVDLVQPDLLVTSVANRKTVQ QLADTKAVLAIDQAFFSQIAPPTSSCLPTVSPS SPLYTVFTSGSTGTPKGAVISHANFASAIVHQT DLLALDPDSRVFDFVSYAFDVSWSNLLHTLA AGACLCIPSEAMRRDNPVEAMQAMKVTHA QFTPSMARTVDPDQCKTLKALILGGEAMSQ HDIAVWAPWVDLRVAYGPAECTVAAVMDT VPEQSGHRDFGKIGRGLGSNTWIVSVSDGE RLAPVGTVGELWLEGPLVGLGYLDQDEKTAA SFIDNPAWLLRGGPGVPGRQGRLYRTGDLVR YCFDGSILFLGRKDNQVKVRGQRVELQEVEH HLQAHLSGTTGVVADVVKPQGSSNAMLVAY LAVGETIHSPLDSVHAALRPLTQGLTDSLSARI PQYMVPSMYLPVAEIPVTTTGKIDRKQLHEL GSSLTMEQLAQIQPPQEGEQQAPQTDLEKLL QQLWAELSAKLRSAGFRIAVPDIFKLKTISRLA PSAASVQGRMKTTWETREDEPFELAPVQQ MFVNVVRRKCNHFNQSFFLRITRQVRAEDV RRALDLIVTQHPMLRARFASDQGGHWTQHI KPYTPGCYRYCEHVESSLAEASPLLDASQVAL DLESGPVFSGDLLQIRDSGDQYLYLVAHHLAV DLVSWRIILADMEDHLTAKASSSFTPMPFQA

TCAGGACGAAAAGACTGCCGCCAGTTTTATAGACAACCCTGCATGGCTCCTCCGAGGAGGTCCTGGTGTTCCTGGTCGTCAAGGCCGGT TGTACCGAACTGGGGATCTTGTCCGCTACTGTTTTGATGGCAGTATTCTCTTCCTAGGACGCAAGGATAACCAGGTCAAAGTCCGCGGGC AGCGTGTTGAATTGCAAGAAGTGGAGCATCATCTCCAGGCTCATCTGTCGGGAACAACCGGAGTCGTGGCCGACGTTGTCAAGCCCCA GGGCAGCAGCAATGCCATGCTCGTCGCCTATCTCGCGGTTGGAGAGACTATCCATTCCCCTCTAGACAGCGTCCATGCAGCATTGCGGCC CCTCACCCAAGGCCTCACGGACTCCCTCTCTGCCCGAATCCCGCAGTATATGGTCCCTAGCATGTACCTCCCCGTTGCAGAGATTCCAGTC ACTACGACGGGAAAGATCGATCGAAAGCAGCTGCATGAATTAGGATCATCGCTTACAATGGAACAGTTAGCTCAAATCCAACCCCCCCAG GAAGGCGAGCAGCAGGCTCCCCAGACAGACCTCGAGAAGCTCCTCCAGCAGCTCTGGGCAGAGGTCCTCAATATCAGTCAAGAACTCA TTGGGATGCACGATAGTTTCTTTTCCCTCGGGGCGACTCAATCACAGCGATGCAGCTATCGGCCAAGCTGCGCTCAGCAGGCTTCCGTAT CGCCGTTCCTGATATCTTCAAGCTGAAGACAATCTCCCGACTGGCTCCAAGTGCAGCATCTGTCAGGGGCGGATGAAAACCACCTGGG AGACCCGAGAAGACGAGCCATTCGAACTTGCTCCCGTTCAGCAGATGTTCGTCAACGTGGTGCGCCGCAAGTGCAATCATTTTAACCAG AGTTTCTTCCTGCGCATCACCCGTCAGGTGCGGGCTGAGGATGTGCGGCGAGCCCTGGACTTGATTGTGACTCAACATCCTATGCTGAG GGCACGGTTTGCCTCGGATCAGGGCGGACATTGGACGCAGCATATCAAGCCCTACACCCCCGGTTGCTACCGGTACTGCGAACACGTCG AGTCCTCTCTGGCCGAGGCCTCGCCGCTGTTGGATGCCAGCCAAGTCGCCCTTGATCTGGAATCTGGACCGGTCTTCTCTGGGGATCTGC TCCAGATTCGCGACAGCGGTGATCAATATCTGTACCTGGTGGCGCATCACTTGGCGGTCGATCTGGTATCCTGGAGAATCATTCTCGCGG ACATGGAGGACCACCTGACAGCAAAAGCCTCTTCGTCTTTCACGCCGATGCCCTTCCAGGCATGGTGTCAACTTCAGGCCGACCATGCTC GAGACTGCCTCACTCCCGAAACGGCGTTGCCCGTTGAGATTCCTCCTCCGCAGCAGGGTTACTGGGGAATTGATCCTGAACGCAACACC TTTGGCAACGCCATCCACCGCAGCTTCACAGTGAGCAAGAACGTCACAGATATCCTCTTGGGGCCTGCCAATAAGTCATTTGATACCCAG CCGGTCGAGATTCTACAGGGTGCTTTGATATACTCCTTCACTCAAGTGTTTCGGGATAGGGCGCCTCCTACAGTGTTCAGCGAAGGGCAT GGGCGCGAGCCATGGGATGCCGCGATCGACCTATCAAGAACAGTTGGCTGGTTCACTACTATGCTTCCGACCGTAACCTCGATGGGACC GGATGATACTCTACCTGATATCATCCGCCATACGAAAGATAACCGACGTCTAGTGCCAGGAAACGGATGGCCATACTTTGCATCCCGCTAC TTGAACCCTGCTGGAAAGAAGGCATTTGGGGCCTACGGTCTGCCCGAGATCACATTCAACTACTTGGGACTCTACCAGCAGTTTGAAAA AGACAGTTCCCTGCTTCAGCCAACCGCCTTGCCCTCAGGCAGCATGTCGGATGTTGACGAGCGGATGCAGCGCTTTGCCCTGATTGAGG TTTCTGCATCGGTGTCCCAGGGCTGTCTGGAGTTTAGCTTCTTGTTCAGTCGTCATACAAAGCACTTGCGTAACCTTGAGGACTGGGTGG CCCACTGTCAGCATGCTCTACGAACGGCTTCGGAAGTCTTGATGCAGCGCCAGCCAAGCTATACACGATGTGATTTCCCACTTATGCGCCT GACAGAGCCAGCCTTGCAGACTCTCGTTGGATATAGTCTTCCACAGCTCGGAGTCTCGTATGGTCAAGTTGAGGATATCTACCCTTGCTC GCCGATTCAGCACGGTATCTTGCTGAGCCAAGCGAAGAACCCTGGCGTGTATTGGACGCGCATTCGATGGAAGGCCCGGTCCTCCGAGT CTGCATTGCCTCCCAATCCTGAACGACTAGCCCGTGCCTGGATGAGGGTCGTTGCACGACATCCCGTCCTTCGGACCCGGTTCATCGATG GCCTTTCTCCCAACAGCGTGCAAGATCAGCTTGTCTTGAAAGCCAGCGAGCCCGAGATACATGTGATATCTGGTCCGGAGGCGACAGAT CCCATCGCGGCTCTTGACTCTTACTGGGAGCAAAGACAGCGGAAAGGACACAAGCTTCACTCTTTCGTCCTCAGCCAGGCACCCTCCGG CGAGGTCTTCTGTGACCTCGAAATGAACCATGCAATCACGGATGCCACTTCGACTGCTCTACTCAAGCGAGACCTTCAAGCCGCATACAC TGAAACCCTCCCGACTATGCCGGGTCCTTCGTACAGCGATTACATCAGGCACATTCAAGCAATACCCGCGGAGGTGGGGATAGACTACTG GCGACGGTATCTCGACGGCGTTCATCCCTGCATTTTCCCAACACTGGCAGCGAATGGCCAGGACGTGGGGGAGAATCCAAGAGGCTCC ATACATCATATGCTCGATCAAGACACGAATACCAGTCTTCAAGTTTTTCTCAAGACGAACGAGCTGACCGCCTCCAACGTCTTTTACCTCG CATGGGCCCTCATTCTCCGGTGCTTTGTTGGGTCGGAGACAGTGTGCTTTGGCTATCTAGTATCCGGTCGTGATGTCCCTATTGACAATGC AGACAGGATAATCGGGCCGTTTATTAACATGCTGGTCAGCCGAGTTAGGCTAGGAGAGGGGGTCACTCTGATGGATATCATGAAGCAAA GCCAGGCGGATTATCTGGACAGTCTCAAGCACCAGCATCGCTCTGTGGCGCAGGCCGCTCACTCTTCGGACGGGCCAGCCGAGCCTCTA TTTAATAGCGTCATCTCGGTGCAAGGTATGGATCTGAAGAAGAGCAGCAAGAGTGAAGAACGTGGTCTCTGTCTTGAGGAGCAAGACG GTAACGATCCAACAGAGGTACGTATTCCCATCCCTTACACATGCATTTGTGGACAGCTTTCCCCTAACCTGGTGATTTCCAGTATGATATCA TGATGAATATTGGTCTGGGGGACCAGGAAACAGCAATGACGTTCAGCTATTACAAGTCCCTGTTATCGGAGCAACAGGCAAGCGGCATA GTGGAGTCCCTGCTTCAAGCGGTCCGGGAAATCATCCACACTCCCTTCAAGAAGCCCTCCCAGGTGAATCTGTCAACGGGCCATGACCA GCAGACTATCTGGAGCTGGAACGCCTCCGTCCCGCCCACAATCAACGTTCCAGTGCACGGTCTGATTGCCAACAAGGTGAAGGAGCAG CCCGATGCCGACGCAATCTGCGCATGGGATGGCGAGTTGTCGTACGGGCAGCTAGATAGCTTATCAACATGCCTGGCCCATCATTTGGTG	WCQLQADHARDCLTPETALPVEIPPPQQGY WGIDPERNTFGNAIHRSFTVSKNVTDILLGPA NKSFDTQPVEILQGALIYSFTQVFRDRAPPTV FSEGHGREPWDAAIDLSRTVGWFTTMLPTV TSMGPDDTLPDIIRHTKDNRRLVPGNGWPY FASRYLNPAGKKAFGAYGLPEITFNYLGLYQQ FEKDSSLLQPTALPSGSMSDVDERMQRFALI EVSASVSQGCLEFSFLFSRHTKHLRNLEDWV AHCQHALRTASEVLMQRQPSYTRCDFPLMR LTEPALQTLVGYSLPQLGVSYGQVEDIYPCSPI QHGILLSQAKNPGVYWTRIRWKARSSESALP PNPERLARAWMRVVARHPVLRTRFIDGLSP NSVQDQLVLKASEPEIHVISGPEATDPIAALD SYWEQRQRKGHKLHSFVLSQAPSGEVFCDL EMNHAITDATSTALLKRDLQAAYTETLPTMP GPSYSDYIRHIQAIPAEVGIDYWRRYLDGVHP CIFPTLAANGQDVGENPRGSIHHMLDQDTN TSLQVFLKTNELTASNVFYLAWALILRCFVGSE TVCFGYLVSGRDVPIDNADRIIGPFINMLVSR VRLGEGVTLMDIMKQSQADYLDSLKHQHRS VAQAAHSSDGPAEPLFNSVISVQGMDLKKSS KSEERGLCLEEQDGNDPTEYDIMMNIGLGD QETAMTFSYYKSLLSEQQASGIVESLLQAVREI IHTPFKKPSQVNLSTGHDQQTIWSWNASVP PTINVPVHGLIANKVKEQPDADAICAWDGEL SYGQLDSLSTCLAHHLVASGVCSDTVVPLCFE KSMWMPVAMLAVMKAGGASVSMDASLPE ERLRTIAKQTEPAVILCSEATSEKAGRLGAPRVI TVGQRLLSGLTIPSRGTTLPKVDPSDRLYVTFT SGSTGIPKGVMITHANMSSALVQQQEALSF GPHVRVFDFVSYAWDVAWSNLLRTLVAGGC LCVPSDSQRREGIEKAMTQLRINCVTLTPSVA RLLNPAAVPHLNTLALIGEPLSQADIMRWAP HTNEIINTYGPSECPACVTVNRIPLDLLYEPNL GAASACNTWIVDPDNTDQLVPVGGIGELWL EGPLIGLGYLGLPERTAESFVENPRWLRSGYA GQLRGGRLYRTGDLVRYTDDGALVYIGRKD SQVKIRGQRVELGEIEYQIREGIARISSATGDP TVVAGVITPRGSGSKMLVVYLGLGQMATGP VDRIREALAGYTSGLDVYLSENLPHYMIPNAY IPVSEIPMTVTGKTDRGRLARTGASYTLTELA EMQPSRGRQRPPTTAMERRLQQLWAAVLG

	GCTTCTGGAGTCTGTTCGGACACGGTGGTTCCTCTCTGCTTTGAAAAATCCATGTGGATGCCGGTGGCCATGCTCGCTGTGATGAAAGCC GGTGGTGCTTCAGTCTCCATGGACGCGAGCCTGCCCAGAAGAACGATTGCGCACAATCGCAAAGCAAACGGAGCCCGCGGTGATTCTCT GCTCGGAAGCAACCAGCGAGAAGGCGGGTCGACTTGGTGCCCCCCGAGTGATTACTGTCGGCAAAGGTTGCTCTCAGGGCTGACGA TCCCCAGTCGAGGCACGACGCTCCCCAAGGTCGATCCATCTGACCGATTATACGTGACTTTCACATCCGGCAGCACGGGGATTCCCAAGG GAGTCATGATCACGCATGCAAACATGAGCAGCGCCCTGGTCCAGCAGCAGGAGGCCCTCTCATTCGGGCCTCACGTCCGCGTCTTTGAT TTTGTGTCCTACGCGTGGGACGTGGCTTGGTCCAACCTGCTCCGTACTTTGGTTGCTGGTGGCTGTCTCTGTGTCCCATCTGACTCCCAGC GCCGGGAAGGGATTGAAAAGGCCATGACACAATTAAGAATCAACTGTGTTACTCTCACACCCAGTGTCGCTCGTCTGCTCAACCCTGCT GCGGTGCCGCACCTGAATACCCTGGCTCTAATTGGGGAGCCCCTGTCGCAGGCCGATATCATGCGGTGGGCTCCTCACACCAACGAGAT CATCAACACCTACGGGCCATCCGAGTGTCCTGCATGCGTCACGGTGAATCGCATCCCGCTGGACCTCTTGTATGAGCCCAATCTCGGGGC GGCTTCTGCCTGCAACACTTGGATTGTGGATCCCGATAACACCGATCAGCTGGTTCCAGTTGGTGGTATCGGAGAGCTCTGGCTGGAAG GGCCCCTCATTGGGCTTGGATACCTGGGCCTCCCCGAACGAACGGCCGAGAGCTTTGTCGAGAATCCCCGCTGGCTGCGCTCCGGGTAT GCTGGACAGCTGGGGCGTGGCGGCCGGCTGTATCGCACCGGCGACCTGGTCCGCTACACCGATGATGGCGCGCTTGTTTATATTGGACG CAAGGACTCGCAGGTCAAGATCCGCGGCCAGCGCGTGGAGCTGGGAGAAATCGAGTACCAGATCCGCGAGGGCATCGCGCGCATCTC GTCCGCCACCGGCGATCCCACCGTCGTGGCTGGGGTTATTACTCCGCGCGGAAGCGGCAGCAAGATGCTGGTCGTCTATCTTGGCCTAG GGCAGATGGCCACAGGCCCTGTTGACCGCATTCGAGAGGCTCTGGCGGGCTATACAAGCGGGCTGGATGTGTATCTCTCGGAGAACCT CCCCCACTACATGATCCCCAATGCATACATCCCCGTCTCTGAAATTCCAATGACAGTGACCGGCAAGACGGACCGCGGACGCCTGGCCCG TACCGGGGCATCATACACCCTGACCGAACTGGCCGAGATGCAACCCTCGCGCGGCAGGCAGCGGCCCCCTACCACCGCTATGGAGCGG CGGCTCCAACAGCTTTGGGCGGCAGTCCTGGGGCTCGATGTCAGTGCCATCGCTGCCGATGACAGTTTCTTCCGCATTGGCGGGGATTC GATTGCGGCGATCCGCCTGGGCCAACGTGCGAGCGAGGATGGTCTGGCCGTGGCCGTGGCCGACATCTTCCGCAAGCCCCGTCTCTGC GATCTGGCTCTCCTCGCTCGTGAGGACCAGGTCACCTACCTTGATCCTTCTCCCTTCTCCCTTCTCCCTGCCGGTTCTACCTCGGACTACGT GACAGCTGGTCTCAGTCCGCTCCTGGACTGCCCACAGCACCACATCGCCGACGTCTATCCCACCACGGACCTCCAGAGCATCTACGCATC CTTTGCAGTGAATGCACATCGGGGGGGAGATCGAGTACATCTACATGGACCTTCCTCAGGGGGTGGACATCGCACGCGTCCGCCGCAGCT GTCTGGATATGTGGCACCATCTCGACATCCTTCGCACCGTTTTCATTCTTGATCAAGGTCGTCTATTGCAAGTCGTGCTCAACAACGTGGA GCCCGAGATTACCATGCAACACACCGAAGGGGATCTGGCAGCAGCATGCGAAGAAGCCTACAGCTGTGATCTACATGAGTCGCTGAGC CTGGGCCGGTCGTTCACGCGGTTCTTCATCACCTCCACCGCAGACGGTCGAGTGCGATTCACCATCCGGCTCTCTCACGCTCAGTACGAC GGCTACAGTCTGCCTGTCATCTTCTCCGTCTTTGCGGCCTTCTATGAGGGCCAGACACCACCCCCAGCCCCGAAGTTTTCGGGCTATATCC GCCACATGCAAAAGCAGCAAGAGGCCGCGTATCCCTACTGGCGCACGCTCTTGCAAGGCTCGTCCATCACCCGGACCAGACACCTCTCC ATAGCCGATGGCCACTGTCTGCCAAACCAGCCCCGTGGCCGGCTGGTTCAATCCAAGACCGCTGTGCCTGCCCCGTCAGATCAACCGGG ATTCACGTCGGCAACGGTCTTTACCACCCTCTGTGCTCGCATGCTGGCACAGATGACAGGCGTCAGCGACGTGGTCTTTGGGACCATTGT CTCCGGCCGTTCCTCCTTACCAATCGCCCTCCAAAACGTCGCCGGGCCATGTGTCAACACCATCCCCGTCCGCGTGCAGATCGAACCCGA CCAGCCACTAGAGGAGCAGCTGGCCAGCGTCCACGACCAACACATCCAGGGCATGTCTTTTGAGACGAGCCAGTTCAGCGACATCGCC GCCCACAGCACCACTTGGCCCGAGGACTCGCGCGCTCCCGACCTGGTTGTTCAGTTCCAGAACCTCGACAACCTGGAGCATGACAAGG GTACGGAAATCCAGGGGATAGGCAGTACACTTGCACCGTGGGAGCAGCGGAACCGGTCCGTGGACAGCGATTTCCTCTTTATTCTGGC GAAGCCGGTGGAAGAAGCCTGGGAGATATCGGTGTCGGCGAGCTCTAAGGTATACACCCAGGATACTCTGGATGCCATGCTCAAGGCCT TGTGTTTGCATGTTGAGAATGTTTAA	LDVSAIAADDSFFRIGGDSIAAIRLGQRASED GLAVAVADIFRKPRLCDLALLAREDQVTYLDP SPFSLLPAGSTSDYVTAGLSPLLDCPQHHIAD VYPTTDLQSIYASFAVNAHRGEIEYIYMDLPQ GVDIARVRRSCLDMWHHLDILRTVFILDQGR LLQVVLNNVEPEITMQHTEGDLAAACEEAYS CDLHESLSLGRSFTRFFITSTADGRVRFTIRLSH AQYDGYSLPVIFSVFAAFYEGQTPPPAPKFSG YIRHMQKQQEAAYPYWRTLLQGSSITRTRHL SIADGHCLPNQPRGRLVQSKTAVPAPSDQPG FTSATVFTTLCARMLAQMTGVSDVVFGTIVS GRSSLPIALQNVAGPCVNTIPVRVQIEPDQPL EEQLASVHDQHIQGMSFETSQFSDIAAHSTT WPEDSRAPDLVVQFQNLDNLEHDKGTEIQG IGSTLAPWEQRNRSVDSDFLFILAKPVEEAW EISVSASSKVYTQDTLDAMLKALCLHVENV
ungB''	ATGTACCCAGCCAAGTGGGTGTTCCTGATCGGGGTGGCGATATTCGAGATCGGATCTCTGGTCTGCGGAGTGTCTCCCAGCTCGGGTGC CCTGATTGCGGGCCGCAGCATCTCAGGACTGGGCGCTGGCAGCATCAACGCCGGCGCTGTCGTGATCGTGACCAACACCATTCCTGTGC GAAAGCGGCCGATCTACCTGGGCTGTCTGGGGTGTGTCCATGGGCTAGTCAGCGTGTCGGGGCCATTGTGAGCTCATCTCCGTGCAACC ATAATCCACATAGATCGGGGGCTAATGCCGTGTGACGAACAGGATTGGGGGTTTGCTGACGGACCATGCCTCGTGGCGATGGTGTTTCT ATCTCAATCTGCCCATCGGAGCAATCACCATCCTGGGCATCATTTTCTTTCTGTCGGCTAACCAACCCCCGTCGGGACATCTCAGCTGGAG GGAAAAACTTCAGTCCATGGATCTTCTGGGCTCGGCGTTCTTTATTCCTGGGATCGTCACGCTTCTGCTAGCCCTGGAATGGGGAGGGTC ACAGTATGCCTGGGACAATTGGAGGATCATCCTTCTCTTCATCCTGTCCGCCATCTTGCTGATCGTCTTTGCCGGCGTTCAGATTCGCGCC	MYPAKWVFLIGVAIFEIGSLVCGVSPSSGALIA GRSISGLGAGSINAGAVVIVTNTIPVRKRPIYL GCLGIGGLLTDHASWRWCFYLNLPIGAITILGI IFFLSANQPPSGHLSWREKLQSMDLLGSAFFI PGIVTLLLALEWGGSQYAWDNWRIILLFILSAI LLIVFAGVQIRAPQGKATLPPRLVSNRNILGLI GYIVGNSGGLFVFVYYLPIWLQAIKGFSASKS

