

SUPPLEMENTARY MATERIALS

Histidine-Triad Hydrolases Provide Resistance to Peptide-Nucleotide Antibiotics

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>CON.1
----xxxxDCLFCKIVAGEIPATVVRETExTLAFRDINPQAPT HVLVLPKxHYxDAAxLAAALxADVLxAXxVAXxEG--IxxxGYRLVFNTGxxAGQTVF HVAHVVLGGRxLxWPP-----G-----
>CON.2
----xxExxIFxRIIxGEIPAExVxExDxVIAFxDIxPQAPV HVLVVPKxxYxNVxELAAGLLAEMVxVAxxIAxExx--x--GEFRLVFNTGxxAGQTVF HVAHVVLxGxLxExxx-----x-----
>CON.3
----xxxxDCLFCRIVAGEIPAxIVAETDxVVAFRDIXPQAPV HVLVVPKxHxxDVAQLAAALLAEMVxVAQQVAXxEC----xGQFRLIFNTGFPxAGQSVF HVGHVVLGGxxLGWxP-----A-----
>CON.4
----xxxxDCLFCKIVAGDVPADVVAETEHTVAFRDIDPQAPT HVLVLPKxHEPDVGSLLLLAAAVxLLxxARRVADxxG--xx--SYRLVFNTGADAHQTVF HCHGHVLAGRxxLGWPP-----G-----
>CON.5
----xTxxDCLFCRFVAGEIPDPVVAESExSLAFRDINPQAPT HVLVPPRRHVPNAGxLAAADLADVxxLAXxVAExEG--L-xxxYRLVFNTGAXAGQTVF HAHHLVVLGGRxFxWPP-----G-----
>CON.6
----xxxDDCLFCKIVAGDIPADVHxxTVAFRDLNPQAPT HVLVPPRSHYxNAAALAXxxLADLxxxAXxVAExEG--Lx--GYRxxVFNTGAXAGQTVF HAHHLVVLGGRxLxWPP-----G-----
>CON.7
----xxxxDCLFCKIVAGEIPxDIVHxxERTVAFRDINPQAPL HVLVPPRDHxPNAAXxAXxAXxAVELVTTAAAVAXxAG--YD--DYRLVFNTGAGAGQTVF HTHLHLLLAGRxxMTWPP-----G-----
>CON.8
-----xDCLFCKIVxGEIPAxIVxRxDxVxAFNDIXPQAPT HILIIIPxHxENAAEVAXxLxGELFxAAGxIAxExG--LD--GYRxxFNTGAXAGQSVF HAHHLHLLGGRxFxWPP-----G-----
>CON.9
----xxxNCLFCKMxxGxIxVTxVxENDxxFVIxDIxPKAPV HxLVI PKKHxYxNxxxxxVxxIGxLxxxxxxLxxxEN--Lx-xGFRLVxNTGADAGQSVx HHLHLLLxGRSxxWPP-----G-----
>CON.10
-----xxxCIFCKIVxGEIPADVVYEDExVIAFRDINPQAPV HVLVLPKxHIxSxxEVx-xxxxxLMxxAXxVAXxLG--LE-xGYRLVINxGxxAGQTVx HLVHVLHLLGGRxFxWPP-----G-----
>CON.11
-----xxxTIFxKIIXREIPADIVYEDDxxLAFRDINPQAPV HILIIIPKPIPxLxDAXxELLGHLxLxAXxKIAxQxG--Lx-DGYRVVINxGxxGGQTVF HHLHLLHLLGGRxMxWPP-----G-----
>CON.12
----MxxDTIFxRILRGEIPCDEVYxDEXCLAFRDIXPQAPV HILVLPKPIxSLxEXxELLGHLxLVAxAKVAXxEG--LE-x-WRTVINTGAEAGQTVF HLVHVLHLLGGRPLxWPP-----G-----
>CON.13
-----xCIFCKIAxKEIPxKVLEDEHxLAFHDLNPQAPT HVLVLPKRHIAGLAEAxPEVLGRxLLGAXQVAXxKLG--Ix-EGFRTVINSGANAGQTVF HLVHVLHLLGGRxMGWPP-----G-----
>CON.14
----xxxDCLFCKIVAGEIPAxVYEDExxIAFxDINPQAPx HVLIIIPKHIxSLAXxAXxLLGHLMxxAAEIXARxQG--LxxxGYRVVNTGxDGGQTVx HHLHLLHLLGGRxMxWPP-----G-----
>CON.15
----MDxCIFCKI IAGExPxxILYQDELVTAFxDxxPIAPV HILIVPNxHIESVNxVExxLLGHMIXVARxLAXxxG--LxESGYRLVINTGPNAGQSVF HLMHLLHLLGGRxMPFxx-----x-----
>CON.16
-----MxDCIFCKIVxGEIPSxxVYEDExVLAFLxINPAPV HILVLPKHIxSLxxIxELIGHIxxxIxKIAKEXG--IxExGYRVVxNCGxDGGQTVx HLFHLLHLLGGRxLxWPP-----G-----
>CON.17
----MxDCLFCKIxxGEIPAxKVYEDDxVLAFLxDIxPQAPx HxLIIIPKHIxxxxDLxxELIGxIXRVAXxIARExG--IxxxGFRIVxNNGAxAGQSVF HIFHLLHLLGGRxLxWPP-----G-----
>CON.18
-----xxDCLFCRIVAGEIPSxxVYEDExVYAFxDVAPQAPV HILIIIPRQHIPSxxDLxAVVSHLIVVAXDIAQxEG--IAESGYRLVxNVGxDGxQVSD HLFHLLHLLGGRxLEWPP-----G-----

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>CON.19 (Hit Hmi, 202 sequences)

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-----xxDCLFCKIVxGEIPAxVYEDDxVIAFxDINPQAPxHILVLPKKHIXTLNDLxxxLLGxMxxxAxXIAxxxG--xxExGYRvVxNCNxxGGQTVYHILHLILGGRxMxWPP-----G-----
>CON.20
-----MxCIFCxiAxGEIPADxVYKDEDVVAFRDINPQAPVFLIIPxRHIAxSLxDLxDxLAGxMxxVANELARxxxG--IxESGYRVVNSGxEGGQVvxxHILHLILGGRQLSxxL-----G-----
>CON.21 (Hint Eco, 213 sequences)
-----MxETIFSKIIRREIPADIVYQDDLVTAFRDIxPQAPxHILVIVPNxLIPTVNDVxxExLGRMFTVAxKIAKQEG--IAEDGYRLIMNCNxxHGGQEVYHILHMLLGGRPLGPML-----x-----
>CON.22
-----xxxTIFxKIIXREIPAxIVYEDDDIIAFxDIXPxAPVHILIIPKKEIXTINDIXxELIGKMxLxxxKLAKELG--IDxxGYRVIxNxxNEDGGQTVFHLHHLGGGKLGxxx-----x-----
>CON.23
-----xxxxTIFxRIIXREIPADIVYEDDxFIAIRDIxPKAPVHLLVLPKKxxxRLxDLxD-xMGxLxLxAxRVARxxx--Lx--GYRLxVNVGExGGQEVFHVHILHLGGxxxx-----x-----
>CON.24
-----xCVFCKIVNKEIPAKIVYEDExxMAFHDINPQAPVHILIIPKKEHIPxxxxLEEKIIGHIXLxANELAKxLG--IxETGYRIIVNxxGxDxGQEVFHLHHLGGxxLGxxI-----x-----
>CON.25
-----MExCIFCKIINKEIPAKIXYEDDxVIAFHDIXPxAPVHILIIPKKxIPTLxDVQEELIGHIHxVAQxLARxLx--L--xGFRLVxNCGKEGGQEVFHLHYHLLGGxxx-----x-----
>CON.26
-----xxDCIFCKIVxKEIPxEIVYEDDxIVAFKDIxPxAPVHILVLPKKHIXSVxxLxxxLIGKMIxxAKKIAxExG--IxxxGYKLIFNVGRxGGQxIxHILHLGGxxxxxxx-----x-----
>CON.27
-----QxKDCIFCKIIRKEIPSKGVYEDDLVYAFHDINPVAPVHILIIPKKHIFGIQxLEPELVGHMFYVARKIAEELG--LANGGYRLVFVNGKDAGQSVFHLHLHLIGGRSWSWPP-----G-----
>CON.28
-----MxxCVFCEIIAKKMPADFXYEDEIVAFxDINPQAPVHILVLPKHYPTLxDxKxELLGKMIILVANEIAKKNF--IHxxGFRLVFNxNREAGQSIYHVLHLGGGRIMMWPP-----G-----
>CON.29
-----x-xPCDFCRIVxGEIPAxIVYRNDHVLAFRDIxPVAPxHVLIIIPxKHIAxSLNDLxxEIAQGILLAAxxVAExLG--IxESGYRLVFNTGxDALQSVFHLHGHILGGxxMGWPP--x--G-----
>CON.30
-----MxDCIFCKIVAGELPSKxxYEDDxIVAFxDINPxAPVHVLVLPKHXxNLADAxELLGKxLVAxEXIAxKxG--Ix-xGFRIxTNxGxxAGQxVxHILHYHLGGxxxxx-----x-----
>CON.31
-----xxxDCIFCRIVAGEIPAxVYRDDxVVAfXDIxPQAPVHLLVLPxQHIXSLxxAxxxxLGxLxLVAEVARxxG--LExxGYRVxxNxxGxxAGQxVxHILHHLGGxxxxxxx-----x-----
>CON.32
-----xxxNCIFCKIVxGQIPSKKVYEDDEILAFHDINPxAPVHFLIIPKxHIXSLxxxxxLLGRMMxLAPRLAxExG--xx-xGFRTVINTGxxGGQEVYHILHHLVGGPRPWxxx-----x-----
>CON.33
-----MSDCIFCKIITGEIPxKKVYEDDNI LAFHDINPAADVHVLVLPKKHIAxSLNExxxELMGKFMxLxIPKIAKxLG--Lx-xGFKTVFNTGKEGGQVMFHXHHLGGxxxxxxx-----x-----
>CON.34
-----MxDCIFCKIVxGEIPAxVYEDDxIVFKDIxPKAPVHLLVLPKxHIXLxELxxxLMxHMMxxLPxIAKxQG--Lx-xGFRTIINTGxGGQEVxHILHHLGGxxxxxxx-----x-----
>CON.35
-----MNDCLFCKIVxGxIPxNKVYEDDxVxAFRDIHPKAPT HVLVLPKQHIxTLxDV--ELLGxLMxRVQHIANxIx--xxExGYRVVInxREGGGQEVFHLHHLGGKxLPx-x-----x-----
>CON.36
-----MSDCIFCKIxxGEIPCxKIYEDDxVLAfXDIHPxAPVHVLIIPKRHIXTIxDIxxxLxGxMIxAAxEVAKxxx--IxExGYRLVxNCNxDGGQVVFHILHMLLGGKRLxxx-----x-----
>CON.37
-----xDxxCLFCKIXAGEEPSEKvWExxEFLCIKNKYPVAPVHVLVMPKxHIEKxEVxTGxFWxKMMxAVFEVvxxLG--LD-KGYKLVNNGAGY--NHFEHEHxHILGGSKxEPGG-----x-----
>CON.38
-----MIxDVFCIIKIGELKSExVYKDXDFxVIKDINPQAPVHLLIIPxKHFEIXxxFKxxLLGKxLLIADKVAxxxG--Lx-xGYRLIINEGxDGGKLVPHFHHLGGKRLGxKI-----x-----
>CON.39
-----MxxCIFCKIxxGEIPSxKVYEDEMI I IKDINPQAKIHYLLI PKEHFAxIXEMTEExLGRxLKKLSxxxDELG--LQ-NGFRLVSNKGEDGxQSVxHILHHLGGKLSxxM-----x-----
>CON.40
-----xxDCIFCKIVEGxIPSKKVYENDxVLAfHDIQPAAPVHVLIIPKKHIAxSMNDVxxELIGEIHxAAQIIAxELG--IAESGYRLINNCGxDxGQxVxHILHYHLLGGxKLxxx-----x-----
>CON.41
-----xxDDCIFCKIAXGEIPSxxVYEDDxVxAFDDIXPxAPVHVLVLPKxHYxNIxDGVP-xLxxLxxAVxEVAXxKG--Ix-EGFRVIxNTGxDAGQTVxHILHHLVGGxxMxxxx-----xx-----
>CON.42
-----MEDCIFCKIVRRELPSDIVYENExVLAfKDI NPMAPTHVLII PKxHLxSLNDLxExxLxxIxxAIKEVAKIXG--VYExGYRVIxSNCGEDGGQVvxxHILHHLGGKxLxxxI-----x-----
>CON.43
-----xxxDfYcDEVLsgKTxVxxVxETDxVLAfHHTRPFwPVHIVVLPKxHIXSLIXLxxxLLxELxVVRxVAAxVx--xEHGACRVxTNLGxY--QDSKHHLHHLVxxGxxxxx-----x-----

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>CON. 69
-----MDCIFCKIIAGEIPSxKVYEDDDFIAILDINPVxxGHTLLIIPKKHFxNIFDTPDDVGxKIYPVLxKLAxAIKEALxCDGINIVQNNExAAGQEVFHSIHIIIPRYENDxIK--FxxxxK-xYxSxEMxKxAEKIKxxIx--
>CON. 70
x---xxxECLGCRLANkxExVHVVEDDYVxCFLDHxPFNEGHTLILPKxHxxEVDDELxXTAxAIMxASxLISKAIKxLYxPDGITICQNGGV--FNELTYHMHVVPYKxQxFY----xxxxxxxxxxxxLxETxxxLxxxIxL
>CON. 71
-----MDCLGCRANGIEPLNIVYENExITCVLDIAPFNEGHTLILPKKHxYxDVEEMxETAYAIMDASxKLSxVLKxLFxPDGISICQNGGx--FNDLTYHMHIIIPRYEGDGFx----WSEPPHGAExRLxETRxxKIIXALxxx
>CON. 72
x---xxxCLGCxLAXKxI-TNTVYENDLVTCILDIAPLNEGHTLILPKxHYxDVDDLDEITAxEIMKTSAVLAKLLKxQFQPDGITVIQNGGK--FNDLTYHMHIIIPRYESDGFx----WVEPTTNAKGRLExETREKLIxLIxQQ
>CON. 73
-----MENCxFCKIINKEKKANIVYENDLVCCFLxEEPINEGHTMLIVPKKHxLDLDQLDxExAIEIMKISKIMVRVLKDTYKxDGYSIMQNGGS--FNNVGYHMHIIIPRYKGDGFS----WSYGEDx--xTLEVVSKKIxQQLKxx
>CON. 74
-----MxxCIFCEIISKxDAYIIVYENDVCCFLDKYPINKGHTLVVVPKxHYxEFxEVDxESLxxVIxxAQKIAxALExxxxxTDGITIMQNGGI--FKDVEHYHMHIIIPRFxDDGFS----WVEPxxVxxEDFSLxxLRxxLxKx
>CON. 75
-----MTIVEQIVxREIDAVIVYESxxVIAFADHPINFGHTLILCPxxPYxTFIDLPExIxxEIXxVARDLYRRIExxFxPDGISIFLQNGGx--FNELxHYHLHIFPRfxGDxFG----WxSSLGIQsx-----ExLRESLxxL
>CON. 76
-----MxCIFCxxIxxx---xILxQTEHFxVVDIDIPQxGHTLIIISKxHYxxIxELxxxxxxELIxLExxLIExLExxxxIxGVTIAXNNGMDxG---TFHFVHLIIPRYxxDGF----WDxx-xVxxxxx--xLxxFxxxLxx--
>CON. 77
M----xxDDCIFCKIANGIIPSxTIYEDDDFRVILDxxPASKGHTALILPKxHYxNIYELxDEXAAKVxxLAKKIAXxMKxxLxCDGxNIVQNGGEAAGQTVFHFHMHIIIPRYxxDxxx--IxWxPx-xxxxEExxEIxxxIxxxx--
>CON. 78