	CCTCAGGGTAAAGCGACACTCCCCCCTCGCCTGGTTTCAAATCGGAATATCCTGGGTCTTATCGGCTATATTGTTGGTAACAGTGGGGGG TTGTTTGTCTTTGTGTACTATGTATGTTCTCGACCTGGATCCCCCCCCCCCCCCCCCTTTTCCCTAGCTGGAATCTCCGCAACATGGCTTAACG ACTTCGTCACCTTGACATAGCTGCCAATTTGGCTCCAAGCCATCAAGGGGTTCTCGGCCTCCAAGTCAGGTCTTTCAATCTTACCCACCCA GTTAGGGGTGGTGATTGCATCTCTAGCTGGCGGGGTCTTAGTCACTTTCGTCGGATACTACACGCCCTTTCTGATTATATCCTCCCTAATGG CCGTCGCTGGCGCCGGCATCCTGAGCTCCCTGCATCCGTCCTCCAGCCTCGCAAGCATCCTGGGGTACCAAGTGGTGCTGAGTCTGGGC ATCGGGCTTGGATCGCAGAACGCCATGGTCGTGCCGTCCGTGGTTTGCGCCCCGGACGATGTAGTCACGGCCATTGCGATGCTCTGCTT CCTGCAGATGCTGTCCAGCTCGGTCGCTCTGTCCATTGGACAGACAGTTTTCCACAACCGGCTGGTGGCCAATTTGCATCGCAGCGCCCC GTCCGTGGACCCCTCCCTCGTTGAAGAAGGGGCGACGCTGCTCCGCGATCGCGTTCCATCGGAGCTTTTGCCGTCTGTTCTTGGGGCGT ATAGCAAGGCTGTCTCGCAGACCTTTTACGTCGGGGGTGGCCATGTGTGCGCTGTCGCTTCTTGGGTCGGCCTCCATGCAGTGGAAGCGA GTCCCTGGCAAGAAAGATGCGGCAGAGGAGGAGAAGGAGGAAGAGTCGCGCGACAGTGATACCCCTGCACCACCTGCGACAGAAGA GAAGACGTGTAAGCAATAGAAGGGCGTGGGTGTATACCTTGCATCCCCCATGTGTGTTCTGA	GLSILPTQLGVVIASLAGGVLVTFVGYYTPFLII SSLMAVAGAGILSSLHPSSSLASILGYQVVLSL GIGLGSQNAMVVPSVVCAPDDVVTAIAMLC FLQMLSSSVALSIGQTVFHNRLVANLHRSAPS VDPSLVEEGATLLRDRVPSELLPSVLGAYSKAV SQTFYVGVAMCALSLLGSASMQWKRVPGK KDAAEEEKEEESRDSDTPAPPATEEKTCKQ
ungC''	ATGACAGTGACAGTACCGCAGGATCTCCGGCTGGGAGAGCCATATGGTGATCGTGCAAACAGTCTGTTGGTCCAAATCCCAACATGGGC GGACATGGTCGATTTTGGGCAGGGAAAGGCGCAGATGAACCACGGCTATCCACGGTCCATTGTGCACCCTGATATCCGTCTGGTAAGGC CCTTGGCTTTCTTTGATCTCGTTCAGCTGGGGCCACCCGGATTGGCCCTGATACTGACGATGATGATGTGTTTGTCCTTCAAGCTCAGTTC CGCAATTCTGGCCAAGGTCCGCGACGACAAAGAATGCACCGATGCTTCCCTTCTATTGTTCTCTGGTGCCCGGACGGCGCTTTCCTGCAA ACAGTATATCCTCCATCTCGCGCAGGCCACGGATCGGCCAACCCTCGCCGATTCGATCCGGGTGTACGTGGTGGACTTCAGTGGGTTCTT GTGTCGTGACCATCACGCTGCTCACTCGTCTGGATCAACCCTTTATGCCGTCCTCTACCCCAGTGCGGCTTGTCGGGATGCTCATGCGTTT TGGCAACGCGCGGGGGCCAGGGATATCATCAAGGTTGGCACAGCGATGCCTGCGGTCCAGTTCTCGACCTCGGATCCACCCATTCACTGC TCCTACCACCGCCACCGCCCCTCCCGACACCCATTCTGTGTACGAGAAACTCCGTTGTAGAATTGCTGGCCATGTGAGACACTGGTCGAG TGATCCTCGGATCACCAAGCAGGTCGCCCCCTCCGATGTCTTCTTATATGCTTCCGGCATGGCAGCCATCTACCACGTGCATCAGTCCATTC TGGCCTGGCGAACCGGGGAGTCCGTGAATGCCGGCCTCCTGTATGGGCCGACCCTCAGTATCCTGCAAGCGGAAGGTCAGGGGTTAAG GTCCTACAACCTAGGAACGGAGGCCGACTTGAATCATCTTGCTGCCCAGCTGGAGCTGGGATCCGGGGAAGCTCGCGCGGTGCAAGCA ATCTGGTGTGAATGTCCCAGTAACCTCACACTGCAGACGGTCAATTTGCAGCGGATACGTCGGCTGGCGGACCAACATGGCATTCCTGTA GTAGTGGACGACAGCATTGCCAGCTTCGCCAACTTGGATCTGTTGGGAGTGGCGGACATTATCGTCTCCTCGCTGTCCAAATACTTCAGC GGATATGCCGACGTAATGGCAGGAAGGCAAGTCAAGTCAAGTCAAGTCAAAGACCCAGGCGCCAACCTACAGACACGGTGACTGATAC TCTCCTCTGCCGGCATACAGCGTCATTCTGAATCCGAATTCTCCACACTACGCCGCCCTGCACAAGCAGATATCCGCCACATACGAGAACA ACCTCTTCGTCGAAGATGCGATCCGACTAGAATCCAACAGCCGGAACTTCCTCCCTCGCATGGATCGAGTCAACAAGACAACGCAACAC CTGGTCACCCAGCTTTTGCCTCTCGTCTCGGATCCCGCGAGCCCATTGACCCGCATTTTCCACCCGTCCGTGTGCGCATCCCGTCCGAACT ATGAGCGTCAGATGCGTGCTCCCTCGTCTGAGATGCCTCGCCCGGGGTATGGAGGCGTCTTCACGATGGAGTTCGCCGACATCGCAAGC GCGTCCGTCTTCTTTGACCACTTACACGTCTGCAAGGGCCTCTCTTTTGGCGCGGATGTCTGCATCGCGTCGCCGTATATGCAGATGACG GGGCAGGCCGGGAAGAAGCAGGCGTTGGTCAATGGCACGAATGATACTATCATCCGGTTTGCCGTGGGGTTGGAGGAGCCTGATGAG GTCCTGCACCGCATCAACACCGCGCTAGACGCTGCGACGCTGGTGTATAGGGCTAAGGGCCATGTGGCCCCGTAG	MTVTVPQDLRLGEPYGDRANSLLVQIPTWA DMVDFGQGKAQMNHGYPRSIVHPDIRLVR PLAFFDLVQLGPPGLALILTMMMCLSFKLSSA ILAKVRDDKECTDASLLLFSGARTALSCKQYIL HLAQATDRPTLADSIRVYVVDFSGFLCRDHH AAHSSGSTLYAVLYPSAACRDAHAFWQRAGP GISSRLAQRCLRSSSRPRIHPFTAPTTATAPPD THSVYEKLRCRIAGHVRHWSSDPRITKQ VAPSDVFLYASGMAAIYHVHQSILAWRTGES VNAGLLYGPTLSILQAEGQGLRSYNLGTEADL NHLAAQLELGSGEARAVQAIWCECPSNLTLQ TVNLQRIRRLADQHGIPVVVDDSIASFANLDL LGVADIIVSSLSKYFSGYADISATYENNLFVED AIRLESNSRNFLPRMDRVNKTTQHLVTQLLPL VSDPASPLTRIFHPSVCASRPNYERQMRAPSS EMPRPGYGGVFTMEFADIASASVFFDHLHV CKGLSFGADVCIASPYM QMTGQAGKKQALVNGTNDTIIRFAVGLEEP DEVLHRINTALDAATLVYRAKGHVAP
ungD''	ATGGCCATGCTGGTCGAGGACAATGACAAGTACCCCGGAGTGCAATGGACTACGCCCGTGAATGAGTTGATCCGCGAGGACTTCGTTCT GGACAACCACTGGACGACGGCAAACGTCACCATTGAGGATATCCTGTCCCATCGGACCGGAATGCCGGGCCATAACTTCTCGCTTGGAG CTGTGTATGCTGACAAGCAGGCCACTGTTCAAGATGTGGTGAGGAGCTTGCGCTTCCTCCCGTCTACCGCACCCCCACGCACGACCTACC AGTACAATAACGCCATGTATATCGTGGCGTCGCATCTTATCCAAACAGTCATGGGCGATGACCTCGGCTCTATCTTTCAAAAGCACATCTGG GACCCTCTCGGGATGAGCAGCACGTATTTCCGCCTGGATGATGCACTTGCCAGTCAAAAGCCCTTGGCAAAGGGCTATGCCTTCGCCGA GGGCAAGTATGAAGCGGTGGAGTGGAAGAACAGGCCGGAAATCTCCGGCGCCGGTGCCATTATCAGCACTGTGGAAGACTACGCGAA ATGGATCTACGCACTACTGAATCAGAGCGGGTTGCCTCTTTCCTCGGAGGGCTACGGAACACTCTGGACCGCGAGAGCACTCATTCCAA ATTCCGAGCCGTTTTTGGCCCCGATGGCGTATGCCCTTGGATGGGACCGTTACATCTACCAGGGAGTGGAGATCATCACTCACGATGGGG GGATAGAGGGATTCGGAGCCGAGATTGTGATGATCCCCGCGCTTAAATTTGGGGTCATCACCATGGCTAACTCGACCTATTCGTCCAACT ATGGGGGAACATGCCTGGCGTATGAGCTTATCGATTCGAAGCTGGGCATCGCTGCGGGGGACAGATTTGACTGGAAACAAAAGTGTGT	MAMLVEDNDKYPGVQWTTPVNELIREDFVL DNHWTTANVTIEDILSHRTGMPGHNFSLGA VYADKQATVQDVVRSLRFLPSTAPPRTTYQY NNAMYIVASHLIQTVMGDDLGSIFQKHIWD PLGMSSTYFRLDDALASQKPLAKGYAFAEGK YEAVEWKNRPEISGAGAIISTVEDYAKWIYAL LNQSGLPLSSEGYGTLWTARALIPNSEPFLAP MAYALGWDRYIYQGVEIITHDGGIEGFGAEIV MIPALKFGVITMANSTYSSNYGGTCLAYELID SKLGIAAGDRFDWKQKYVDIVDQMDAYNA

CTTGTCATTCCTCTTGCTCTCCAACAAACTGACTAAATCGGGAGCAGATATGTCGATATCGTCGACCAAATGGACGCTTACAATGCAGACG CGGTCCAAATCTTCTACCCCGATCTCCCGTCTCCTCCTCTACCGGGGCCGACTCTCGCTATCGAAGCATACTCCGGCACCTACTGGCATGAT GCCTACGGTCGGCTCGATCTCTCCATAGATGGCACCGGCACAAAGCTCCACGCGGACCGAACTAATTGTACCAATACCTGCTCTCTTACAT TCGAGAACGTCACGGGAAACTACTTTATTATTAGGCTGCTTGTAGTTGGAGCCGAGACCGTCCTTCCAGCTGAGTTTTCGGTTGACCCGG ACGGGAAGCCAAGGTCTGTCGGTATAGGGTGGGAGCCAACGATGGGGATAGAGAAGAAGATTTGGATGCGCAAGGTCGATGGTGATG ATACCGTTGGGCTGCATCGCGCCCTGCCGTACAAGCCATCCAGAACTCCCCAGCTGCCGGAGTTTTTGACTGGCCACCTTTTTGTCTAG	DAVQIFYPDLPSPPLPGPTLAIEAYSGTYWHD AYGRLDLSIDGTGTKLHADRTNCTNTCSLTFE NVTGNYFIIRLLVVGAETVLPAEFSVDPDGKP RSVGIGWEPTMGIEKKIWMRKVDGDDTVG LHRALPYKPSRTPQLPEFLTGHLFV

	UngA A1	UngA A2	UngA A3	UngA A4	UngA A5	UngA A6	UngA A7	UngA' A1	UngA' A2	UngA' A3	UngA' A4	UngA' A5	UngA' A6	UngA' A7	UngA'' A1	UngA'' A2	UngA'' A3	UngA'' A4	UngA'' A5	UngA'' A6	UngA'' A7
UngA A1		50.495%	47.146%	49.754%	54.455%	52.580%	53.606%	69.479%	47.794%	48.000%	50.000%	53.234%	51.870%	52.882%	79.259%	49.754%	44.444%	51.351%	52.723%	53.846%	53.580%
UngA A2	50.495%		52.228%	53.056%	47.420%	47.922%	49.880%	48.267%	58.231%	52.120%	53.695%	45.658%	45.771%	44.750%	50.000%	77.037%	52.840%	55.392%	46.552%	47.277%	49.140%
UngA A3	47.146%	52.228%		49.140%	47.277%	46.437%	46.154%	50.990%	50.739%	55.473%	49.261%	48.139%	45.771%	45.750%	48.395%	52.956%	74.938%	50.245%	45.926%	45.926%	47.912%
UngA A4	49.754%	53.056%	49.140%		49.010%	50.735%	47.255%	49.507%	49.633%	50.123%	64.532%	49.877%	50.743%	49.005%	49.877%	55.012%	49.140%	81.373%	48.157%	49.507%	47.677%
UngA A5	54.455%	47.420%	47.277%	49.010%		48.522%	48.441%	52.228%	46.305%	47.015%	48.020%	56.188%	48.507%	49.626%	52.970%	48.522%	43.704%	50.370%	75.802%	48.883%	50.493%
UngA A6	52.580%	47.922%	46.437%	50.735%	48.522%		48.931%	49.140%	46.455%	47.525%	51.843%	46.798%	61.139%	49.380%	50.614%	46.569%	46.192%	52.696%	49.877%	73.449%	49.389%
UngA A7	53.606%	49.880%	46.154%	47.255%	48.441%	48.931%		52.174%	48.086%	46.359%	48.798%	48.910%	48.786%	65.281%	51.202%	48.558%	46.747%	50.600%	50.602%	48.193%	77.831%
UngA' A1	69.479%	48.267%	50.990%	49.507%	52.228%	49.140%	52.174%		46.552%	50.126%	51.741%	54.135%	53.133%	50.126%	70.896%	48.515%	45.906%	51.980%	52.239%	50.746%	53.598%
UngA' A2	47.794%	58.231%	50.739%	49.633%	46.305%	46.455%	48.086%	46.552%		50.000%	49.140%	48.395%	44.665%	45.025%	48.030%	57.740%	51.478%	50.611%	45.679%	46.914%	47.420%
UngA' A3	48.000%	52.120%	55.473%	50.123%	47.015%	47.525%	46.359%	50.126%	50.000%		49.000%	48.485%	46.970%	45.431%	47.870%	55.250%	55.779%	51.122%	47.250%	46.883%	48.130%
UngA' A4	50.000%	53.695%	49.261%	64.532%	48.020%	51.843%	48.798%	51.741%	49.140%	49.000%		47.132%	52.500%	49.246%	50.000%	54.074%	47.772%	66.832%	49.257%	50.746%	49.136%
UngA' A5	53.234%	45.658%	48.139%	49.877%	56.188%	46.798%	48.910%	54.135%	48.395%	48.485%	47.132%		49.507%	49.136%	52.120%	46.020%	46.650%	51.117%	57.214%	49.000%	50.873%
UngA' A6	51.870%	45.771%	45.771%	50.743%	48.507%	61.139%	46.970%	53.133%	44.665%	46.970%	52.500%	49.507%		49.877%	50.627%	47.500%	45.636%	53.367%	48.371%	62.720%	50.503%
UngA' A7	52.882%	44.750%	45.750%	49.005%	49.626%	49.380%	65.281%	50.126%	45.025%	45.431%	49.246%	49.136%	49.877%		51.378%	47.000%	45.729%	51.500%	52.513%	50.882%	68.514%
UngA'' A1	79.259%	50.000%	48.395%	49.877%	52.970%	50.614%	51.202%	70.896%	48.030%	47.870%	50.000%	52.120%	50.627%	51.378%		48.889%	45.297%	51.111%	53.483%	52.854%	51.980%
UngA'' A2	49.754%	77.037%	52.956%	55.012%	48.522%	46.569%	48.558%	48.515%	57.740%	55.250%	54.074%	46.020%	47.500%	47.000%	48.889%		53.086%	57.389%	57.395%	47.382%	50.124%
UngA'' A3	44.444%	52.840%	74.938%	49.140%	43.704%	46.192%	46.747%	45.906%	51.478%	55.779%	47.772%	46.650%	45.636%	45.729%	45.297%	53.086%		49.507%	44.776%	45.522%	47.891%
UngA'' A4	51.351%	55.392%	50.245%	81.373%	50.370%	52.696%	50.600%	51.980%	50.611%	51.122%	66.832%	51.117%	53.367%	51.500%	51.111%	57.389%	49.507%		51.117%	52.120%	50.743%
UngA'' A5	52.723%	46.552%	45.926%	48.157%	75.802%	49.877%	50.602%	52.239%	45.679%	47.250%	49.257%	57.214%	48.371%	52.513%	53.483%	57.395%	44.776%	51.117%		51.000%	52.239%
UngA'' A6	53.846%	47.277%	45.926%	49.507%	48.883%	73.449%	50.746%	50.746%	46.914%	46.883%	50.746%	49.000%	62.720%	50.882%	52.854%	47.382%	45.522%	52.120%	51.000%		48.878%
UngA'' A7	53.580%	49.140%	47.912%	47.677%	50.493%	49.389%	77.831%	53.598%	47.420%	48.130%	49.136%	50.873%	50.503%	68.514%	51.980%	50.124%	47.891%	50.743%	52.239%	48.878%	

Figure S1: A domain sequence alignment comparing UngA, UngA', and UngA".

	UngA C1	UngA C2	UngA C3	UngA C4	UngA C5	UngA C6	UngA C7	UngA' C1	UngA' C2	UngA' C3	UngA' C4	UngA' C5	UngA' C6	UngA' C7	UngA'' C1	UngA'' C2	UngA'' C3	UngA'' C4	UngA'' C5	UngA'' C6	UngA'' C7
UngA C1		25.606%	49.091%	24.390%	28.014%	24.000%	25.172%	58.824%	20.557%	47.601%	25.347%	25.725%	22.662%	24.747%	74.074%	25.685%	49.638%	25.000%	26.897%	25.510%	23.875%
UngA C2	25.606%		24.232%	41.924%	41.812%	45.033%	19.388%	23.958%	49.826%	22.759%	43.151%	39.493%	43.369%	19.289%	23.183%	70.205%	25.597%	41.638%	46.048%	45.734%	22.680%
UngA C3	49.091%	24.232%		21.993%	25.263%	22.772%	25.256%	49.455%	20.962%	60.219%	22.680%	25.271%	23.132%	25.248%	48.727%	27.703%	71.739%	24.315%	25.939%	24.832%	25.000%
UngA C4	24.390%	41.924%	21.993%		44.170%	40.864%	19.932%	23.958%	45.139%	19.723%	54.167%	44.565%	42.652%	20.305%	24.042%	42.466%	25.086%	67.596%	43.643%	41.837%	20.000%
UngA C5	28.014%	41.812%	25.263%	44.170%		43.434%	19.723%	25.442%	43.945%	24.735%	46.831%	51.852%	43.750%	17.617%	26.950%	44.251%	27.368%	46.127%	70.139%	45.329%	21.107%
UngA C6	24.000%	45.033%	22.772%	40.864%	43.434%		20.266%	26.000%	46.488%	22.591%	43.854%	39.649%	50.347%	17.647%	20.667%	47.020%	24.422%	39.867%	44.333%	71.854%	20.598%
UngA C7	25.172%	19.388%	25.256%	19.932%	19.723%	20.266%		21.453%	20.690%	22.759%	20.678%	18.705%	19.573%	56.701%	24.138%	18.644%	24.232%	19.932%	22.337%	21.356%	70.070%
UngA' C1	58.824%	23.958%	49.455%	23.958%	25.442%	26.000%	21.453%		23.077%	49.815%	25.436%	22.022%	24.731%	21.212%	60.662%	25.086%	46.739%	23.875%	25.862%	25.939%	22.300%
UngA' C2	20.557%	49.826%	20.962%	45.139%	43.945%	46.488%	20.690%	23.077%		20.833%	45.675%	42.125%	44.928%	18.229%	20.209%	55.363%	24.742%	44.483%	43.836%	46.528%	21.799%
UngA' C3	47.601%	22.759%	60.219%	19.723%	24.735%	22.591%	22.759%	49.815%	20.833%		22.569%	24.727%	21.223%	23.116%	50.554%	23.891%	57.818%	20.690%	24.742%	24.407%	23.183%
UngA' C4	25.347%	43.151%	22.680%	54.167%	46.831%	43.854%	20.678%	25.436%	45.675%	22.569%		45.652%	43.165%	22.727%	22.917%	44.863%	24.055%	56.491%	45.890%	44.898%	20.408%
UngA' C5	25.725%	39.493%	25.271%	44.565%	51.852%	39.649%	18.705%	22.022%	42.125%	24.727%	45.652%		40.264%	16.461%	23.551%	41.516%	27.798%	48.913%	59.124%	41.727%	19.424%
UngA' C6	22.662%	43.369%	23.132%	42.652%	43.750%	50.347%	19.573%	24.731%	44.928%	21.223%	43.165%	40.264%		18.584%	20.504%	49.104%	23.843%	42.652%	44.765%	53.381%	19.929%
UngA' C7	24.747%	19.289%	25.248%	20.305%	17.617%	17.647%	56.701%	21.212%	18.229%	23.116%	22.727%	16.461%	18.584%		24.242%	17.347%	24.257%	21.212%	16.923%	23.350%	60.622%
UngA'' C1	74.074%	23.183%	48.727%	24.042%	26.950%	20.667%	24.138%	60.662%	20.209%	50.554%	22.917%	23.551%	20.504%	24.242%		23.288%	49.638%	24.306%	25.172%	23.129%	25.260%
UngA'' C2	25.685%	70.205%	27.703%	42.466%	44.251%	47.020%	18.644%	25.086%	55.363%	23.891%	44.863%	41.516%	49.104%	17.347%	23.288%		26.689%	44.027%	48.288%	47.959%	21.429%
UngA'' C3	49.638%	25.597%	71.739%	25.086%	27.368%	24.422%	24.232%	46.739%	24.742%	57.818%	24.055%	27.798%	23.843%	24.257%	49.638%	26.689%		26.370%	27.986%	25.839%	23.288%
UngA'' C4	25.000%	41.638%	24.315%	67.596%	46.127%	39.867%	19.932%	23.875%	44.483%	20.690%	56.491%	48.913%	42.652%	21.212%	24.306%	44.027%	26.370%		45.890%	41.356%	21.017%
UngA'' C5	26.897%	46.048%	25.939%	43.643%	70.139%	44.333%	22.337%	25.862%	43.836%	24.742%	45.890%	59.124%	44.765%	16.923%	25.172%	48.288%	27.986%	45.890%		45.051%	24.399%
UngA'' C6	25.510%	45.734%	24.832%	41.837%	45.329%	71.854%	21.356%	25.939%	46.528%	24.407%	44.898%	41.727%	53.381%	23.350%	23.129%	47.959%	25.839%	41.356%	45.051%		22.449%
UngA'' C7	23.875%	22.680%	25.000%	20.000%	21.107%	20.598%	70.070%	22.300%	21.799%	23.183%	20.408%	19.424%	19.929%	60.622%	25.260%	21.429%	23.288%	21.017%	24.399%	22.449%	

Figure S2: C domain sequence alignment comparing UngA, UngA', and UngA".

weblogo.berkeley.edu

Figure S3: A domain AMP binding motif identified in extracted A domains.

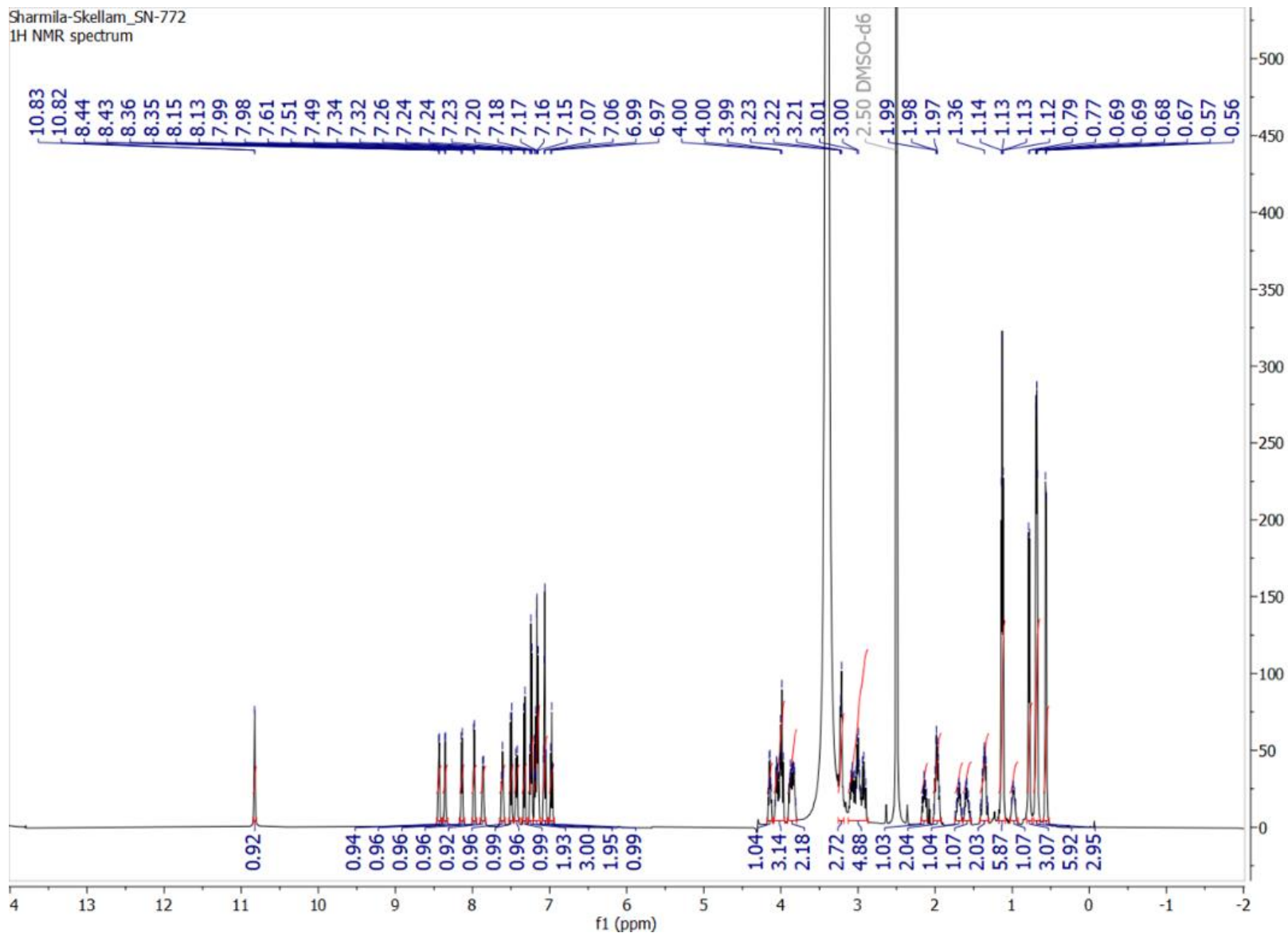**Figure S4:** C domain active site identified in extracted C domains.

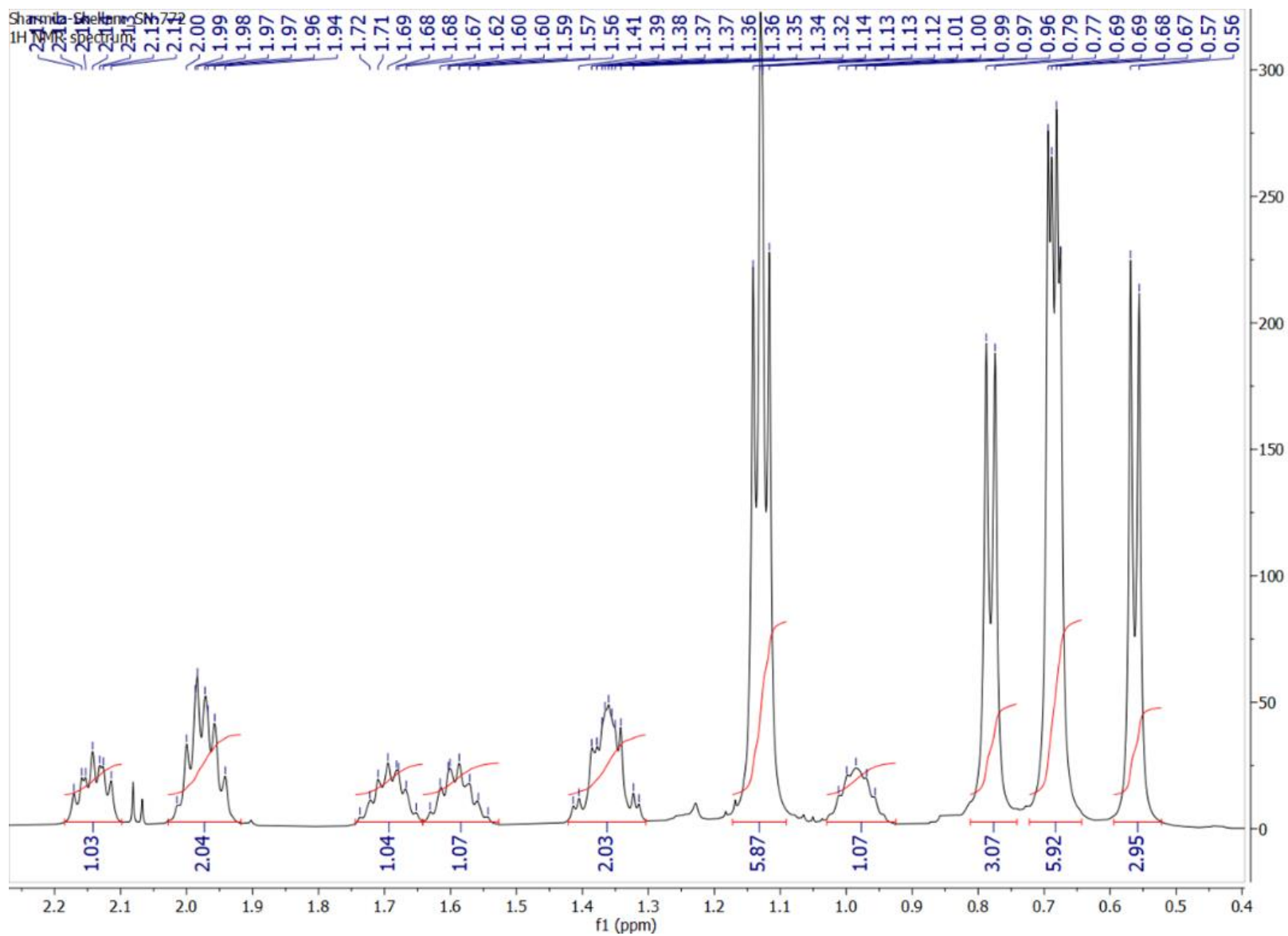**Figure S5:** ^{1}H NMR spectrum of **1** (500 MHz, DMSO-d_6).

Figure S6: Expansion of the ^{1}H NMR spectrum of **1** (500 MHz, DMSO-d_6).
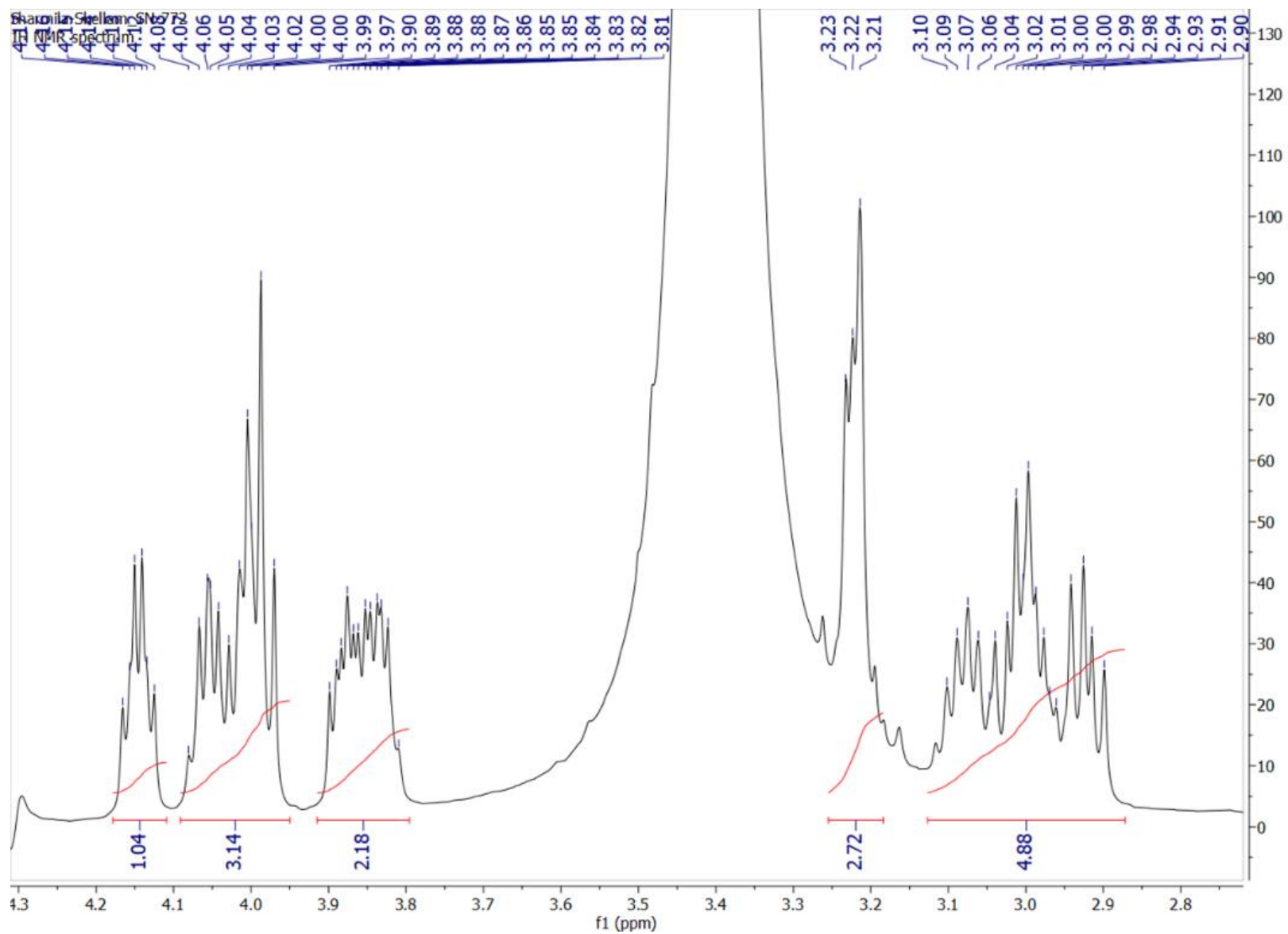
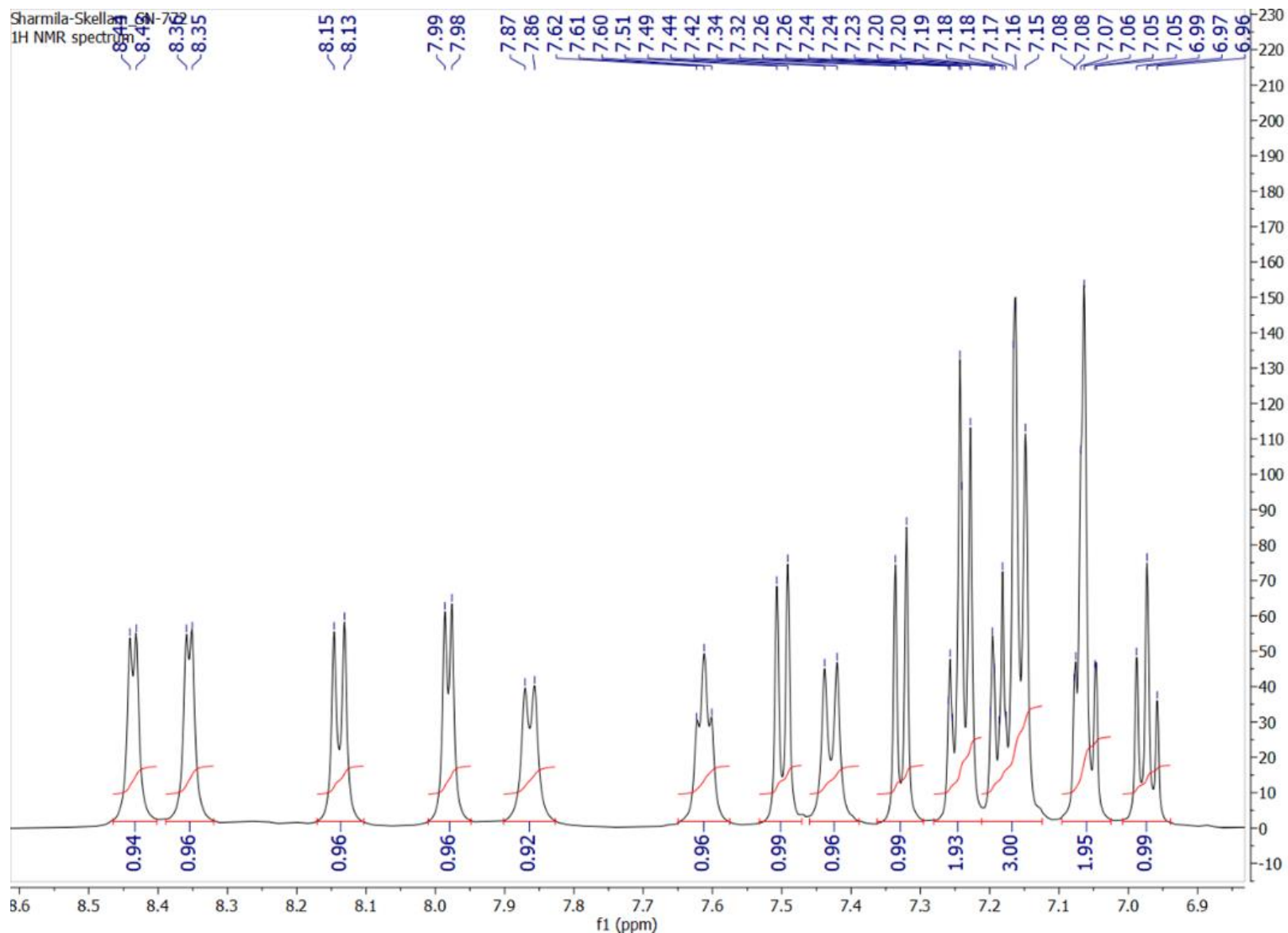**Figure S7:** Expansion of the ^{1}H NMR spectrum of **1** (500 MHz, DMSO-d_6).