-----xxxCVFCxIVAGxxxAXxVxEDxxxVAFLDxRPLFxGHTVLIVPRxHVxTLxDLxPxxVxPFFxxVQRLAxAVExALxAXGSFVAXNNxV--SQSVPHTLVHVVPVPRxKGDGLR--GFWRPxxRYDxxExxxxxAxRIRxALxx--
>CON. 79
-----xxxCxFCxIxxxxxDxxLVxRxxxVVPVLxQRxxNPGHTxLVLVxHVTxLHxVPxDxLxEIFxVxARVTxAVRDAFGAVGSxVVQNNxx-PGQxLxHxHVHVIIPRxxGDGFx--xxDPxx-xxxxxxRxAXAAxLRRxLxx--
>CON. 80
x---xxDSCILCxINQDxLxHFxIAExxxFKAVLDxYPITEGHTLILSRSHxSHLEQLxDxEXELFxFARxLGxRMxxVMDxVDYNLIVNNGx-xGQHIPHVHIIIPRRKGDSDLx--FYWTRF-PxxxxxRLxKVxxKxxxx--
>CON. 81
-----MxCIFCxIAGxLPAxxVYEDExxIVLMDIYPLxxGHTVLIIPRxxHxxxLxELxxxxxHLxxLAXRVxxAXRxxAXGxxGxNLLINDGxxANQHVPHTVHLHIIIPRRxGDxxx--xxxRFG-xxxxxxLxxxAXxLxxxLxx--
>CON. 82
-----xxxCVFCxIVAGxAPAxVYEDDxxLAFLDIRPITRGTHTLVIIPKxHxxDLxDLxPxxGAXMFxxQRIAXxAXRxxSLxADGxNLxINDGRAAFQTVFHTLVHVVPVPRxxGDKLx--FAKGxL-xRRxxDxExTAXxLRxALxx--
>CON. 83
-----xxxCVFCxIVxGxAPASxVYEDDxxVLAfMDIxPVTPTGHTLVVVPVPRxHAXxLxDLxGAXMFxVGQRIAXALRxxSLxCEGVNLFADGxAAxQEVFHTVHLHVIIPRxxGDGFx--Lxxxxx-xxxRxxLDxxAXxIRxALxx--
>CON. 84
-----xxxxCIFCRIVAGEIPASxVYEDxxTIAFMDLxQVNPGHTVLVxxKxHxxTIYDLxExAAAVMRTAxRVARAVxxAFxPxGLTLxQANGxAGxQTVxHTVHLHVxPRxxxDGIX--xxWPxK-xPxxxxLxxxAXxRLRxxLxx--
>CON. 85
-----xxxxCxFCxIVxGxAPAxIVREWxDALAIxPxGxVTxGHTVLVIIPRxxHVxDxxxDPx-VTxxxMxRAELAAExxxxx-----xNLITSxGxxATQTVxHTLHxHLVPRxxGDGLx--LP-----WTxxxxxxx-----
>CON. 86
-----MxAXCVFCxIVAGxAPADVVREWDDVIAIRPLxPVTPTGHTVLVIPTHVxDVGQDPx-VSARTMACAAxLAGxLP-A-----ANVITSKGxAATQTVxHTLHHLVIVPRTAGDxLP--LP-----WTPQxxx-----Ax-----
>CON. 87
x---xxxxCxFCxIVxxxPARxVYRDxxVVAFFPxxPATxGHTLVVVPVPRxHVxDIwLxxxxAxLxxAVLRVAXAIRxALxPDGLNIIQSNGXAAATQTVxHTLVHVLPVPRWGDxMG--xIWPxx-xxSxxxxDxxxxIRxAXxx--
>CON. 88
-----xxCxFCxLxxxxAxWVARxxxAXAFxPLxPLAPGHTLVVVPVPRxHxxDIxDAPPxxLAATxxLVQVAXAMRxxALxAXGVNLSASGPGSEQSVPHLHFHVVPVPRWDDGIS--TWPxx--SxHRxxGDPxxxLAXALx--
>CON. 89
-----MTCPFCsIVxGDEDAxILDETDLAFAPLxPxSEGHTLVVVPKxHYESLFDIPExTLxxVxxHARxIAXRLRxx-GFDGVNLLHASGEAAQSVPHFHTLHLPVPRSDxLD--LWPES--YESxxxxxxYEIRxxLE--
>CON. 90
-----YExYxCPFCxxVxGIEQxDIYQDExVTAFIASxPNNKGTHTLVIIPNxxHYENIYDLPEXAXxIHxxAKxVAIAMKEVYKCDGVSxRQHNEPxxGNQDQVWHTLVHVFPVPRYxxDNLY--xTx-xx-xSxPEERxxYAEKLRxxFxx--
>CON. 91
-----xxGYxCPFCxLAXGDxxxDLVYQDDxVLVFIAXDGHxGHTVMIxPxHxExLYDLPDxVxxRIxxxTRxVALAMKxAWNPEGVSTRQHNEPAGNHVWHTVHVFPVPRWDDxLY--xxx-RH-PVDxEXRAxKAXELRAALxx--
>CON. 92
-----xxxYxCPFCxLxxGxxxxDVVxRTERAxAXIAPRPxNxGHTVLVIIPxxHxENLYDLPEXXXGHAVxDLVQxVAVAMRxxYGCxGVSTRQHNEPAGxQDQVWHTVHVFPVPRYxGDxLY--xxx-xx-xVxxEERxPYxxLRAXLxx--
>CON. 93
-----MPGYxCPFCGIAXTLPEsAVVLVDxNVFALVPTHGGIKGHTCLVIIPRxxHYENVLDIPDxLGxDFFRATRRLAxAMRxxVfxCEGISRQHNGPAGNHVWHTLVHVFPVPRYxNDGLY--GGQ-KV-PYSTEERIELAARLRAALH--


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>CON.119
-----xxxDCIFCKIVxGEIPARIVxETDxxIAFLDAxPLAxGHTLVI PKxHYERIxDMPxDxAxDLFXxVHxLxPxVExAVDADATxVAINNGxxAGQEVPHVHVHIVPRFEGDGGG--AMxxxR-DLSDxELDxIxxxIxxx----
>CON.120
-----xxxDCLFCKIISGEIPSHKVYEDExVYAFLDIYxSEGHTIVV PKKHFXxFTDMxExAxLFXxSVNKIxxxVEKAFSAxGxNIGINNGxVAGQxVPHVHVHIIPRxxGDGGG--SIVxTx---DxxNLxELAExIRxxx---
>CON.121
-----xxxCIFCKIVxKEIPNYTVYEDExVLAFLDIHPxAKGHTVVI PKxHxxxLxDMSEExxxxLxxGVxRAxERIxLxxLxPDGFNIGINxGxAAGQxVPHVHVHIIPRWEGDGGx--SIIx-N---xxxxVEEVxKxFxx-----
>CON.122
-----MxxCLFCKIxxxEIxSxxIYEDExTxAFLDIxPRAPGHTMVI PKKHxxxIxDLxxExIxLFXxVKKVxxxLxKxLxxDxFTIGINHGExAGQxVxHLHVHIIPRFxxDGGG--SVVx-N---PKESLxxIxEKIxxxxx---
>CON.123
-----MCIFCKIVNKEIPAIVYEDDxxLAFLDINPxSKGHTLVI PKxHYExFDEL PxExLxxLxxxIKKVVExLKK-LNxDGYNINNGxxAGQEVxHVHVHIIPRYExExxxx---xxxxx-KIDLDEIxxxIxx-----
>CON.124
-----xxFxLxPRL--xxDTxxIGDFPLCRLxLxNDxxYP-WxILVPRRxIxEIYQLxxxDQxQLxxESxxLAXxLxxxFxxDKMNVAAAL-----GNMVPQLHVIHHIARFxxDxAWPxxPVWGxxPxYxxxxxxxxxxxxLxxxLxxx
>CON.125
-----xxxFLDPRL--xADSxxVxDxPLCQVRLxDDARFP-WLILVPRxxxxEIxDLxxxDQAxLxxEIxxAxALRxxxxxDKLNIGAL-----GNVVxQLHVHVGRRxGDAAWPGPVWGxGxxYxxxxxxxxxIAXLRxxLxxx
>CON.126
-----MxxFLDXRL--xRDSxxIxLGLCELRLMNDxRWP-WLILVPRQxVxEIFDLTPLDQxMLTFETNxVAXALKxVTGxxKINVGAL-----GNIVRQLHVHVVIARxEGDxNWPxPVWGxGxPYxxxxxxxxFxxxIxLxALx--
>CON.127