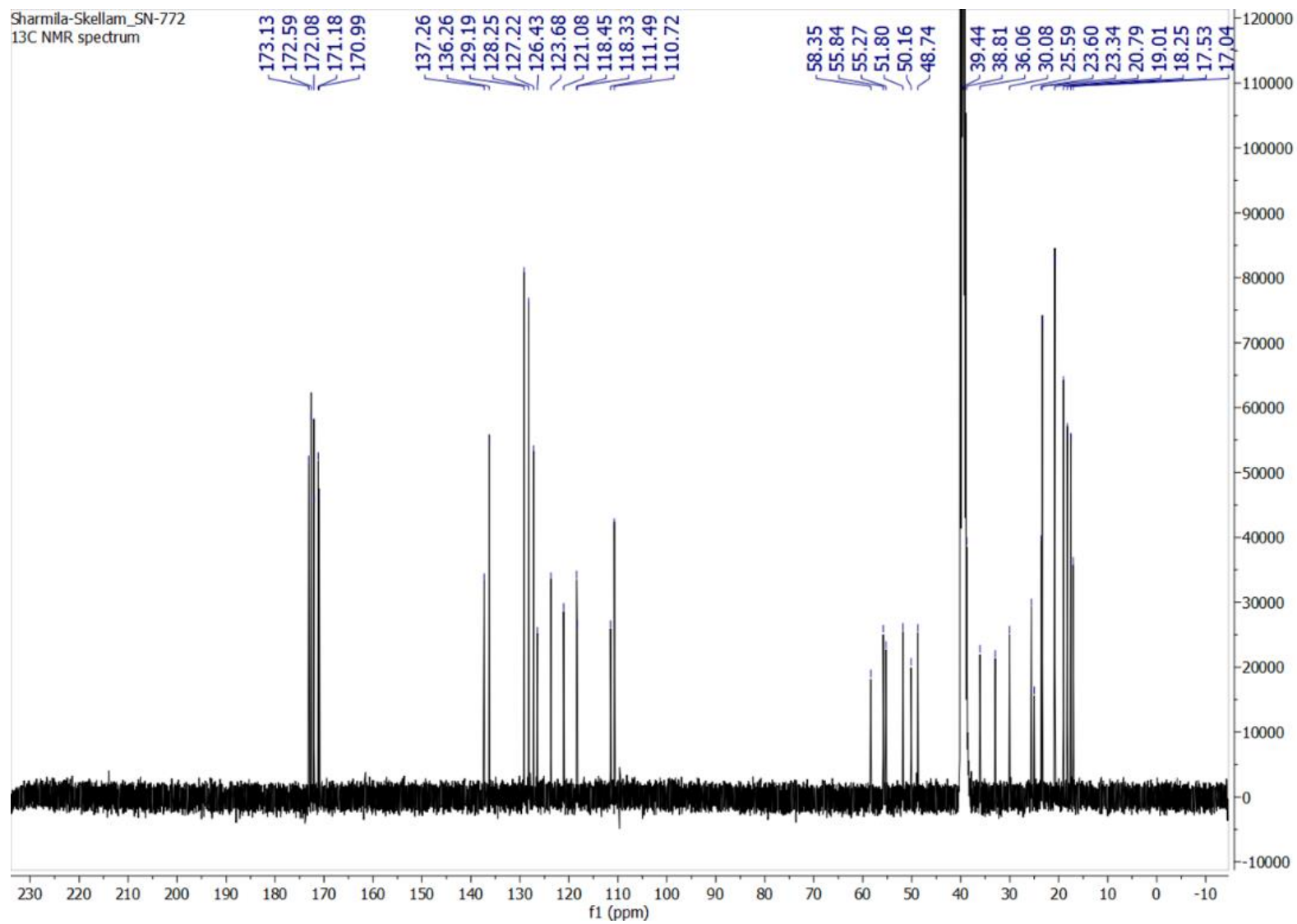**Figure S8:** Expansion of the ^{1}H NMR spectrum of **1** (500 MHz, DMSO-d_6).

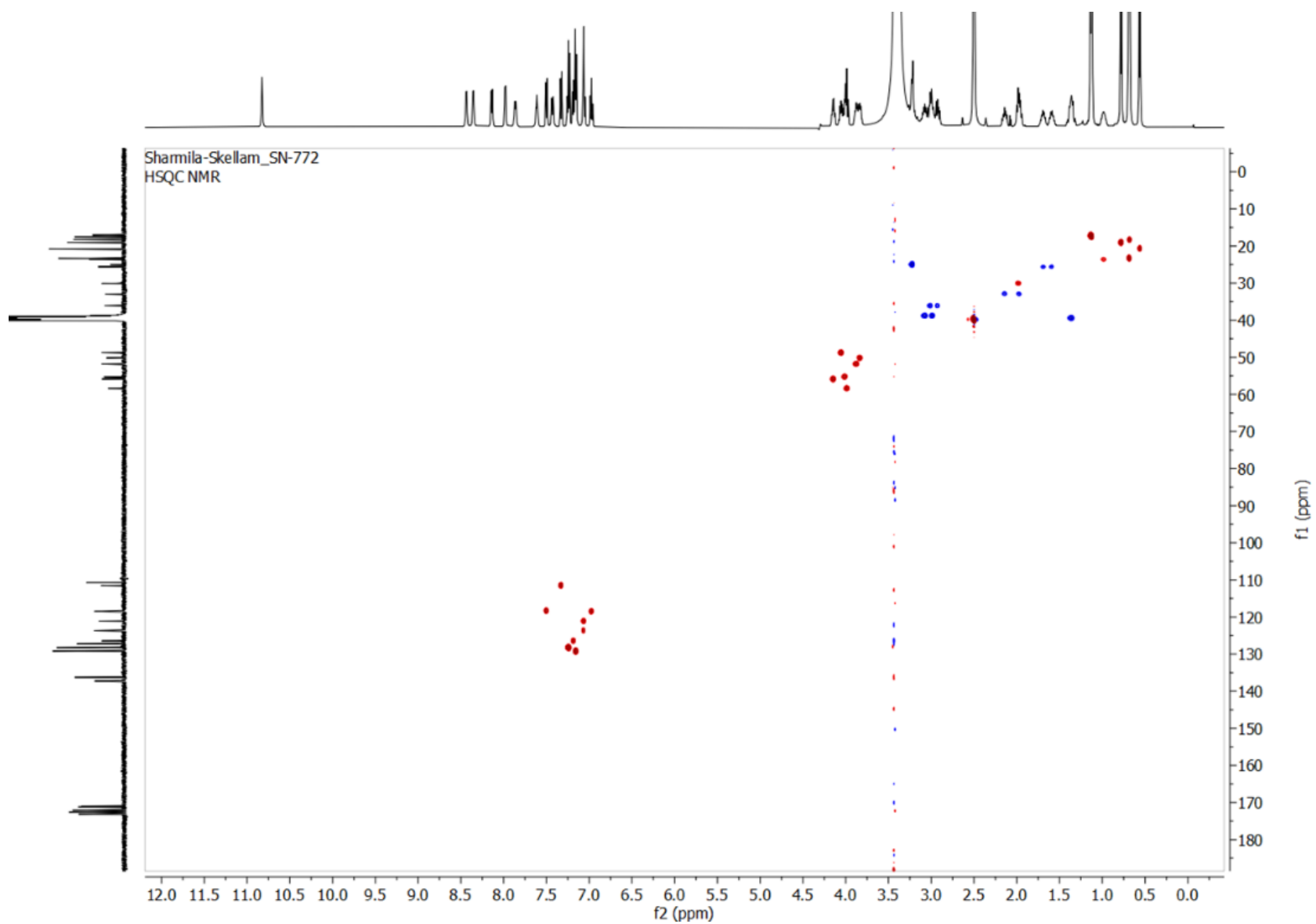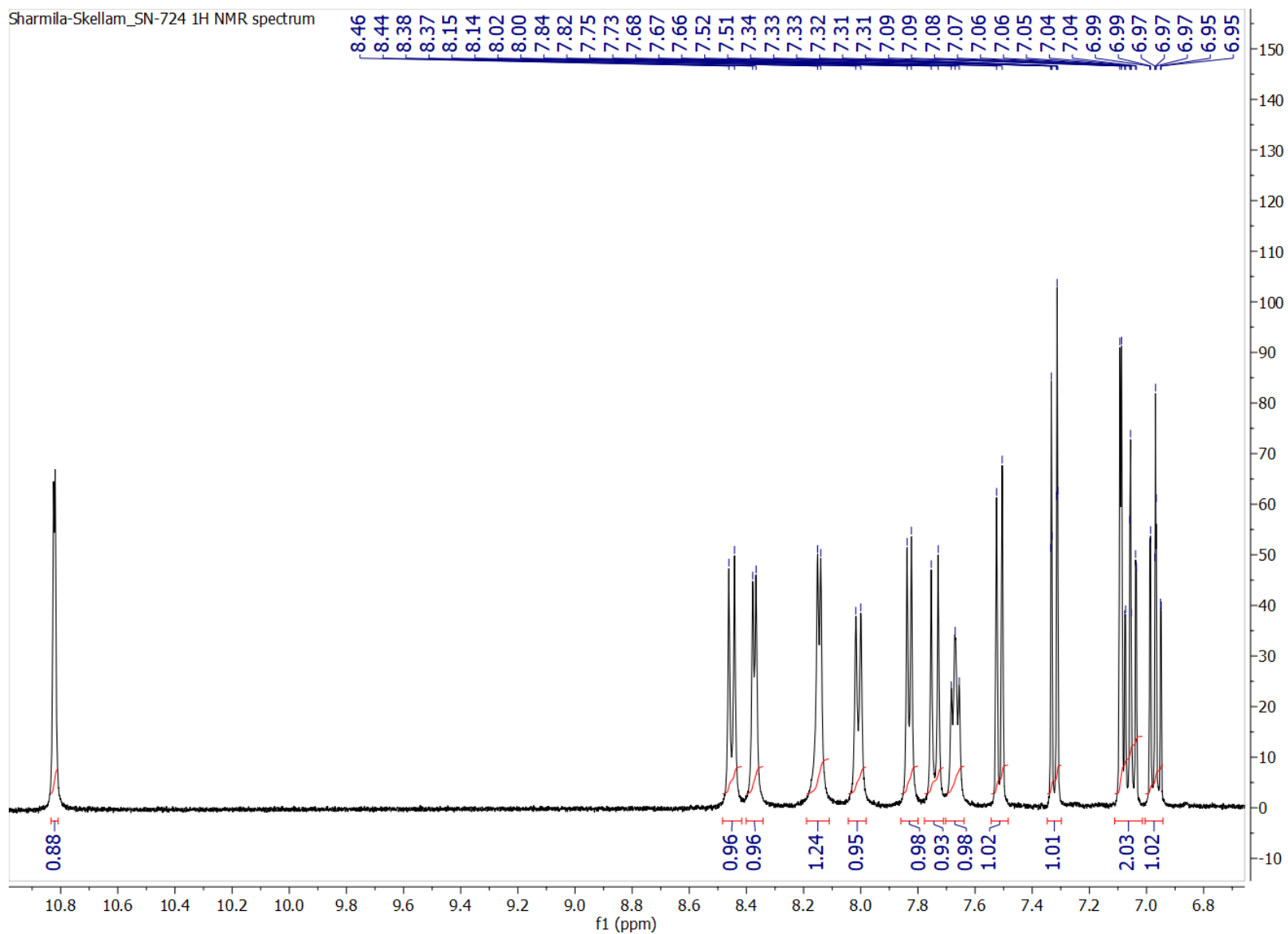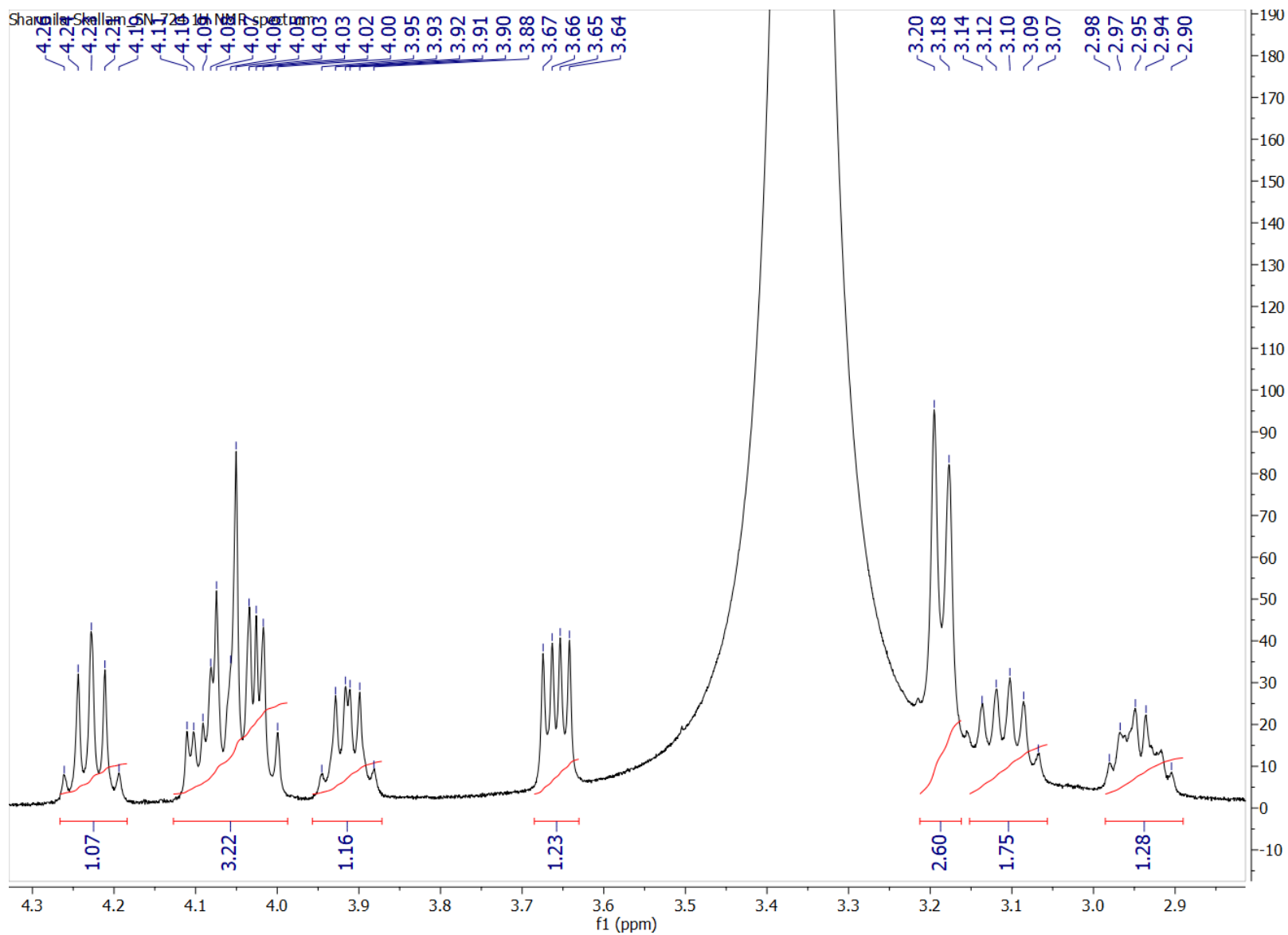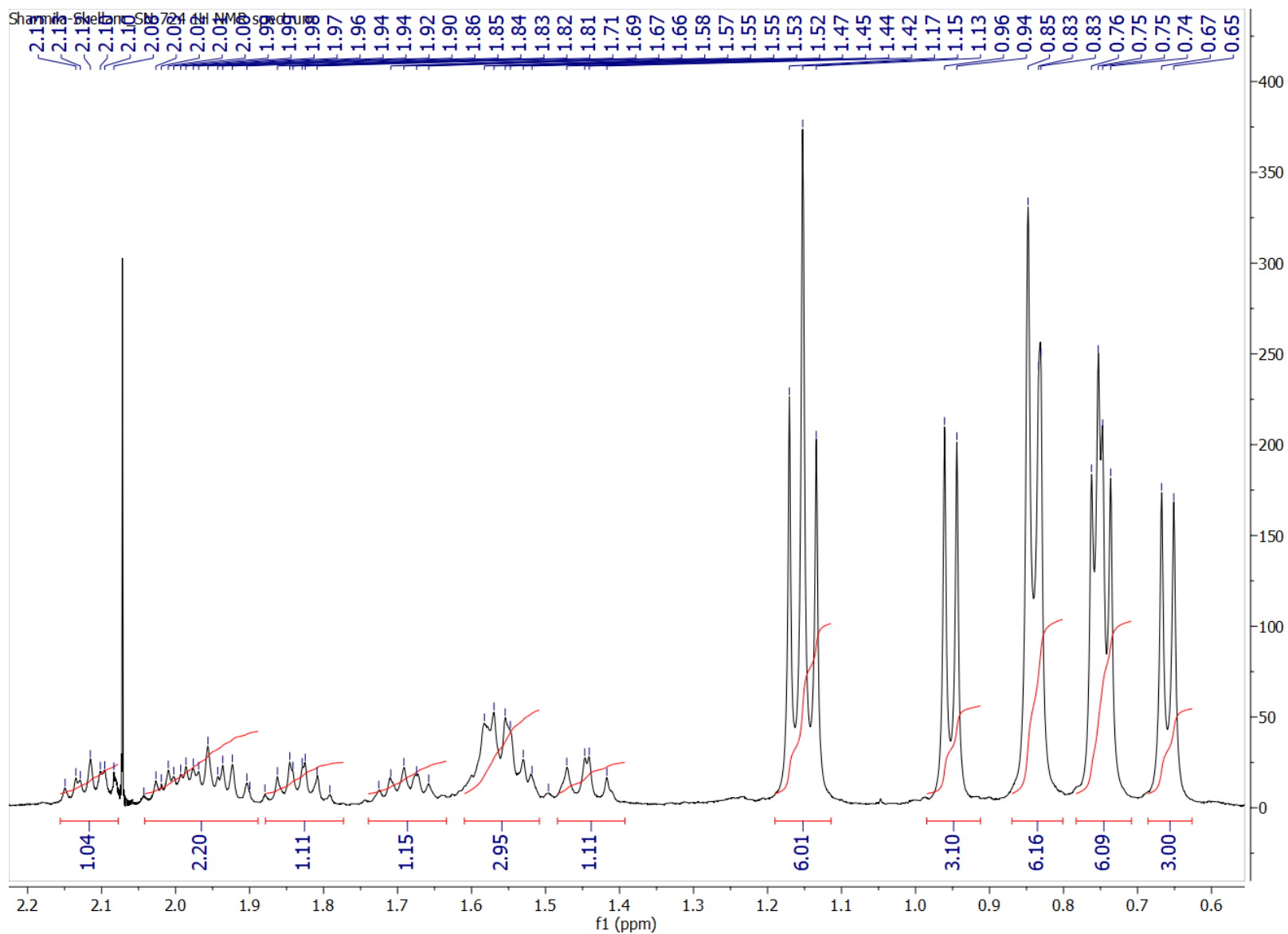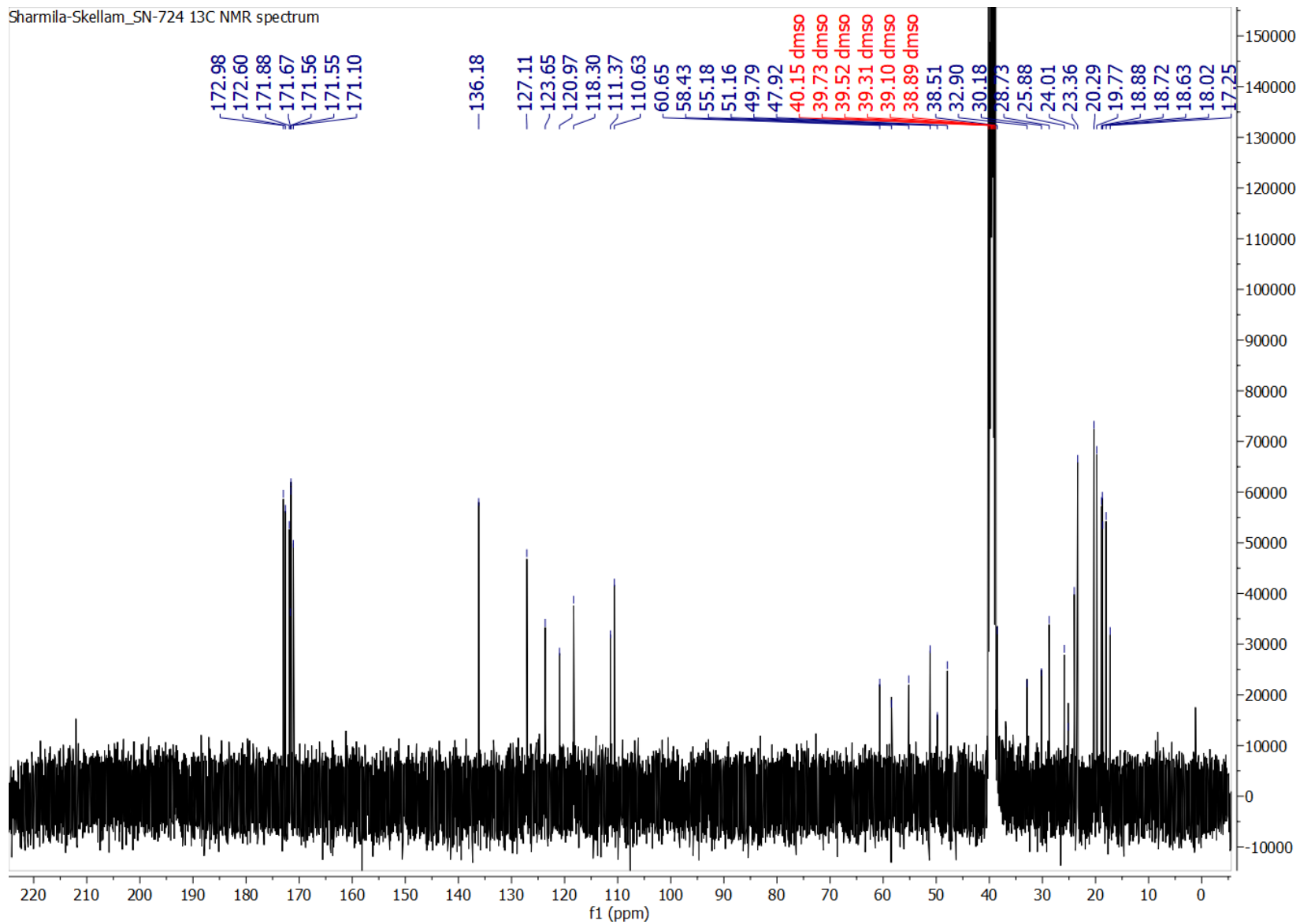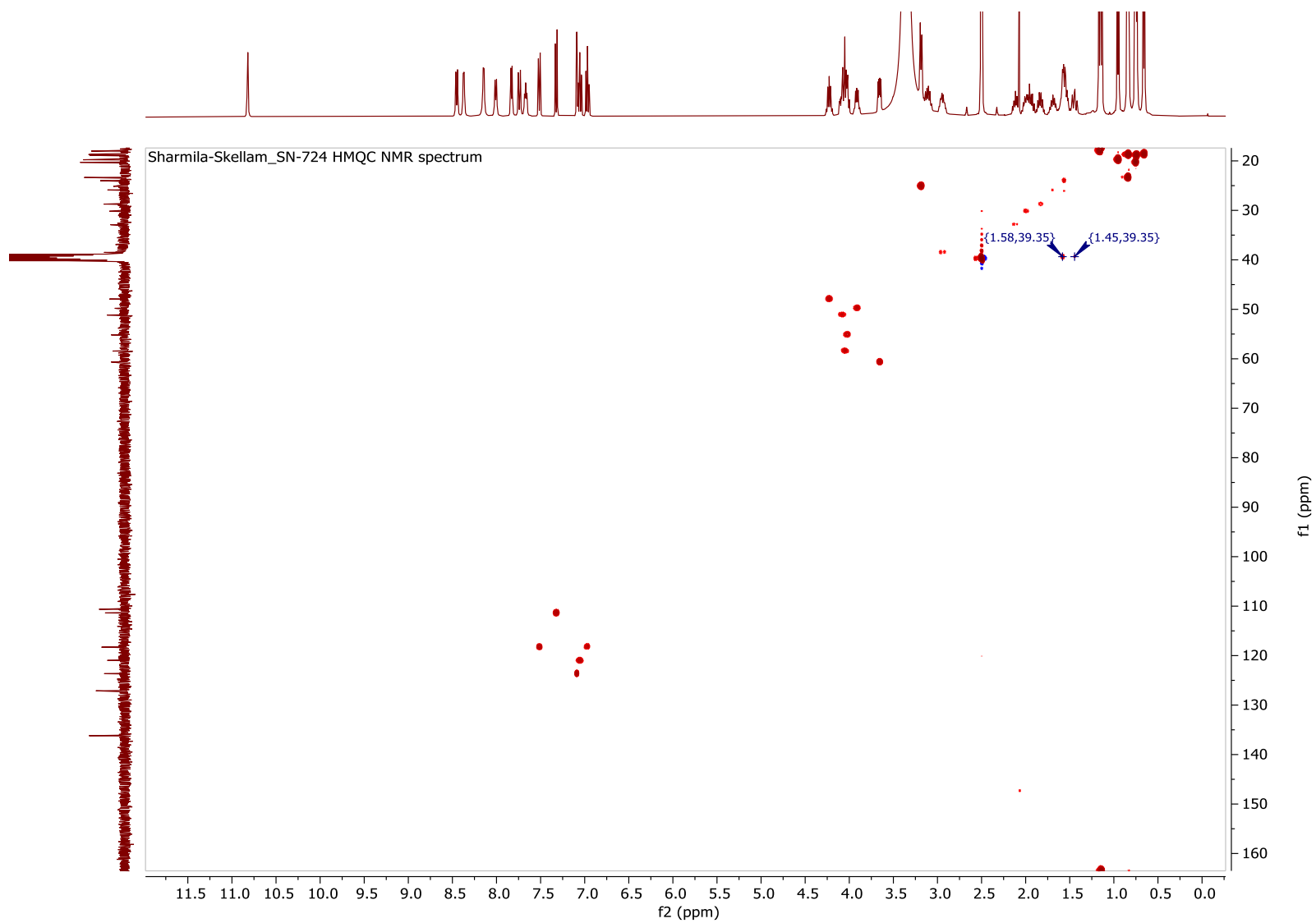**Figure S9:** ^{13}C NMR spectrum of **1** (125 MHz, DMSO-d_6).

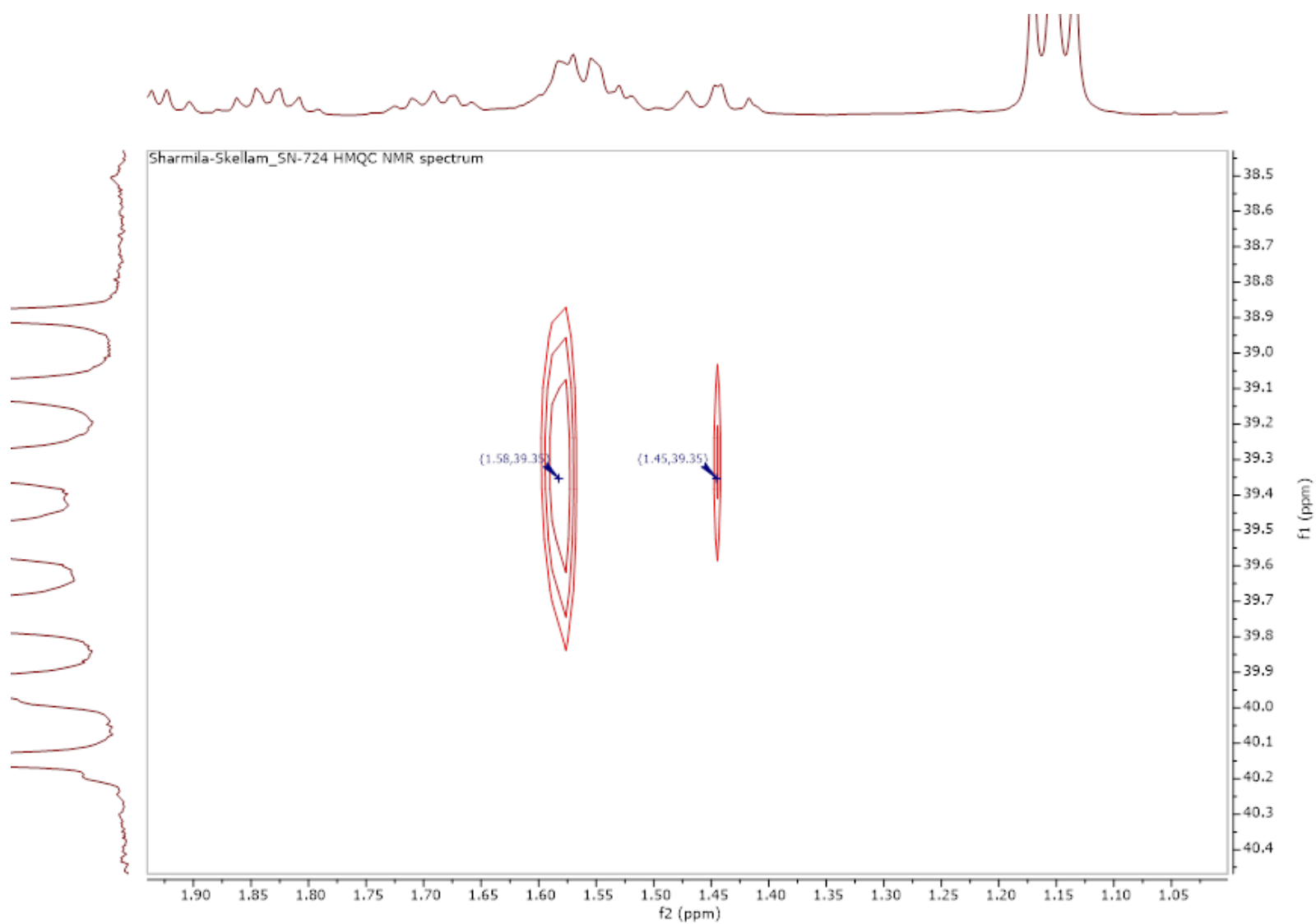**Figure S10:** *g*HSQC spectrum of **1** (^{1}H:500 MHz; ^{13}C:125 MHz, DMSO-d_6).
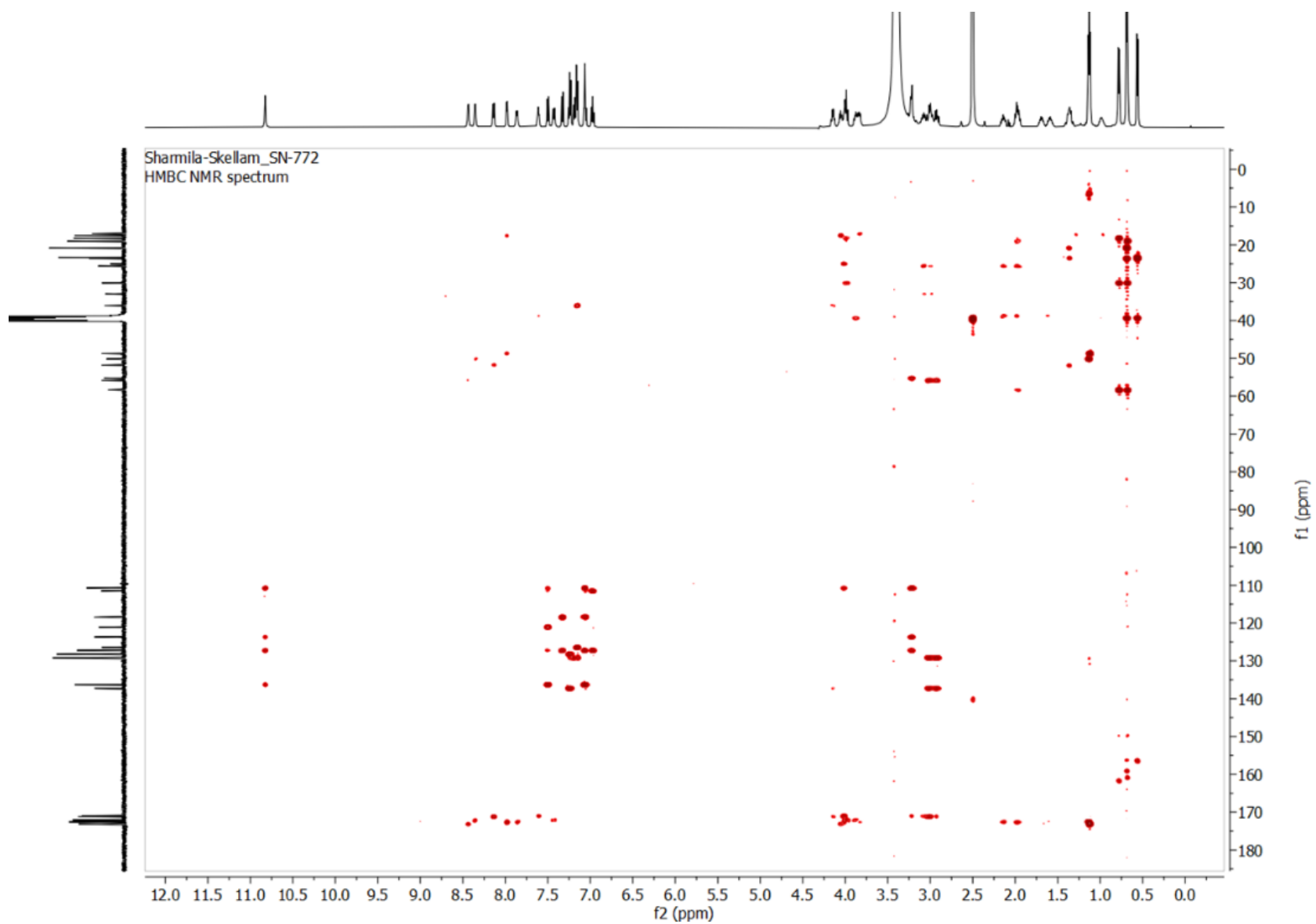
Figure S11: *g*HMBC spectrum of **1** (^{1}H:500 MHz; ^{13}C:125 MHz, DMSO-d_6).
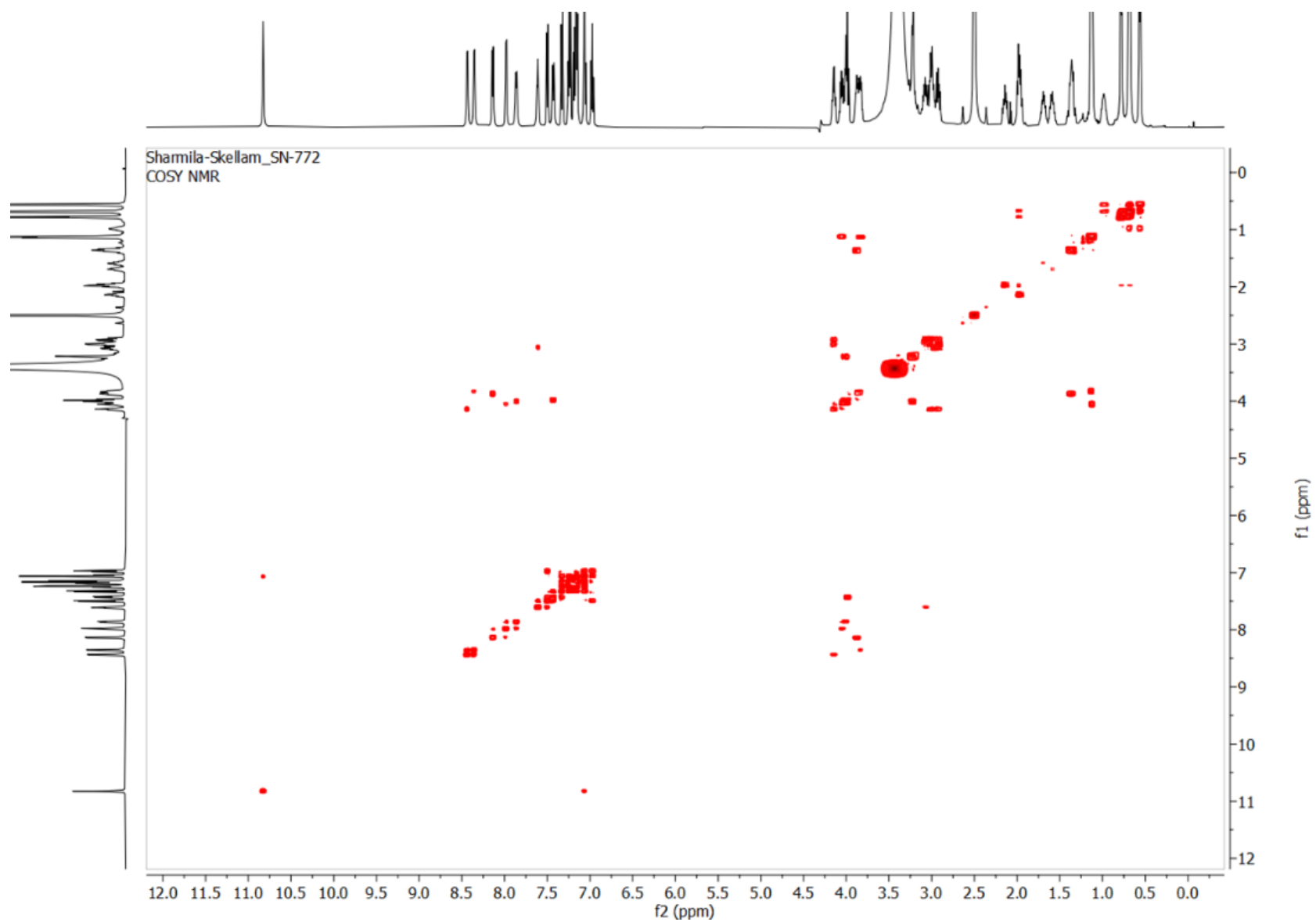
Figure S12: *g*COSY spectrum of **1** (500 MHz, DMSO-*d*₆).
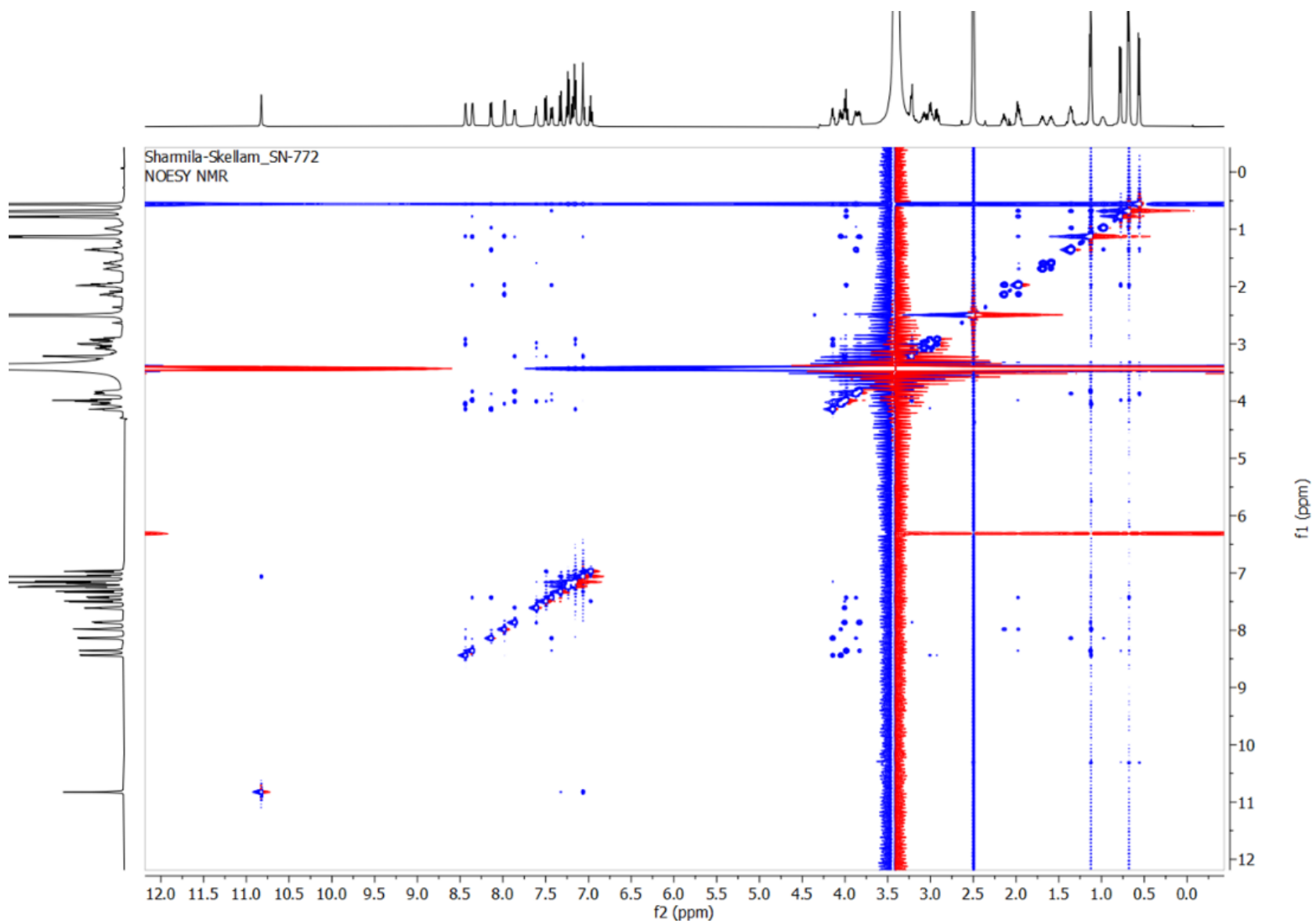
Figure S13: 2D-NOESY spectrum of **1** (500 MHz, DMSO-d_6).
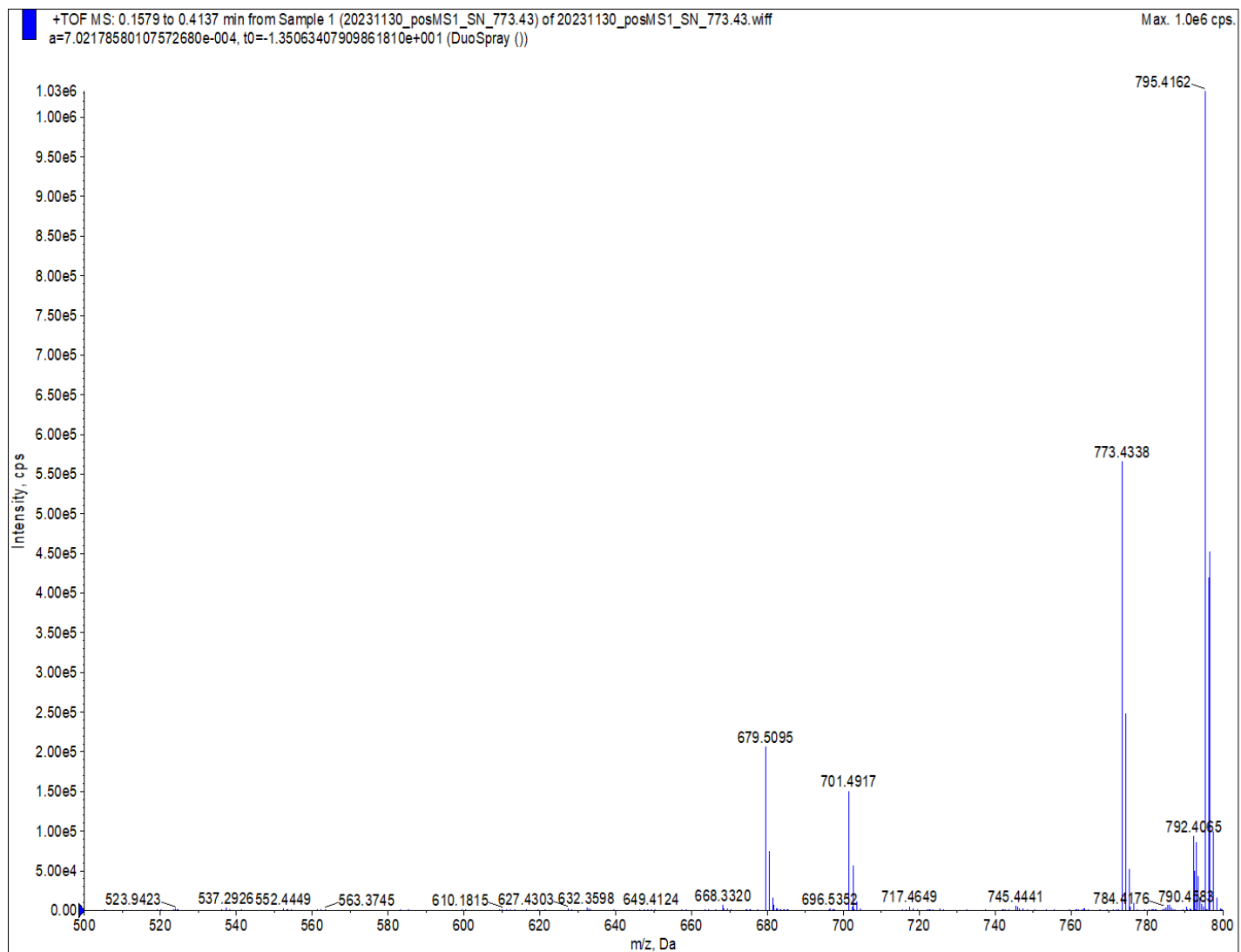
Figure S14: HRESIMS spectrum of **1** in positive ionization mode.
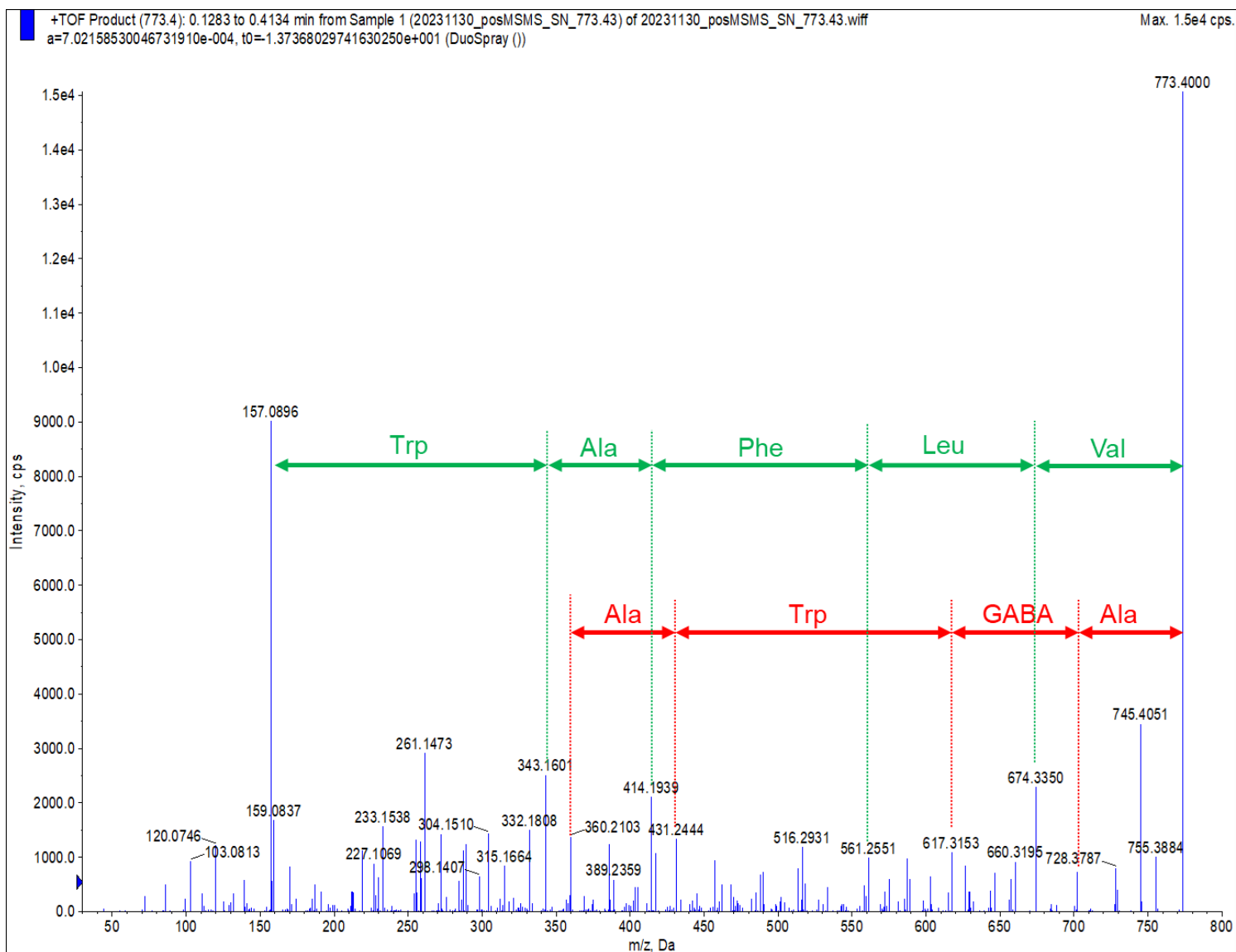
Figure S15: HRESIMS/MS spectra of **1** and fragmentation patterns in positive ionization mode.
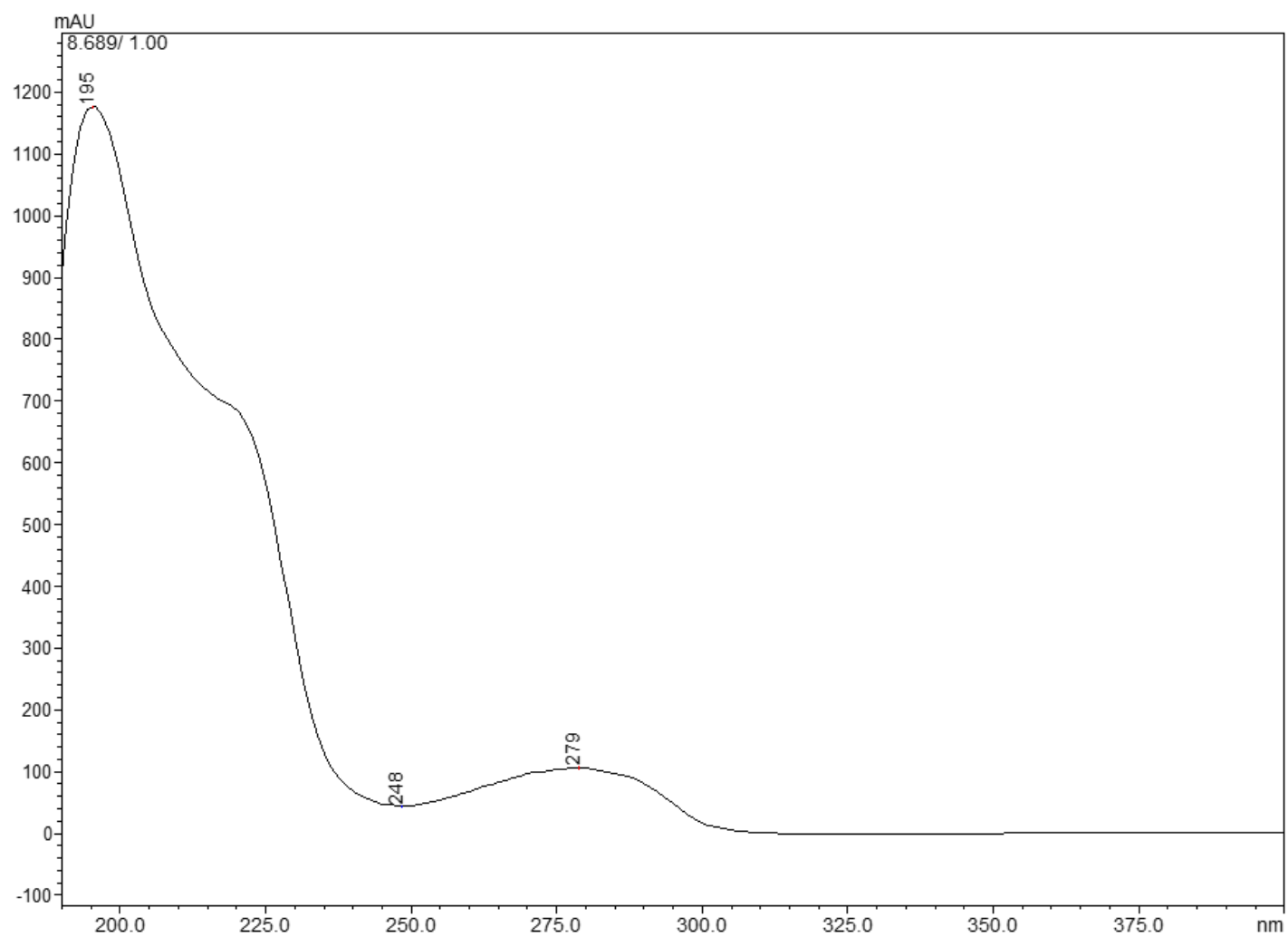
Figure S16: UV spectrum (photodiode array, H_2O:MeCN) of **1**.
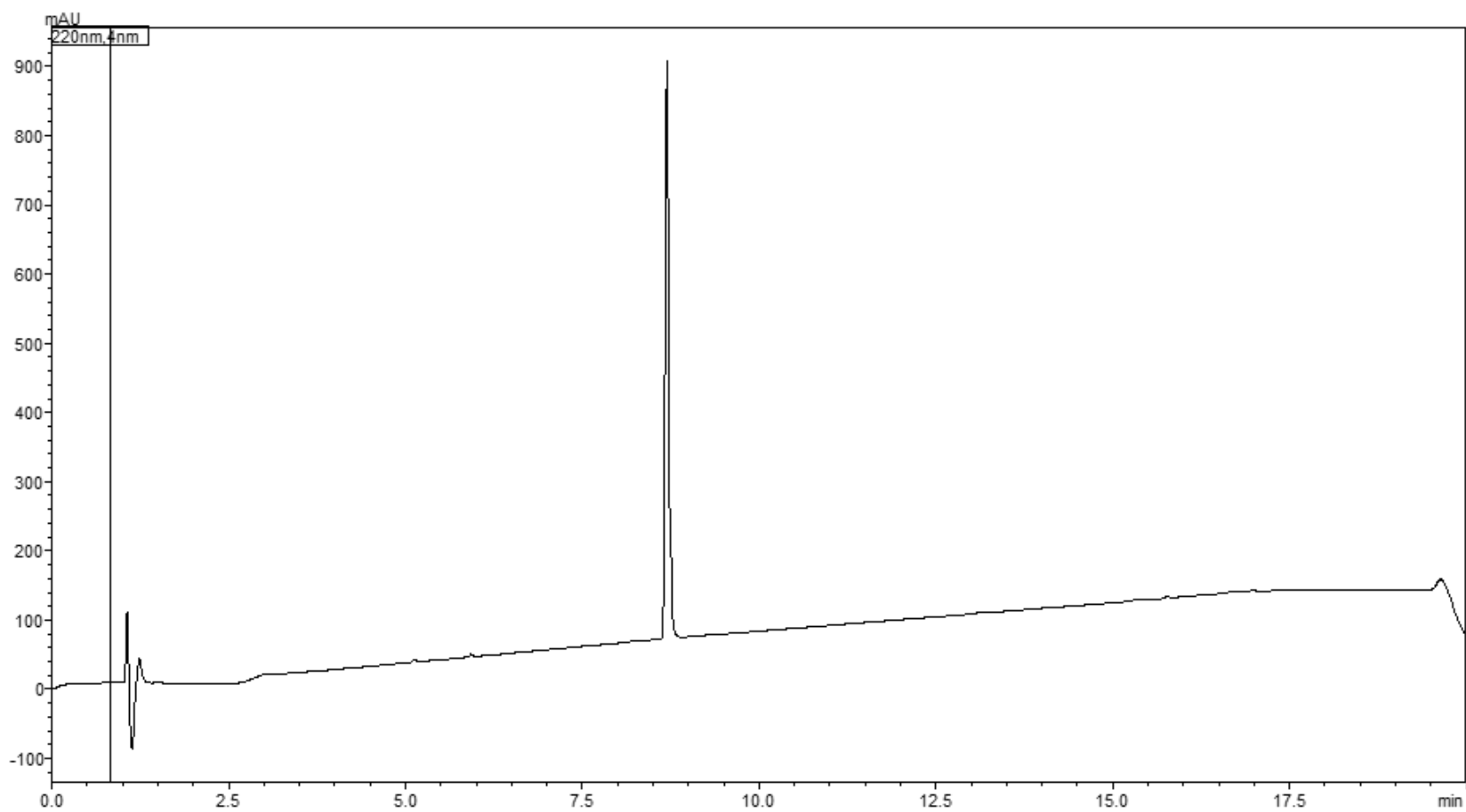
Figure S17: HPLC-PDA chromatogram of unguisin J (**1**).
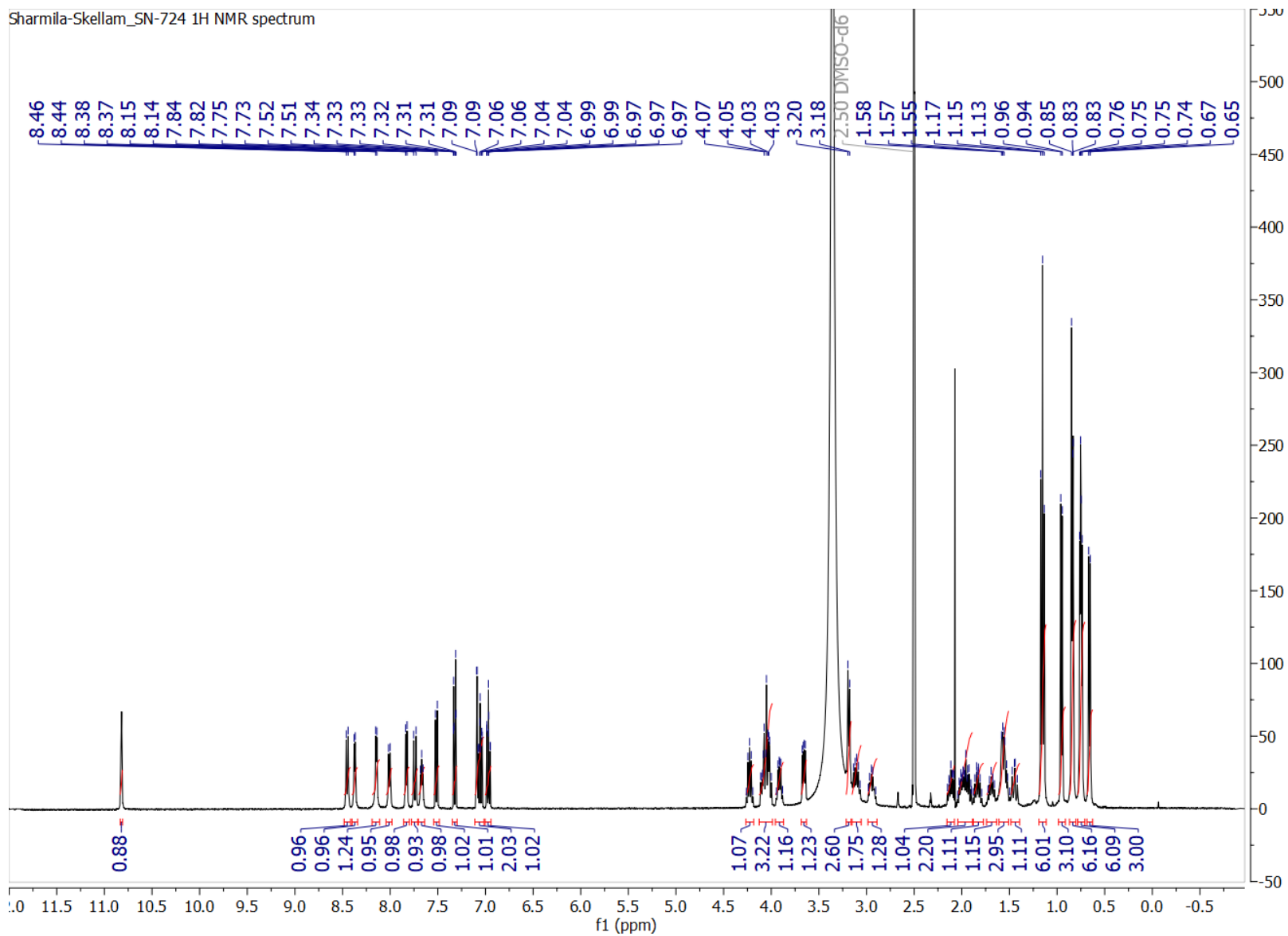
Figure S18: ^{1}H NMR spectrum of **2** (500 MHz, DMSO-d_6).