-----MxxFLNPRL--EGDSLxVADLPLCxVRLMKDANY-PWLLIIPRxxLIEIIDLSExDQxQLMREIAXASRALRxxVTxCEKLNVGAL-----GNQVSQLHVHVVIARFxxDAAWPGPVGAXPPYEPxxxExLIXxLRxALAXx
>CON.128
-----xxxFLDPRL--AADTIPVGDxLCSVLLMDDARFP-WLILVPRRxxEITDLxxxDAxxLxxEIRIATxVMxxLAKPKVNVGAL-----GNVVAQLHVHVVIGRFRSDPAWPGPVWGxGTPYPxHAXAQLIERxxALFAAA
>CON.129
-----xxxFLDXRL--xADTxVxDxLxLCRLLMNDxRWP-WLILVPRRxIVELFDLxxxDRAXLxxEAxxVARALKxxxxAEKMNIATL-----GNVVRQLHVLHVVARxxxDPNWPxxPVWGFxxPYxPxEAEAXxxRLxExLx--
>CON.130
-----xxxWxLHPQL--AxDTHPVxxxLxEVxLMDDANY-PWILVPRxxxxExxDLxxDQxxLxxEIxxxSRALRxxFxPxKLNVAAL-----GNMVPQLHVHVVIARFxxDxAWPxxPVWGxxxPYxPExLxxRIxxLRxxLxxx
>CON.131
-----MFxLHPRL--xADTVxVxxWPLCRVLLMNDxRWP-WLILVPRRxVxEIHxLxxxDQxxLMxEIAXASxxLExxxxPDKINVGAL-----GNMVPQLHVHVVIARxRDDPAWPGPVWGxGxPYxxxELExxVxRLRxxLxxx
>CON.132
-----xxFxLHPRL--xADTLxVxDxxxCRVLLMNDxRYP-WLILVPRxxLRDFHDLxxxxxxxFMEEIRxVSEVLxExxxxAXKMVAAL-----GNMVPQLHVIHVVIARFExDAAWPGPVWGVGxPYxxxxxALxxKLxxAIxxx
>CON.133
-----MxFLDKRL--EKDSxLVxxxxxFOIRLMNDxRFF-WIILVPRxxxLTELHDLxxxxxNxLxxxAxLxGxxLkxxxKxDKINIGxL-----GNIVSQLHLHVIVxRHxxDAAWPGPVWGxGxxLDxxxKxxRxxLIxKxLxxx
>CON.134
-----xxxFLDXRL--AxDTLxLASLxLCQVLLFNDxRYD-WLVLVPRxxCxELDLDSxxQQxQLWREVxxVAQxLRxxQPxxKLNIGAL-----GNVVxQLHVHVIVLxxGDPAWPGPVWGHSPPYxxExxxxAXxxWQxxLxxx
>CON.135
-----MAxLHPRL--AADTxALGETDLCWLRWMNDQRFX-WLIVVPKRDLREWHHLPxEQQALLxxVNxLAXELEERITGADKINIGAL-----GNMVPQLHVIHIARFxxGDPCWPGPVWGGxPWxxxQxPWLxxLxLxxxxx
>CON.136
-----xxxWELHPQL--xADSFVxELxICQLRLINDQRFX-WLLLVPRIAAxELxDLxPxxxxQQLxxEIxxVSRVLQxxxQPxKINVAAL-----GNxVPLHVIHVIARFxxDAAWPxxPVWGxGxPYNPxDxxAXxNxLxSxxAXx
>CON.137
-----xFLHxxL--xxxSxxIxDLxLCxIRLxxNxxFP-WIILIPKRxxEIxDLxxxDQxxLMKEIxxxSKxMxxxFxxxKLNvxxI-----GNxVPLHVIHVVIARxxxDxAWPxxVWxxxxxYxxxxLxxxIxxIKxxFxxx
>CON.138
-----MxxFLHPQL--xADCHxLGxLxxxxLLHRNAXVx-WFILVPEtDAXDLDLDPxxxRxxLxxCxIxSxFLKxxLGxPKVNIAAI-----GNLVPQLHLHVIVGRRPxDPCWPxxPVWGHLLxxYxxxEIxxLxxxLxxxxxxx
>CON.139
-----xFLDXRL--ExDCFEIxExxxxxxLLMNNxxIP-WFIIVPxTDxxELYxLxxxEQxxLxxxINxISxFIxxxFxxDKLNVAxI-----GNVVKQMHVIHIGRxxExDPxWPxxPVWGNxxxYxxxExxxxxxLxxxxxxx
>CON.140
-----xMDxIIPPEx--LFESxWLYEHPLYSLMx-EKTEIP-WLLxVPKQxLxxx-xxxYxx--xLYGxIYQLxDxLQxxGLGxHFNIAKI-----GNKxPYxHVIHVIVFREPNDExWPDxIWCHExxSx-ExPEKKEExLxxFYsxx
>CON.141
-----MxFLDXRI--xSSxxLxDWPLSRVYLKNDAXFP-WxILVPRxEIQEIYQLSxxxRxxLMEEIxxLSxIMxxYFKPKLNIGAL-----GNIVSQLHVIHVVARFxxDxxWPHGIWQxxxxYxxxxLxxLVxxLRxxIxxx
>CON.142
-----xxxDWRxDRIG-GENPTVLxRLxxGFAVIGDVQFLPGYCVLLxxxxVxxLxLxPxxERxxFLxDMxxLGEAVxxACxxRRVNYEIL-----GNTDxFLHVAHVWPRYxWEPxExxPVWLYPxxLGP-RHDxLRxxIxxxLxxL
>CON.143
-----xxLIXQRVx-GxNPxVIxRMxSGWAVMGDVQxLPGYCLLLPDPVPSLNDLxxEARxxYLxDMAxIGDALLxATGAxRINYEIx-----GNxEPxLHxHVIHFPRYASEPExxxPxWxYD-xFxxxxHGxLxxxIRxxLxxx

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>CON.144
-----xCLICERIX-GxNPYFVKELETGYVYIGDHQYFKG YTLFLCKEHxTELHxLExxxRxKFLxEMSLVAEAVxxAFxAEKMNyELL-----GNGDAHLHWHLFPFRxxGDxxxKGPVWwxPxxPxxxELExMKxxLxxELxKL
>CON.145
-----xxxCxxCxxVx-xxxxxxVWxFPxSVAFLGPxQxxxGYCVLxNRxHASELxQLGx-DRTAFLDDMAxLAEAIxxCFxPHKMNyELL-----GNxVPHLHWHIFFRQxxDPxRLHPVwxAxRLGxxPxxEVVERLRAWLTxN
>CON.146
---W---xxxCGMCxDAH-NEHSxLIXxTxSYVRLxRNQxHxGWxIVFLREHVxDLxELxxxQLSxFWxDVQRAARAVxKVFxPxKINYLVM-----GHRxPHLHCHIFPQHxxDDPxxNVx--IxDxLxDDEYDxxVxALRKAWxxS
>CON.147
-----xxxCxYCxExE-xxLMIxIXELxxSxLYLFKQDQTHxGRCIVAxKxHxxELxELsxEERxxFMxDVxxVxAXIxxKxFxPKINyGAY-----GDxxxHLHHLVFPKYKDGxxWGxxF-xMNPxLxDxEYxxMIxxIKxxLx--
>CON.148
-----EKFGxxIKEFDxSxxYLxRDQTxRGHCVVVxKESxSxYxRLSTLERNTFxADIxRVxKAIxKxFxPDXIQYIYx-----xDVDxQLxHHLIIPKYKDxETYGKxx-xxDxxLxEEEYExxLxxQIxENLx--
>CON.149
----xx-xxCxxCGFxL----WxPIAxLSVSRVGLYDDARFPGRxIVSLREHYDHLDEAPxxILxxFMADIQxASxVLRRxGVERVNIAIL-----GNxxxHVHHAHVIPRRxxDxNxGxAPWDxAxxLxPxxRxxLVxxLRxxFxxx
>CON.150
----xxGxxCxMCxxxx-xxWGIRIxGEVADAYLxRxGxxRGYxVVIWRGRVxEPTELSDxEAAAYWxDVLxVGRALxxxYxPLKMNYxxL-----GNxVPHLHHLVLPVPRYxDDPAGxPLxxxLDxxDxxQLxxDAAALRxLLxxx
>CON.151
-----xxxCPMCSKWx-DDPxLRIAELEHxxVMLNRDQFFPGYxVVFTRxHVTELFHLDxxVRxGVMEEVSAVAALxxLFQPxKINyELL-----GNMVPxHMHHLVPRFATDPLWPRPIWSEPHxLxxEEYxERIELIRxxLxxx