Figure S19: Expansion of the ^{1}H NMR spectrum of **2** (500 MHz, DMSO-d_6).

Figure S20: Expansion of the ^{1}H NMR spectrum of **2** (500 MHz, DMSO-d_6).

Figure S21: Expansion of the ^{1}H NMR spectrum of **2** (500 MHz, DMSO-d_6).

Figure S22: ^{13}C NMR spectrum of **2** (125 MHz, DMSO-d_6).

Figure S23: *g*HSQC NMR spectrum of **2** (^{1}H:500 MHz; ^{13}C:125 MHz, DMSO-*d*$_6$).

Figure S24: Expansion of the *g*HSQC NMR spectrum of **2** (^{1}H:500 MHz; ^{13}C:125 MHz, DMSO-d_6).
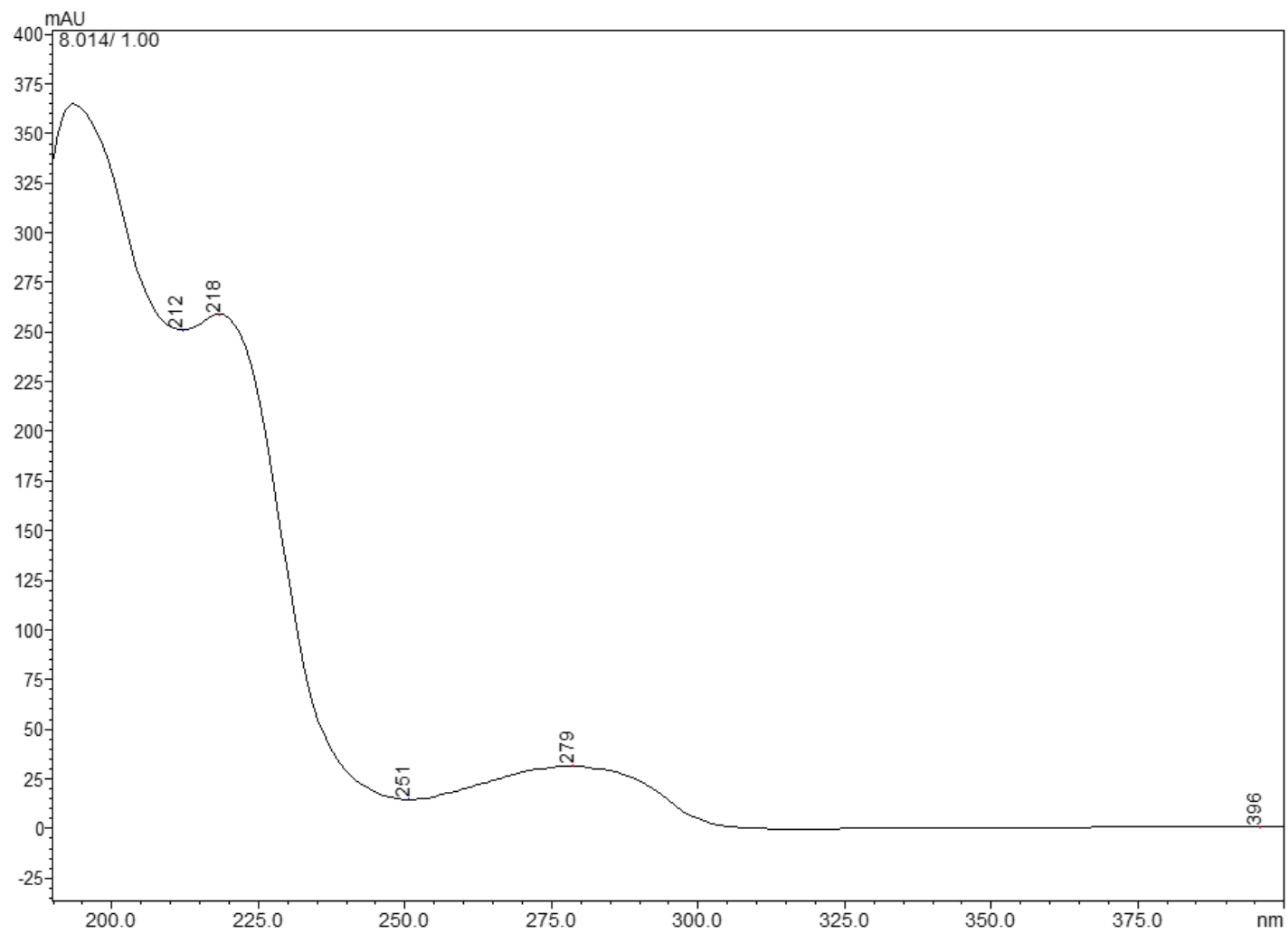
Figure S25: UV spectrum (photodiode array, H_2O:MeCN) of **2**.
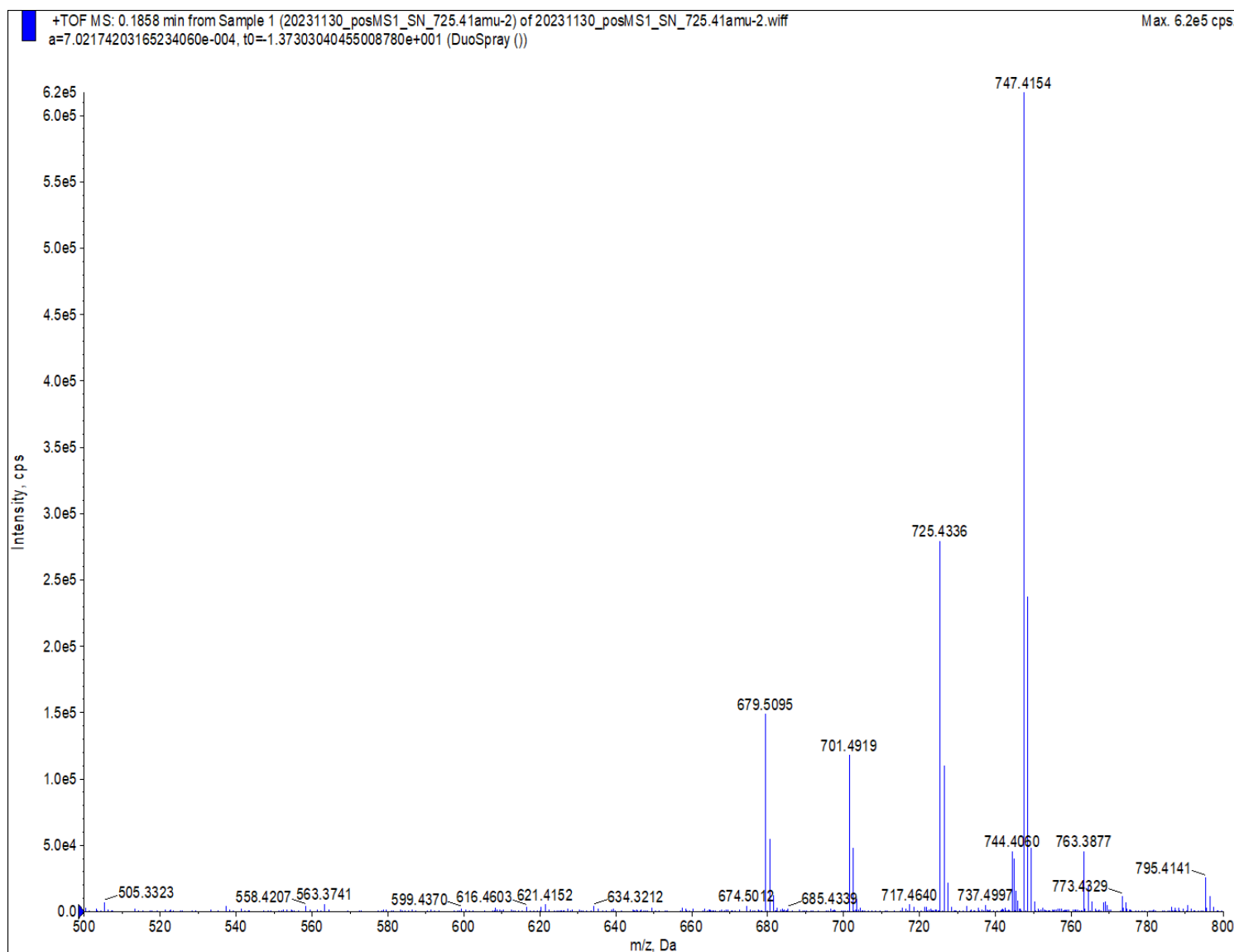
Figure S26: HRESIMS spectrum of **2** in positive ionization mode.
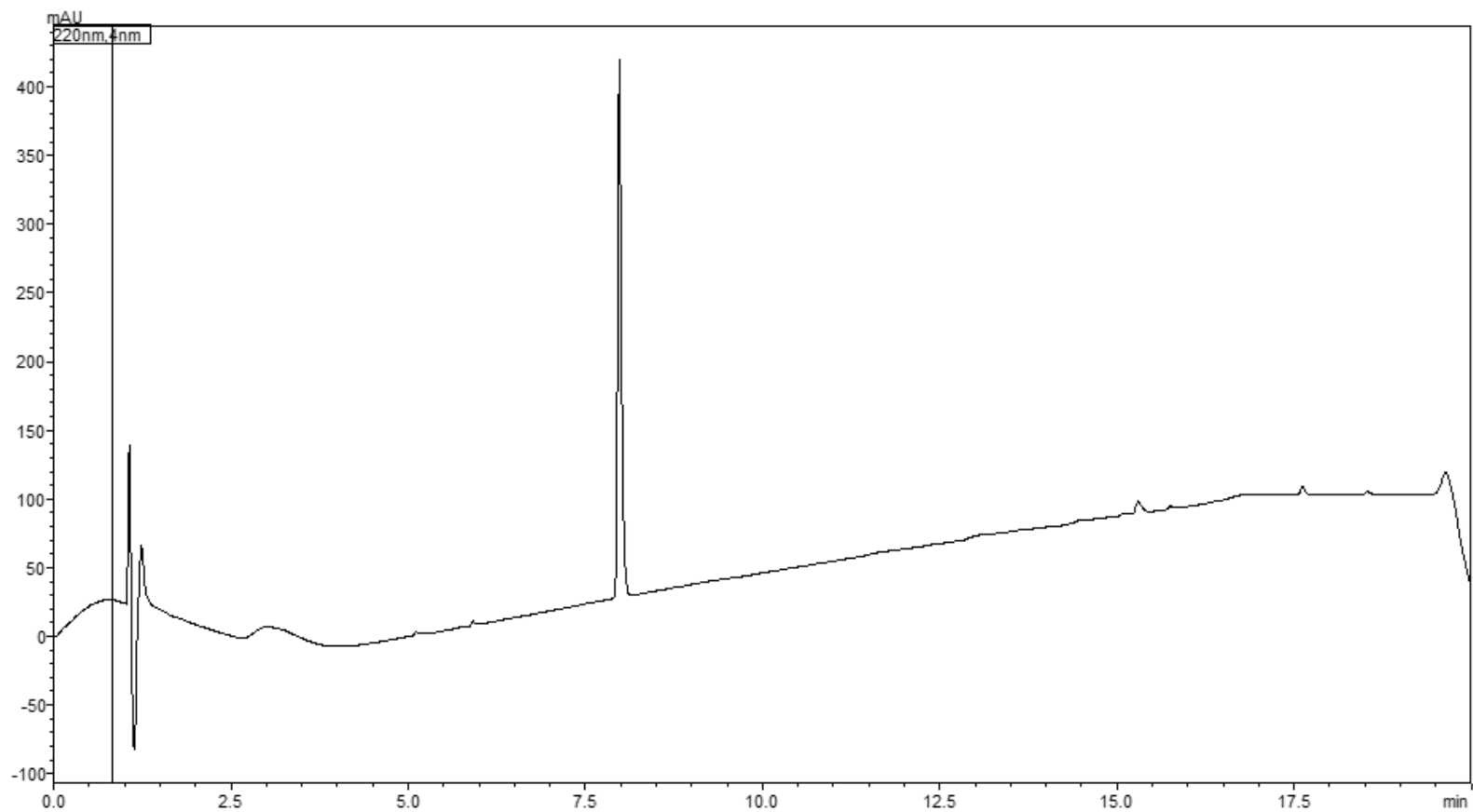
Figure S27: HPLC-PDA chromatogram of unguisin B (**2**).
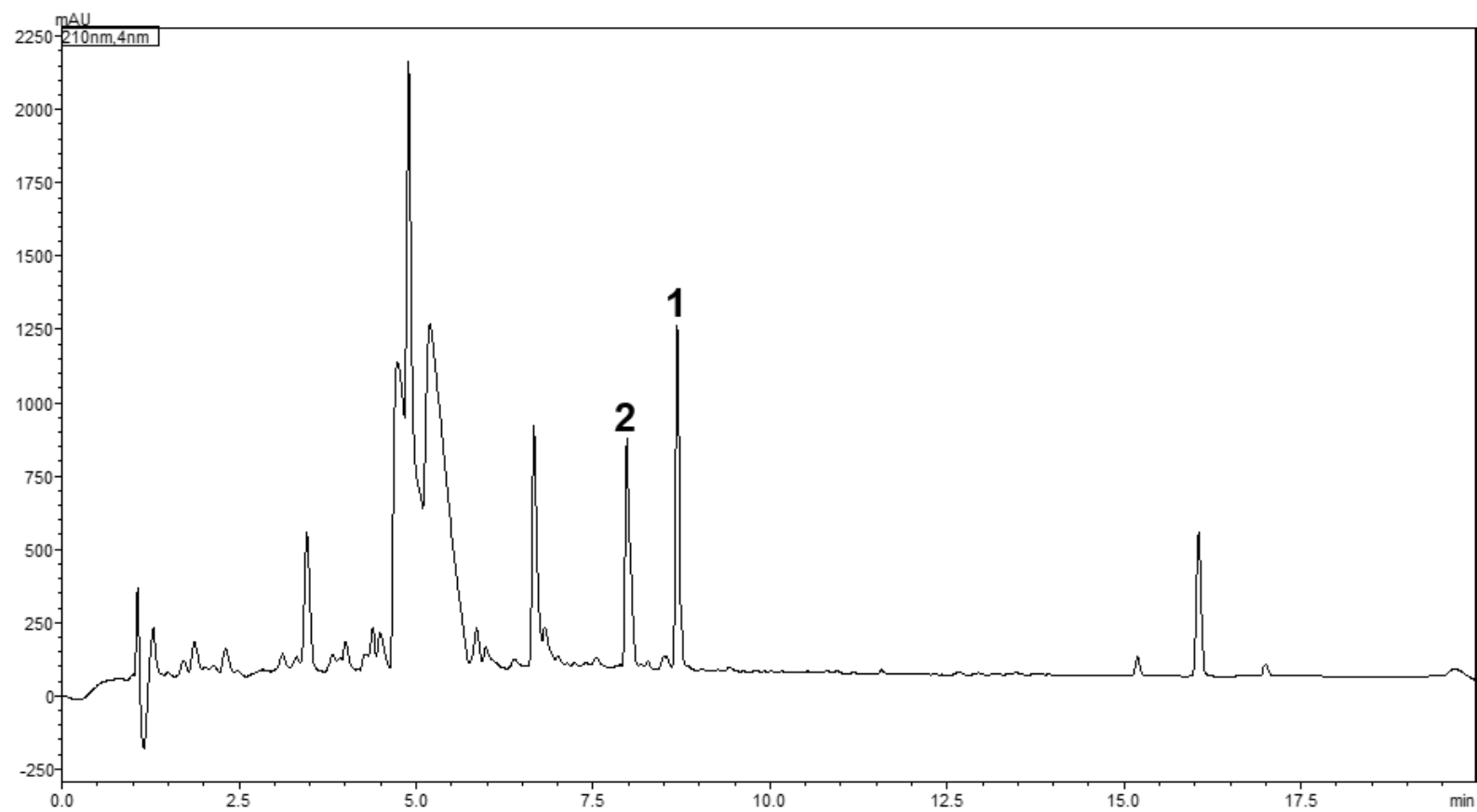
Figure S28: HPLC-PDA chromatogram of soluble-organic extract from rice culture of *A. heteromorphus*. Peak labels represent Unguisin J (**1**) and Unguisin B (**2**).
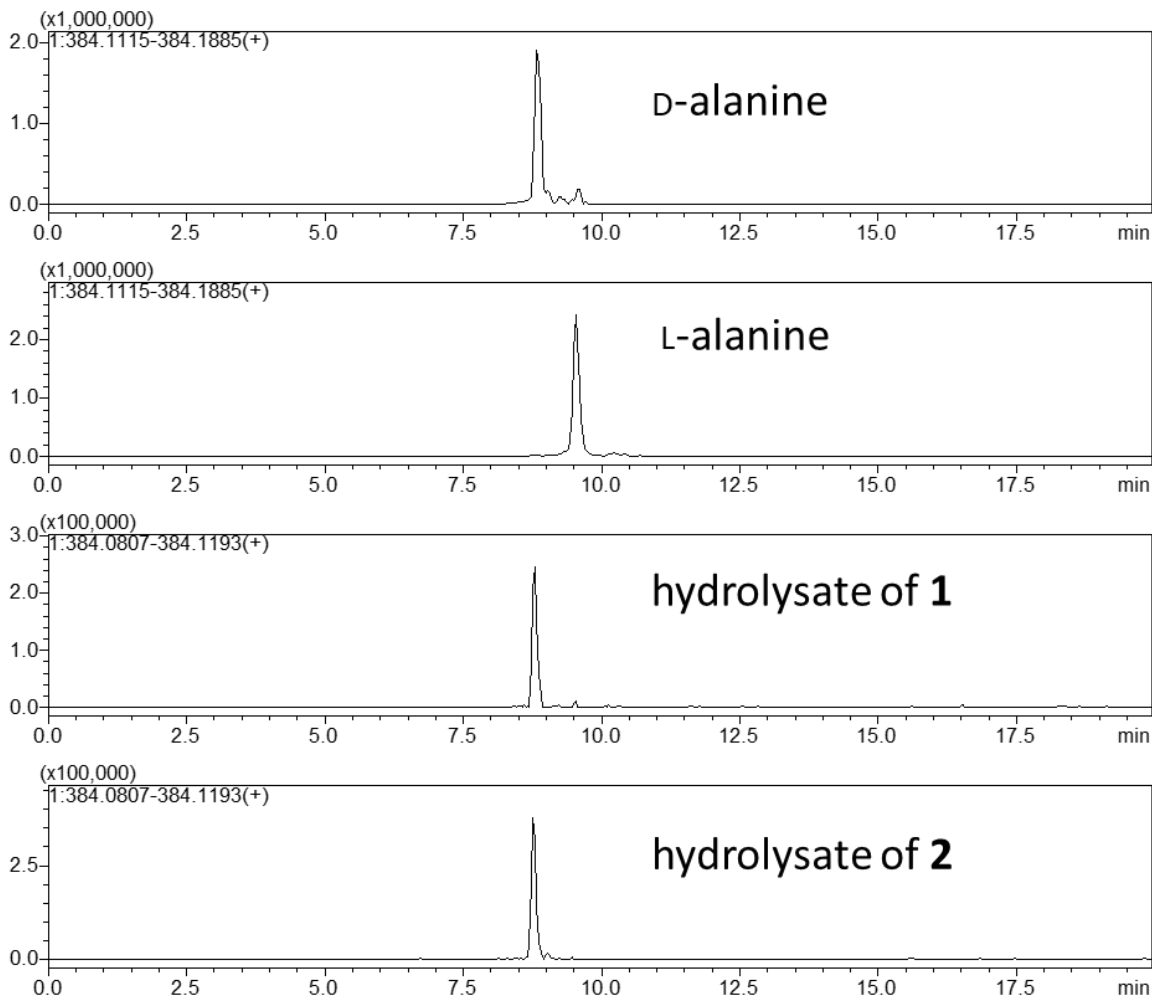
Figure S29: LC-MS analysis of N^α-(5-fluoro-2,4-dinitrophenyl)-D-leucinamide derivatives of the hydrolysates of **1** and **2** as well as the alanine amino acid standards.
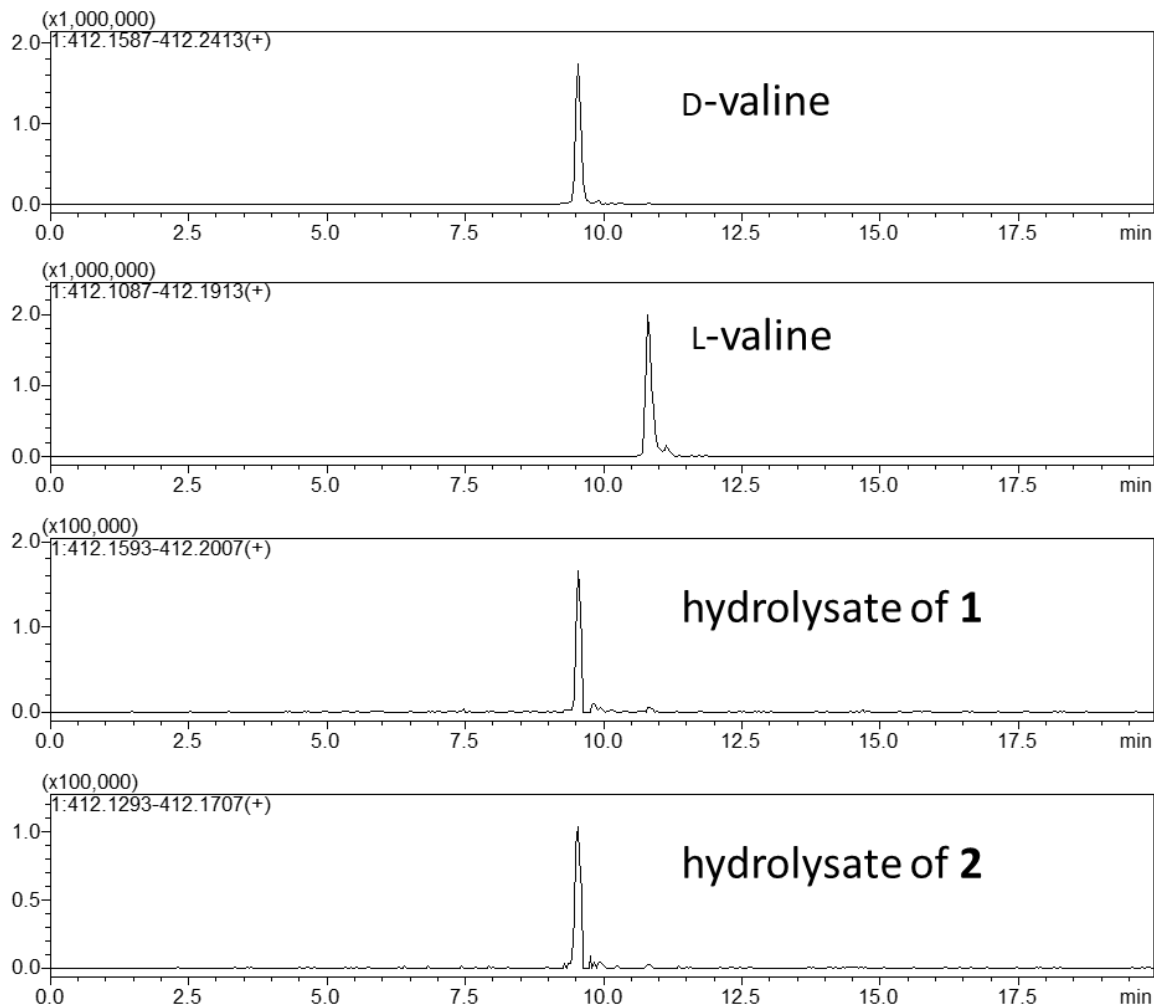
Figure S30: LC-MS analysis of N^α-(5-fluoro-2,4-dinitrophenyl)-D-leucinamide derivatives of the hydrolysates of **1** and **2** as well as the valine amino acid standards.
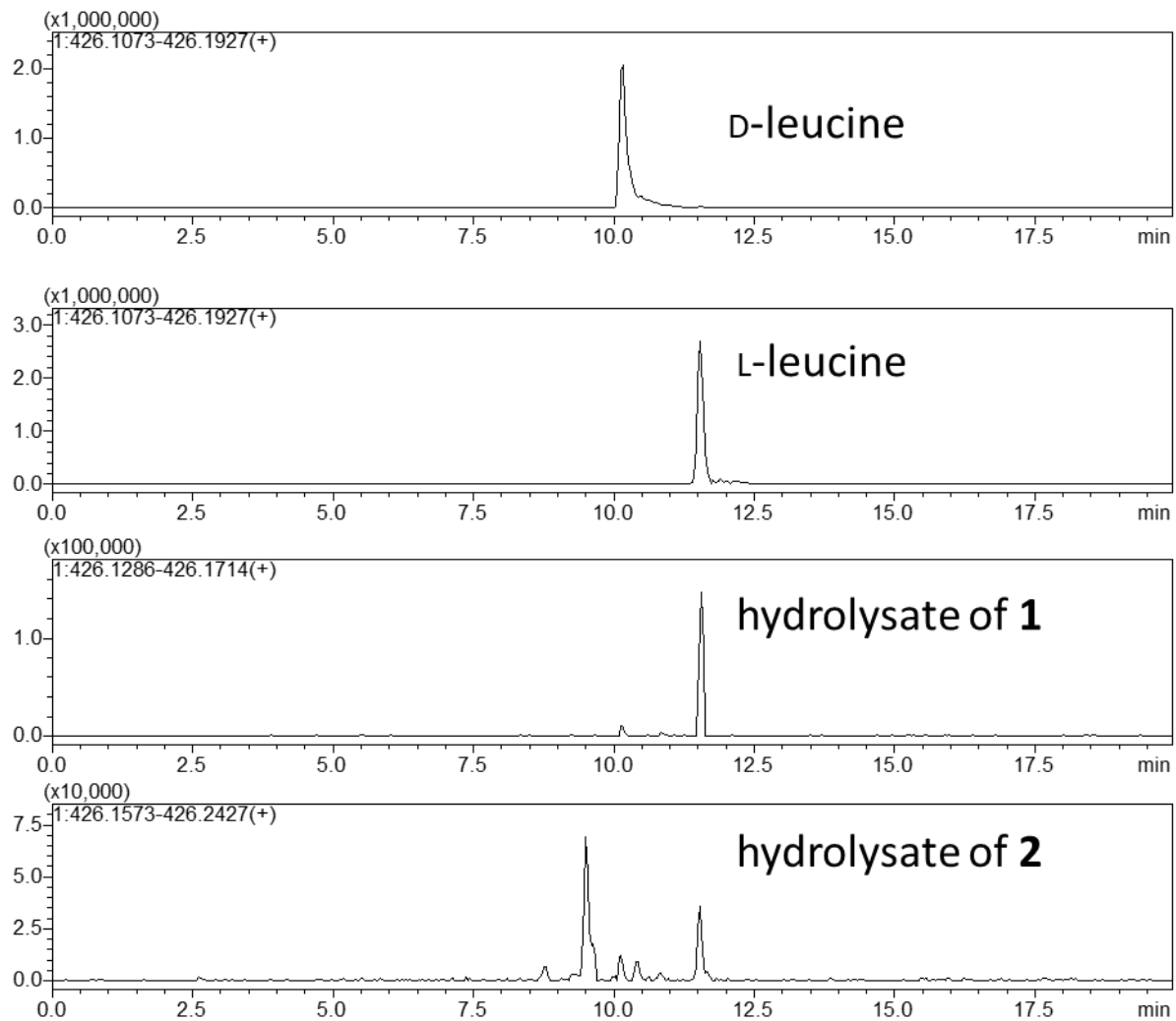
Figure S31: LC-MS analysis of N^{α}-(5-fluoro-2,4-dinitrophenyl)-D-leucinamide derivatives of the hydrolysates of **1** and **2** as well as the leucine amino acid standards.
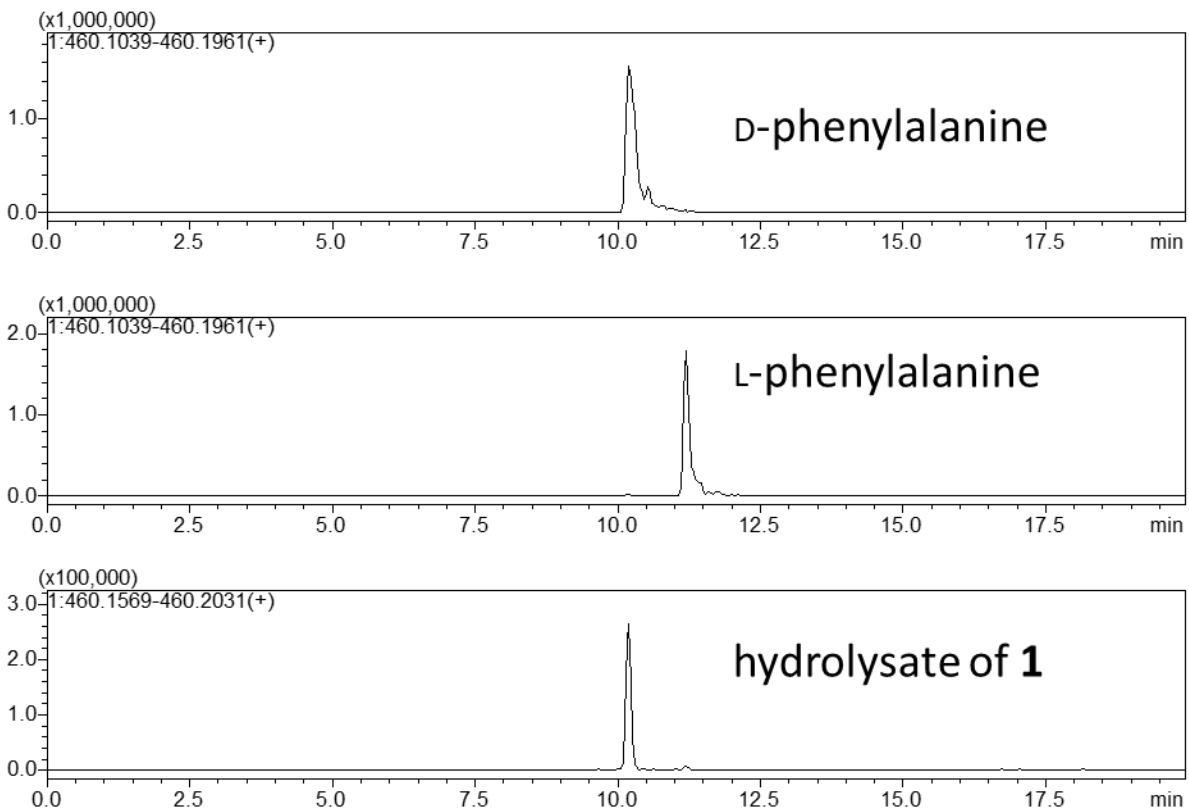
Figure S32: LC-MS analysis of N^α-(5-fluoro-2,4-dinitrophenyl)-D-leucinamide derivative of the hydrolysate of **1** as well as the phenylalanine amino acid standards.
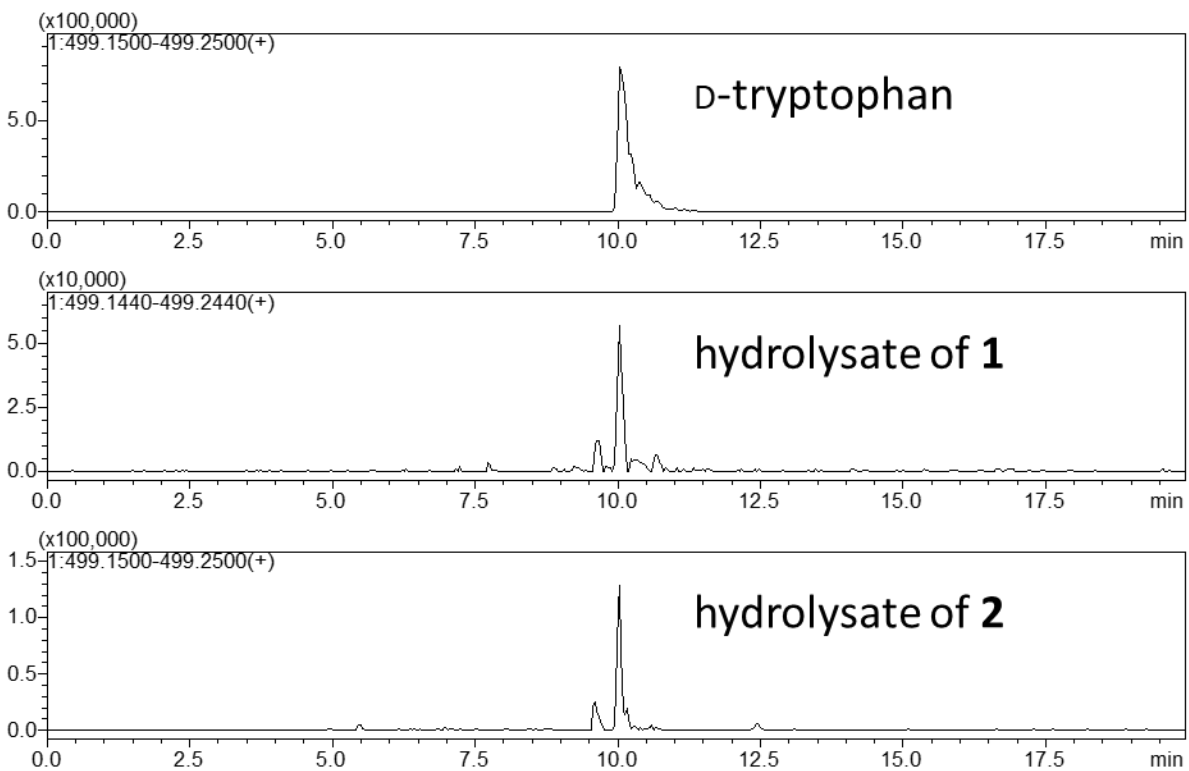
Figure S33: LC-MS analysis of N^α-(5-fluoro-2,4-dinitrophenyl)-D-leucinamide derivatives of the hydrolysates of **1** and **2** as well as the D-tryptophan standard.
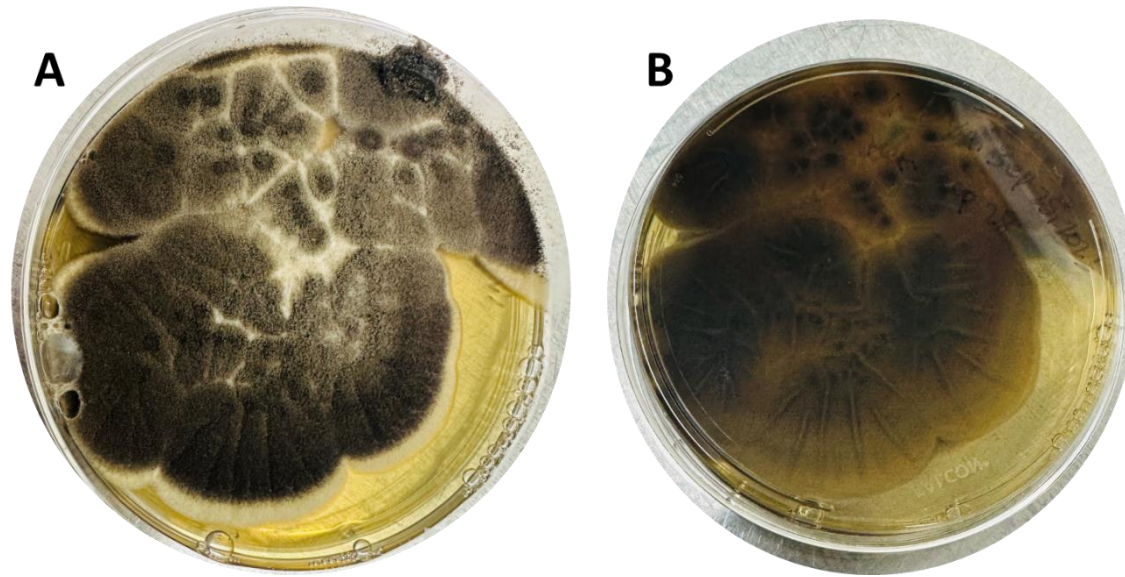
Figure S34: Colonies of *Aspergillus heteromorphous* CBS 117.55 with 7 days of growth at 25 °C. Colonies on DPY agar plate verse (**A**) and obverse (**B**).