>CON.152
-----DxxCKACxGTW-PRxDHFIA DLGLSRAYLHDDQFFPGWTVLVFQRHATELFHLSPEERxxLIEEVxRVAXxLAExxxAxKINyELL-----GNQLPHLHHLIIPRLADDPAPLEPVWRVPHxLxGxxLxxxIDRLRxxxxxx
>CON.153
-----xxxCLCxxG----GxIWRDxxxRVVxVDDxxYPGFCRVIWNxHVxEMSDLxxxDRxxLMxxVxxVExALRxxMxPxKINLASL-----GNMVPxHLHWHVIPRFxxDxHFPxPVWAxxQxxxxxxxxLxxxLxxxLxxx
>CON.154
-----xxxCPICAxx----EDILxQxxxLRVIAVDExxAPAFRCRVIWQEHVAEMTDLxPAERxELMExVYRVEAAMRQVFxPxKINLASL-----GNVVPxHLHWHVIARFEDDAxFPAPIWAxPxLPE-DWxxQVxxLLxxxx--
>CON.155
-----xPxCPLCQxxG----GxLLWRGxxLRVIxVxDxDYPGFRTRVIWNxHIxEMTDLSxxxRxxLMxAVYxVExVQRxxLxPKINLAQF-----GNMVPxHLHWHIIPRWRxDxHFPDAIWAxPRxxxxxxxxLxxYxxxLxxLxAL
>CON.156
-----xxCPLCAxxx----ExIWRNxxFxLIDVSDPxFPxYFRLIxxDHVxEMSDLsxErxxMWDLLxxLEEAMxEAMRPDKVNWAQF-----GNMVPxHLHWHLIARWxDxxFPECPWxPxQVIxExxxExLxxRLAxLxxx
>CON.157
-----MIYENxxIxI-ExExSEIP-WIKIFTKxxYKELSDCxxxxRxxLFExLxIXEKxMLxYxPxKINIASF-----GNYVPRVxHVMARFEEDSFFPExMWGxKQLPx--FExFxxxLxxxLxxx
>CON.158
-----xxNATxxKF--GYPxTLIxEYxHWxVLLRPxQPTLGLVVLVxKExAxAFGxLxxxAFaelxxVVxxIExxLxxxVxYEKINyLML-----MMVDPxVHFHVIPRYxGxRxFxDAGWPxPxLDxxxxxxxxLxxxLxxxWxx-
>CON.159
-----xxLxxFRxKF--RVDELLIxxxEAWxWSVRPxQxTLGSxILSLNRxAxxLxEVtTxExAxLxIVxxLExxLxxxFxxDxINyLxL-----MMVDxHVHFHVIPRYxxxRxxWxDxGWPxxPxxxxxxxxLxxLRxxLxxxxxxxx
>CON.160
-----xxx---xxx--YxxxxIKEYxYWTIxIHxNQxYLGRCI IWxKRxx-DLSDxTxEExxELxxVLxELxxxxxKLFQPDWFNyxxL-----GNxxxHxHxHFIPRYxxxRTFxDRWGHNYxxxxxILxxIRDxIKxxLx--
>CON.161
---xLxxxxxxxxGxxM--DYNQLKIKSFKHWDIYLHENQCYLGRVVFQLKDGIEDFLDIDxEVRDEFFQIGQNVKALKxLFPKPKMNyAAL-----SNTSPxHMHHLIIPRYKEPRTFKDTRWGQNYVIDE xTLFKIRDALKxQL---
>CON.162
-----xxCxxCxx---xxxGxxIxETxxWxVFLAPxQxxLGCVVALKRHxxxLSxLxxEExDFxxIVKkLExALKxxFxATLfnWxCL-----MNxxPHLHWHFIPRYxxxVxFxDPxFGxxxxIxxExxxxIxxxIKxxLxx-
>CON.163
---ELxKGICxSCYNxx-E--GxIIYEDDKVRCxFEKxPRATGHTxIxSKEHYEDISEMPxELGxHIFxISxxIIXLxKEIXGAEKV-YMCT-----MCDRNxHFFHQLFPRLKxKGFxKNF--VKEExETxxLYKEKLKELxx-----
>CON.164
-----xSPKAMIYEDQxLYVCLAxPI TRGHTIVAWKExVPDLNxxLxERDYDYLMDTVNAVVRxAMxKVLxIKKV-YLxY-----MDEARxVHWHLVPRYx-EKGFxVF--LHQPSLAPxI-xRxL---KxK----
>CON.165
-----DCxxCxxxx---xxxxIWXNERWRLxxxxxxxxGLPLVLMxPxEHx-DLxDLPELAAExGxLxxxIxRxVEALPxVGRxHVxRx-----GDGGAHLHWHVFFARPxxxxQLxGSxWD-DLxxPxDVxxADAxxVAXxLAXx
>CON.166
PG--x-xxDCxAcx-AP---DDAYIWXERWVRAMRPTGLPMVLI LEXRSHL-DLGDLPNLLAAELGVMTRVLERAIRSLDGVARVHVNRW-----GDGSAHLHWHVFLARPYGRLQLRGTLWD-DIPIPExQWRENALVAAWLADx
>CON.167
-----xxCxxCx-xx---xxxxIWXDEHWRLxxxxPxxLPxVxLxPRxHx-DLxDLPExxAELGPMQRVERAIxSLGGVARVHVxRW-----GDGxALHLHWHVLPxARPxGMMQxRGxLWE-DVxLPxxxxxxxxRxIAXAMAXx
>CON.168
-----DCxxCxxAA-DxxYVWVRDDLxMLGxPEPxSLPFVxFLMPRRHA-DLSDLTPxEAARMGELLVxIERAAxxVLDVPRIQVxRW-----GDGxELHHLHWHVLYARPTGMxQLRGTxWD-DLAXPxAExRADxEXVAXRLEAX

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>CON. 219
xxAYxExGxxYwxDLvxExGeryLxQxGxxxWlxxFAPRGLxVxAIF-xGxxTxDLxxxDLxELaxGLxxVlxyYDxxN-IxSfNxAlyxA--xEdxGFxxHxRIxxRxxSDISxL--Q-ILxxDxxxIxxPExIaxELKxxFx--
>CON. 220
FEAFxxxxxxFWxELIxxExGeryIGQIGDxHwLxxFxPLGMGEMCVF-PGxxxIxDFxDxxxxxLVxGLxxIFxyFYxxKG-IYSFNASLFFG--PGQxxFPAHFRIIVPRAPDLNFF--Q-AxLQEPVxVVxPEDLCREIRPYFxx--
>CON. 221
QIxFxxxGKEYFTxLYxTExGERWIGExGNVAWMHAYAPKGHNDFIGIF-xxxxSFxDIxExDWDDFAxGLxxIFxxFKEQG-FxSfNLxLxIS--VxNxxQxVHVRILIPRTSDINxF--Q-xLHQEPLSYKxPEEVAxxARKFFxK-
>CON. 222
HLRHxExGxRlFSDYLxxExGxRYIGATGxWEWLAFAPEGFYELWIGIL-PGxTSLxxPxDxxWQxLARGVINVQKFYRSLG-RNGYNLGLLxLEDxNDLELR--VVLTVRRSDFTGF--E-IMLGDMAFTTPEXTAExARxFWQx-
>CON. 223
QLxYExxGRxYwXELxExExGeryVGxxGxxxWFxPFAPxGFYHVxGVx-xxxxDIxELsDEDLxxLaxGIxxVlxxYxxxG-LNSFNFLxGAXPxxxxxxLxxRIVARxxDVTYF--E-KLHxEMVDxxPEExAxLRxxF--
>CON. 224
HLKYxKHGKNFWEDLCxxERGERWIGQxGRxCWITSFAPMGxNELAVW-PGRQGfLEWTxQDvWDLARGLNxVLKxWHEMG-xGTFNFtCFxPPLxDSPhFCxxMRLVTRRTDDYFL--Q-RxMxNELIITxPExMAQxMRExFxx--
>CON. 225
--ALNKRHXKSFsqYMLEENPxLxVKDYGEVxLVVPYFMKRPLDMLLVKdSExRYLHQLSxxEQQQVVxGIQxAIxAAILQMGxPPAYNMIVNNGPGCG----LYLEFLAKTQxMGgy--EQIGL--FVCQANAxDsAxLRQxIxx--
>CON. 226
AEIFE--xGCHLCTSR---HDDRiIYENETwiXWATSSPRRNYHVRxAPKRHVxRFTDLxxxEIxGLAETLkxVsAMDKIGIxRDRNVLFYSxPYGYDSFFHLHVDIIPFEx-IGGI--E-MLDSVRVARVxPEEAAKxLREALEK-
>CON. 227
-x---xxxxCFFCxxPxxDEDGLIVARGExVYVVLNLYPYNPGHLMVCPYRHVADYxDLTxxExxELxxFTQxAMRVLrxVSxPxGFNIGMNxGxVAGAGIAHLHQHVPRWxGDANP--V-IGxT-KVLPQLLxDTRxLLAxAWxxx
>CON. 228
-----DxDGcxFcXLPERDRENxIVARSdHAFVLLNNYPYnPGHVMVIPxxHTGDYxxLxDxxLLDHARLkQRTxDALExALxPDGFNAGLNLGxGAGGSIDHLHThVPRWxGDTNP--V-IxDT-KVIVEALDDTYDRLEHFAFAxD
>CON. 229
-----xGCVFCAxAAAADAENLVLYRGQxCFVVMNLYPYNTGHLMVVPYxHTADLxGLxxETAxELFxLTQRSVAILOtYxPHGFNLGMNLGRVAGAGIxHLHMHIVPRWNGDTNP--I-IGGT-KLIPEALDDTYARLRPxFxxx
>CON. 230
-----xxCIFCxxxxxDxExLILYRGxxxFVIMNxYPYnNGHLMVxPxRHVxxLxxLxxEExxELxxLxxxxxxVLRxxxxPxGFNIGINLGRxAGAGIxHLHxHIVPRWxGDTNP--V-IxDT-RVIPExLxxTYxxLxxxFxxx
>CON. 231
-----xxxxSVFxxILxSDxETFIvHRGxxxFVILNAFPYSSGHLVLVLPxRxVaxLxDLTxDExxELWxxVTDAVxALKxxYxPEGLNVGINLGxAGGSVxHLHVHVPRWxGDSNT--A-VaxT-RVLPEALxxTxRIRxxWxxx
>CON. 232
-----xxxxxFxEIxxxDxxxLILxRxxRxFxIMNRYPYNPGHLMVVPYREVxDLxxLTxxExxDLxxIxxxxxxLxxAMKPxGFNIGFNLGxAGAGIxHLHxHIVPRWxGDTNP--V-IGxT-RVLPQxLxxLWExLxxxxxxx
>CON. 233
-----xPSIFxxLAAEDEDNLILWRGEHVfVIMNxYPYnNGHLIIVPYREVAxYDALTxEQxxMTxAIxRCIRWLRxALKPDGFNVGMNLGRAAGAGIPHLHxHVPRWxGDTNP--T-TAET-KVLPExLRDtyRKLRAAIDAD
>CON. 234
-----xGCxFCxAxxxDxExLILYRGxxAxVILNRYPYNPGHLMVxPxRHVxGLxELxxxExxELxxLxxxAVRxxLxxxxxxPxGFNIGLNLGRxAGAGIxHLHxHIVPRWxGDTNP--V-LxET-KVIxESLEETyXKLxExxxxx
>CON. 235
-----xxCVFCxxxxxDxxxxIIXRGExxFVILNXYPYTSGHLMVVPYxHxxxLxxLxxExxxEMMxLxxxxxxVLRxxYxPxGINIGMNLGxAGAGIAHLHLVLPWxGDTNT--x-VGET-RVLPExLxxTWxRLRxxxxxxx
>CON. 236
-----KxxGCFLCxYxxxDDDNLVxYRGRHCFxIMNKYPYnPGHVMVAPYRHVxxIXDLsEELxEXcXxLxxxIxxALxKVLGxxDFxIGINIGRVAGAGIEHMHIIIPRXPx-----x-Ixxx-xxxxxxVxxxTxLRExLxxx
>CON. 237
-----xGCVFCxIxxNDEExxVLYRDExCFxVMNxYPYTPGHFMIIpHxHxDxxExLxxExWxHMSxxVQxGVKLLKExFGAxGVNIGMNLGxAGAGIxHLHxHIVPRWxGDTNT--T-IGxT-RVYGxDFxxIYxKLKxxxxxxx
>CON. 238
-----MSNEE---LIIMKNxxxxVxHNPxPFNNGHLIIPxRHx--SINEIDxSxLxELMDLxKRFxxILxRVYNPHGFNVGIS-----LxPHVxIQVPRWNGDvMT--LFYNVK-V-VPETVxESVSRIRxAVRE-
>CON. 239
xx---xDVxCVFCAIAEG----xVLYNDxxNMVxMNIYPYnRGHLxVIPxKHytDLNELxxEELKxLFxLVQRxxxLIREVIKPDGINVGINLGEAAGxSIXHLHIIHIVPRFKxESME--T-TADT-RVIEExIXKFxEKID-----
>CON. 240
LV---PxxxCILCxIxxx---LxVxExExFIVSVNLYPYNPGHLIIFPRRHIXDxRELTxEExxELHExTxxxLxILDxxWxPxGFNIGYNMGxxSGGSIPHLHxHIVPRYPNExxD--I-LxGx-RIIIEDPERLxKxxx-----
>CON. 241
-----xxxxCxFCxxxxx-----xIVxENxxAYAIxDxYPTxxHxLIIIPKRHVxDYFDLxxxExxxxxxLLxxxRxxIxxDxSVxGFNIGxNxGxxAGQTIFHxHIIHLIPRRxGDVxN--P-RGGV-RGVIPxKxxY-----
>CON. 242
-----xxxCIFCxxxxx-----xxIxENExAxAIYDKYPVNxGHxLIIIPKRHxxSFFeATxEEIxxIxxLLxEVKExLDxKYxPDGYNIGVNVGxxAGQTIxHLHIIHIIIPRYxGDVEN--P-RGGI-RxIKxxLVxYxx-----
>CON. 243
-----xxxCxFCxxxxx-----ExIxENDLxYaxYDxYPVsXGHLIIPxRHVxxYFDxTxEERxAIxxLIxxxKxLLDxKYxPDGYNIGVNxGExAGQTVMHHLHIIHLIPRYxGDVxx--P-xGGV-RGVIPxKxxY-----

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>CON.244
-x---xxxxCVFCQxxxx---xxVLENDLxAFWDIHPVSKGHLIIIPKxHxxTFFDVxxxExxAMxxLIxxAKxLLDxxYHPDGYNIGINVGxxAGQTVMHCHIIHLIPRYxGDxPx---x-xGxI-RxMLPxxxxxxx-----
>CON.245
-----xCxFCxx--x-----xxILENELxxAFFDRxPVxPGHLIIIPKxHRxDYFALTxxEKQAIxxLLQxGKxLLEEYQPDGYNIGxNCGxxAGQTIFHCHCHLIIPRYxGDxPx--P-RGGV-RGVIPxRQxY-----
>CON.246
-----xxCPFCEx--x-----DxIFENELxAFYDxxPVSEGHILIVPKRHxASYFELTKAERxAIDELLELCKxYLDExVHPDAYNIGINVGxxAAGQTVFHCHVHLIPRYQGDVKN--P-TGGV-RGVIPKQNYR-----
>CON.247
-----xxxxCPFCxxxxQ---xIVLENExCxFLQxxxxxLxGSGIIVPKxHRxTVFDLTxxEEWxxTYxLLxEVKxYLDxxYxPDGYNIGWNxGxVGGQHIxHAHLHVIPRYxDEPA---GKGI-RYxLKxxxNRRxxxx-----
>CON.248
-----xxxxCRFCxxNxD---xPLxxNxxFYMLxSxDPxPxAxMIVxxRHxESPfEMxxEEWADLGxMLxxAKxxLA-xxxPDGFTLGWNVGAVGGQHVFAHLHVIXRFAGEPxx---GRGI-RxIxRxx-----
>CON.249
-----xxxxSPFxxIPxx---EWIASNExAFAIxDxFVTPGHTLVIxRRxVxxWWEATxxEQxxLMELVdXVRxxLDxxxxPDGYNVGFNAGxAAGQTVxHLHVHVIPRYxGDVxD--P-RGGV-RHVIPxRGNy-----
>CON.250
-----MxxFxxIPxx---RxIYExExFFIIXxDxFVSPGHxLIISNxxKxDFFELsxEEKxxLxKLIxxAKxLIEExxxPDGYNIGMNCGEAGQTVFHFHCHIIIPRYxGDMEN--P-RGGV-RHxIPGKGxY-----