Figure S35: Colonies of *Aspergillus heteromorphous* CBS 117.55 with 21 days of growth at 25 °C on solid rice in Erlenmeyer flasks.

Table S2: ^{1}H and ^{13}C NMR data for **2** (^{1}H: 500MHz, ^{13}C:125MHz; DMSO-d_6).

residue/position		δ_C	δ_H (mult., J in Hz)	δ_C	δ_H (mult., J in Hz)
			2		**Unguisin B (Malmstron, 1999)**
Alanine	NH	-	8.37 (d, 4.9)	-	8.36 (d, 4.6)
	Cα	49.8	3.91 (m)	49.8	3.92 (m)
	Cβ	17.3	1.14 (d, 7.1)	17.3	1.16
Alanine	NH	-	7.83 (d, 6.2)	-	7.82 (d, 6.1)
	Cα	47.9	4.22 m	48.0	4.23 (m)
	Cβ	18.0	1.16 (d, 7.1)	18.1	1.16
Valine	NH	-	8.14 (d, 4.5)	-	8.13 (d, 4.4)
	Cα	60.6	3.66 (dd, 8.4, 4.4)	60.6	3.67 (dd, 4.6, 8.2)
	Cβ	28.7	1.83 (m)	28.8	1.82 (m)
	Cγ	19.8	0.95 (d, 6.7)	19.7	0.95 (d, 6.6)
	Cγ	18.7	0.84 (d, 6.4)	18.8	0.84 (d, 6.4)
Valine	NH	-	7.74 (d, 9.8)	-	7.73 (d, 9.7)
	Cα	58.4	4.05 (m)	58.5	4.07 (m)
	Cβ	30.2	2.00 (m)	30.2	2.00 (m)
	Cγ	18.6	0.66 (d, 6.6)	18.6	0.66 (d, 6.6)
	Cγ	18.9	0.74 (d, 6.6)	18.9	0.74
GABA	NH	-	7.67 (t, 5.5)	-	7.65 (t, 5.3)
	Cα	38.5	3.11 (m), 2.94 (m)	38.5	3.11 (m), 2.95 (m)
	Cβ	25.9	1.69 (m), 1.55 (m)	25.9	1.65 (m), 1.58 (m)
	Cγ	32.9	2.11 (m), 1.95 (m)	32.9	2.11 (m), 1.94 (m)
Tryptophan	NH	-	8.0 (d, 7.1)	-	7.98 (d, 6.8)
	Cα	55.2	4.02 (m)	55.2	4.05 (m)
	Cβ	25.2	3.18 (d, 7.2)	25.2	3.20 (d, 8.5)
	NH	-	10.82 (d, 2.4)	-	10.81 (d, 2.0)
	C-2	123.7	7.08 (d, 2.3)	123.6	7.11 (d, 2.2)
	C-3	110.6	-	110.6	-
	C3a	127.1	-	127.1	-
	C-4	118.3	7.51 (d, 7.9)	118.3	7.54 (d, 7.9)
	C-5	121.0	7.06 (ddd, 7.9, 7.1, 1.1)	121.0	7.08 (t, 6.9)
	C-6	118.3	6.97 (ddd, 8.1, 7.1, 1.1)	118.3	6.97 (t, 7.2)
	C-7	111.4	7.32 (dt, 8.1, 0.8)	111.4	7.35 (d 8.1)
	C-7a	136.2	-	136.2	-
Leucine	NH	-	8.45 (d, 7.9)	-	8.43 (d, 7.7)
	Cα	51.2	4.07 (m)	51.2	4.09 (m)
	Cβ	39.4[a]	1.58 (m), 1.45 (m)	38.7	1.58 (m)
	Cγ	24.0	1.57 (m)	24.1	1.58 (m)
	Cδ	23.4	0.84 (d, 6.4)	23.4	0.84 (d, 6.4)
	Cδ	20.3	0.75 (d, 6.0)	20.4	0.74

[a]Confirmed by HSQC. Carbons signals at δ_C 171.1, 171.6, 171.6, 171.7, 171.9, 172.6 and 173.0 ppm.

Table S3: Summary of additional NRPS identified in the genome of *A. heteromorphus* CBS 117.55. Abbreviations as in main text; R = reductase.

fungiSMASH contig ID	NCBI GeneID	Putative NRPS size (aa)	Putative domain arrangement
2.2	37069286	4028	C_T-A-PCP-C-A-MT-PCP-C-A-PCP-TE
35.2	37070309	5593	A-PCP-C-A-E-PCP-C-A-E-PCP-A-C-PCP-C-PCP
57.3	37069398	1436	C-A-PCP-R
119.1	37067680	5115	A-PCP-A-PCP-C-A-PCP-C-A-PCP-C-A-PCP
139.1	37063074	2302	A-PCP-C-A-PCP-R
143.1	37069176	2452	A-PCP-C-A-PCP-C_T
150.1	37069727	9562	A-PCP-C-A-PCP-E-C-A-PCP-C-A-PCP-E-C-A-PCP-E-C-A-PCP-E-C-A-PCP-C_T
161.1	37069763	2775	A-PCP-C-A-PCP-E (truncated; close to scaffold edge)
172.1	37061517	671	A-PCP (truncated; close to scaffold edge)
172.2	37067500	4765	A-PCP-C-A-PCP-C-A-PCP-E-A-PCP-C (truncated; close to scaffold edge)
172.5	37069805	1931	A-PCP-C-A-PCP (truncated; close to scaffold edge)