>CON.251
-----xxxxCPFCxxxxD---GxLxxNxLAYVRxDxFVSPGHLIIIPRRHxxDWFDLTxxEQxAIxELIXQAKxxLDxxYxPDGYNIGMNCGEAAGQTVMHMCHLIIPRYxGDxxD--P-RGGV-RxVIPEKxDYxxxx-----
>CON.252
-----xxxxCPFCxx--x-----xxVLENxLAFAIYDRxPVTPGHxLIIPxRHVADWFDxTxxEQxAMLxLxxxxRxxLxxExxPDGFNIGVNCGxAAGQTVFHVHMHLIPRYxGDMxD--P-xGGV-RGVIPARQKY-----
>CON.253
-----xxxxCxFCNPxxx---xLLTESATAYAFDGYPVSKGHxLIIPKRHVSNYFELxKFEQsACWxMVNKVQxILxxEFxPDGFNIGININxxAGQIXxHxxIHLIPRYxGDxxN--x-KGGI-RxVIPxKxxx-----
>CON.254
-----xxxxCPFCxLxxx---RIIxNxxAxxIxDGFVSPGHTLIIIPRRHVASFfExTxERxALxxLLxxAKxxLDxxExxPDGYNIGINDGxAAGQTVPHLHIIHLIPRYxGDxxD--P-RGGV-RWVIPEKAXYwxxx-----
>CON.255
-x---xxxDCxFCRxxSxD---PIIxENRSFxAxFDxxPVNPGHAXIIPRRHVxSLFDLxExEQADYFDxIXGVRxxIEExTxPDAyTIGxNDGRAAGRSIDHLHIXLIPRYxGDVED--P-RGGI-RNVIPxRxxxxxxx-----
>CON.256
-----xxxxCPFCxxxxx---RVxFxxxxVxAIWDAFPVSPGHLIIVPRRHVxTWxDLxxxEQxAIWxAIxxAxxxIxxRxxPDGFNVGFNxGEAAGQTVxHFLHVIPRxxGDMxD--P-RGGV-RHVIPxKGNy-----
>CON.257
-----TExNCPYCNFDEY---DVIxKNDFGVILPEPNLSKGHxVIIPLRHVSSFFDVTDKERKSLMSLLELARNELQRHQPxGFHIGFNDGxVfGExSEHLHIIHLIPRYExQxLK--x-RWGI-xxx-----
>CON.258
-----xxxDCPFCTxSSE---xLLETESAxAxAVxxxxPxTxGHITIVVPKRHVASYFDLxxxEQRAxWxVVDRVKSxLNERxxPDGFxVGFxxGxAxDxxAGHAXIHLIPRxxPxxSxx--x-PRx---V-----
>CON.259
-----xxCxFCDxxxI---xxIYENxLxFAFxTNIPIxPGHxLVCPxRxVSxIDELTDGEIxALFDLxxxIxExMKKxFNADGFNYAWNEGxxAGQTVxHLHIIHLIPRKKGDxG----IxES-RxxSPEQELxEVAEL-----
>CON.260
-----xxxxCPFCxSxxx---xxxFxSExFxAIYNxSPILPGHSLIIPKRHVxSLFDLTxxELsxFMxFxRKVxxLLxKIFxTDAFDWxLQEGxAAGQSVxHLHMHIIPRkxGDLPE--P-GDWx-RxxLSExELxxIxxx-----
>CON.261
-----MxCPFCxPxxE---xILYEDELIRILIDSYPANRGHLVVPRRHVExWEELxEEEKxALLRGVELAMExLKExLxPDGFNVGINLGAAGQTVPHLHVHVIPRWKGDcxx--P-RGGV-RKAVLDIEDENLSLk-----
>CON.262
-----PFLPYExDLVADISDTHVxLLNKFNVDHHLIIVTRxFExQExLxxxDFxALxxCLxE-----xDGL-xFYNGGxxAGASQPHKHLQVLP-----
>CON.263
WAIHG-LxSxxxxNPFPLPYExSMVxExAGExHVCLLNKFPVISPGLLICSkxFVPQxSxLSxADFxAWLxGFDx-----PDVF-GFYNCGPVAGASQPHRHMQLV-----
>CON.264
-----QERKFLCxxNLPxEQx-GIPFGxxYxILVNPFPFIPxHFTIPxxxHVPQxIxxRFxDMLDLARxLxD-----YT---IFYN-GPKCGASAPHxHFQAGNKGFMPiEx--D-xx-----
>CON.265
--xx---xxCPFCD-xExLxxI--IxEGDxIWLKNKYPTLxxQVIESxDxxGDISTYSxEHxxxLxxFALExWxEMxxSxKYKSVLxYKNxGPxSGGSLRHxPHMQIVGLxxxD-----
>CON.266
-ExxxYSExCPFCRGNEHxxxxxxIxDGQWKSvKNKYPIIDEHVIIDTYRHNGNFYNMSExEFxNMfXMYxNRYKxLxxxxGIxYINIFKNxLRDAGASLMHPSQIX-----
>CON.267
-HNKKFKEDCPFCxxxQHxTAXKIYDxQGSxKVVENKYPxVxHxVVIIEGRDHSKxFYELsKEHIxEI IKAYIxVSKNIYExEFIKYVQVFNNGRxxAGASLQHxHHSQII-----
>CON.268
-DEX-----xCPFCGPxESxTPPxRVGxxxxWRVFPNKFPIDxHVIVESPDHxxxIxLsxxEVxEI IKYxDRFRxxKx---xxxVxIFxNQGxxSGASIXHPSQLVxVP-----

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>CON. 269
xxIx-xxxxCPFCPExERxTPxD---GTRIVTFPNLYPFADxHVTVI TRAHxV--ExFxxRQIxDALxGQI-----xSLxxxGYxSINWNYLPSAGASIxH~~PHL~~-----
>CON. 270
-----CPFCxENxKMPxKEIAExGRIVVFPNLFYPSKHVVVFSxQH~~YVKLEEF~~TxxLIKDAFxAAQTYIQxVxxxxKxxYASINWNYLPxSGGSILH~~PHL~~HVI-----
>CON. 271
--VxMKxGVCFFCxEK-YHxKPIIxxxxHWxVTENxxPGxKH~~FL~~IxKxHIxxxxELTxAxELxxIFxxLxxKxx----IxGGxxIMRFGDxxGATVxH~~LH~~AHLIxGxxRxExx--ExLxxLGYKxKK-----
>CON. 272
--VxIxGxCPFCxE-K-WHxxPILKRxxDWFITRxxxPNTRx~~FL~~IIGRxHxExF~~xEL~~xxxDWxxITxLVRWAIKFKF----IRGGGLAMRFGD~~T~~DGATVxH~~LH~~xHLI~~V~~PNIKTGKA--xTVx~~F~~PIG-----
>CON. 273
--YRMxAGICLFCPxRx-HEKQxVLWETxHMMVTPNEFP~~G~~TRL~~L~~LLI~~P~~KHEVTDLLDLsxAARAD~~F~~WEVLxxVRDRYG----LTHYGLGVRNGDCRGGTIR~~LH~~~~V~~HVLxGxxExxxF--xPVRMK~~F~~SSxPxR-----
>CON. 274
--LEHKSxxCxFC---S-xESxQVVRExEHF~~x~~LVKNx~~F~~GIVx~~E~~~~L~~MLIPKRHIxSLxELxxDExxEYVDIIxx----YE----xxGYSIYARAxSxTKSV~~P~~Hx~~H~~THLIRIDGKxIKx--Lx----YxxxPHI--LxxR-----
>CON. 275
-----MECF~~F~~CEI-DKx---RxIKxxK~~H~~CFVIFSNPRLMPG~~L~~LLVI~~P~~KRHVEKLxELxExExxDL~~F~~NxVixYQE~~K~~IIKxI-AxGCDIRQNYR~~K~~QxxLKV~~D~~~~L~~H~~I~~HLQPRDFEDEL-----YxKx-QxExEL~~F~~E~~E~~IxKLLxx----
>CON. 276
----LxDHxCFFCNx-Nxx---FxIxENxxxYIIxARAPY~~V~~ED~~L~~LLIIPKRHVixLxNLxxxExxxIxxLIxxxN~~x~~LHxK--Hxx--VxLxxRxSTGKTix~~LH~~~~F~~H~~L~~V~~P~~KxxIxx-----xxS-Qx~~D~~KR~~K~~F~~x~~IxExNKLKxLx--
>CON. 277
----xxxxDx~~F~~CxE--EIIxRQLVYEGKHVxILYDYA~~P~~IG~~K~~L~~F~~FIIVP~~K~~xHRxxF~~x~~ELTx~~D~~EYVEAxLSxKLIxHYKEQ-GYSxxYIFH~~K~~xxRxAGQSV~~P~~H~~V~~Hx~~H~~LI~~F~~TxxKxELx--VLxGSS-PLx~~D~~DELRRRVxxYRxELxx--
>CON. 278
--xx-xxxxCPFCNx--xVLExQ~~F~~YEDDLVIGLxTYKPIx~~P~~G~~L~~CLII~~P~~KRHVERF~~x~~ELTDx~~E~~ILRIGQV~~I~~KKVNxA~~E~~KVFGT~~x~~SYILLQKNGx~~E~~VGQSV~~P~~H~~V~~H~~F~~HY~~P~~RRKxx-Lx--FLxxKK-PLxxEEMxExVxKMKxAIE~~x~~--
>CON. 279
P----xxxxCAF~~C~~xYLxGxRPFTILxRNxxVAVLVTRE~~Q~~R~~G~~x~~P~~~~L~~LLVI~~P~~VRHxPTILD~~L~~TDxExxALxxVRxAAx~~A~~IDxAYxRPGIAVQ~~N~~NGV-xxQAIx~~LH~~~~F~~H~~V~~AGTLPGGGTD--WGDP---ELxVxETD~~x~~IAxRIxPYxxx--
>CON. 280
P----VRDPCDLCEGMAGRExWxV~~V~~DEGEHTLTVINP~~W~~QFEV~~G~~QCCVITRRHVATLLDLS~~D~~PECSAVMxA~~A~~KRVAEALVxAYQPLGIL~~T~~FQ~~N~~NGV-YGQET~~P~~H~~F~~H~~V~~VPRQP--GSD--WGIP---PVxAxQLAETV~~K~~RIRAHLPx--
>CON. 281
-----xxxDCT~~F~~CDx~~E~~---ExKIxxRTKNF~~x~~VWLSIG~~Q~~IVEG~~L~~CLII~~P~~NDHYHCxGALPxxLxxEYLxLKE~~x~~VRxILxExY~~G~~-xCI--FYEHGNVQ~~P~~GLCY~~H~~AHLH~~V~~AVPVxxDLxxx--xxEDGL~~F~~PIKLxxx~~D~~x~~F~~xExGHYLYY--
>CON. 282
-----xxECx~~F~~CKILKxxxxN~~x~~ILxETDNFIV~~F~~PxTGx~~F~~IEG~~L~~LLIIP~~K~~xHIxxFAELSx~~E~~ELKELxxIINxxSEI~~x~~KKxYxxxxx--xFEH~~G~~xxSGxSIV~~H~~AHLHIIPxNIxxxxx--IxKxxxxxExIDxxNDxIxYxxYLxY--
>CON. 283
-----xxxCV~~F~~CDRSQ--FEERLIxExExFYIIATL~~Q~~IxxG~~V~~VLLx~~P~~KRHVxCLGAMxxxExxxxxxxxxxVxxxLxxEYxxxxI--IFEHG--GQTIK~~H~~AHLHIIPxxxDLxxR--IKx~~D~~FxxIxxxxxLxxxYxRxxPYLF--
>CON. 284
-----xxxCx~~F~~CxExN--LxDRILYETENWxLVPALGS~~F~~IPG~~L~~LLIVS~~K~~xHFxSIXxCPEDIFNELExLLKxVxKLIxxxYxxxxI--xFEH~~G~~xKGGCCID~~H~~x~~L~~HLI~~L~~PF~~D~~GxIIx--ExxxxSxxxxFxDIxDLxIxNxxYLFYN
>CON. 285
-----xxxxCE~~F~~CTELx~~D~~xIxRIMxxxExFVVMPTIGxIx~~L~~LLVLPKRHYESxQLxN~~x~~IxELxxLLxxLxNKLxx-FG-xV~~V~~--xFEH~~G~~xxSxCGVY~~H~~AHLHIIPVPSxIDxx--xFLxxxENISxxxTFxLNxxQYLMx--
>CON. 286
-----Mx~~D~~CQ~~F~~Cx~~E~~Fax-xKTRIIITEADxWVLLPTIG~~C~~LTPG~~L~~xLFMPLEHLDA~~A~~ADVxPADLxQVAAxLExMRxLIQxRYG-PxI--VAEHGE~~x~~GASCCS~~H~~x~~L~~HLI~~L~~IPVDPDAIx--AEKVG~~G~~PGxRLxSLADLPAAE~~x~~SYLYL-
>CON. 287
-----M~~P~~SCDL~~C~~x~~A~~IDPVxQPRVLAANxHAAAVPTIGAFVxG~~L~~LLVVPxxHVLSLGxLxxxERAGVDxLxRELxRLxDVYxSPVL--GFEYGLPGxRRIx~~H~~GHL~~L~~LPSTADLxGW--L-----
>CON. 288
--x--xIx~~C~~RF~~C~~xxxxxxxDRPLxESxxFxAIPSIGxLVEG~~L~~xLIVPKRHxLNFxxxxx--R~~x~~E~~F~~xxFASxVxxxVxxxY~~G~~-xV~~V~~--xFEH~~G~~SxTGCGVD~~H~~AHLHIIPVxxxDLxxx--V-xD~~x~~DxxxWxxIxL--xxxEYLxx--
>CON. 289
--x--xxRECT~~F~~CEVExxxxDYVLYESDH~~F~~VVMPCIGAL~~T~~DW~~L~~LLIVPKRH~~T~~LSVGLDDAxxADLxxLIPQVTDxIRxRxGxExL--VFEH~~G~~DKGGACx~~D~~~~H~~TH~~I~~HVPTxxDxxxF--LITMRPCxDWIxARHx~~V~~ERQRPYLxLx
>CON. 290
--x--xxxDCVLC~~P~~PL---LPGGVLAxDxxFL~~L~~MPDLAPLADG~~L~~LLLVTRxHxQCAGxFGxxLWxRALRWRDRVxLYRxAyGxDLL--LFEH~~G~~QGGGACID~~H~~AH~~W~~HL~~L~~PGT~~x~~GVRVAV--LExxGxPPAxHxALRARFRAGRSYLL--
>CON. 291
-----MxEx~~D~~FCxELSGAPxSRIIxTxxxTLIADMSPLVIG~~L~~LLLPx~~x~~HYLSFAQVLxxHxxEVxxxLxxFxxLYR~~x~~TFG-Exx--ILEHGMxSxACIT~~H~~AHL~~L~~HxLPIDx~~D~~xxxL--MxxDGLxxxxLxSLxELAx~~x~~DSPYFL--
>CON. 292
-x----xGDxCx~~F~~CQLMENPEQLxLVGETDNFYAWLExPPRAK~~G~~HTxVVPKEHxESVMDLSPSEYxExMxLVREVMEKx~~E~~GLGADGVSAMNIx~~E~~AGGQMPH~~A~~YI~~Q~~V~~F~~FRFEDDENA-----

Figure S6. Alignment of cluster consensus sequences of the HIT domain proteins from completely sequenced genomes. The phylogenetic tree, constructed from the multiple alignment of 15,351 HIT sequences (Figure 6A) was split into subtrees at the average depth of 1.5 from the tree tips, producing 292 clusters of 4+ sequences. Consensus sequences were derived for each cluster from the corresponding subsets of the alignment (positions, less than 30% conserved denoted by “x”). Positions corresponding to active site histidine residues are highlighted in yellow. Consensus sequence for the MccH^{Hmi} (CON.109), HinT^{Eco} (CON.19), and HinT^{Hmi} (CON.21) clades are shown in red font.