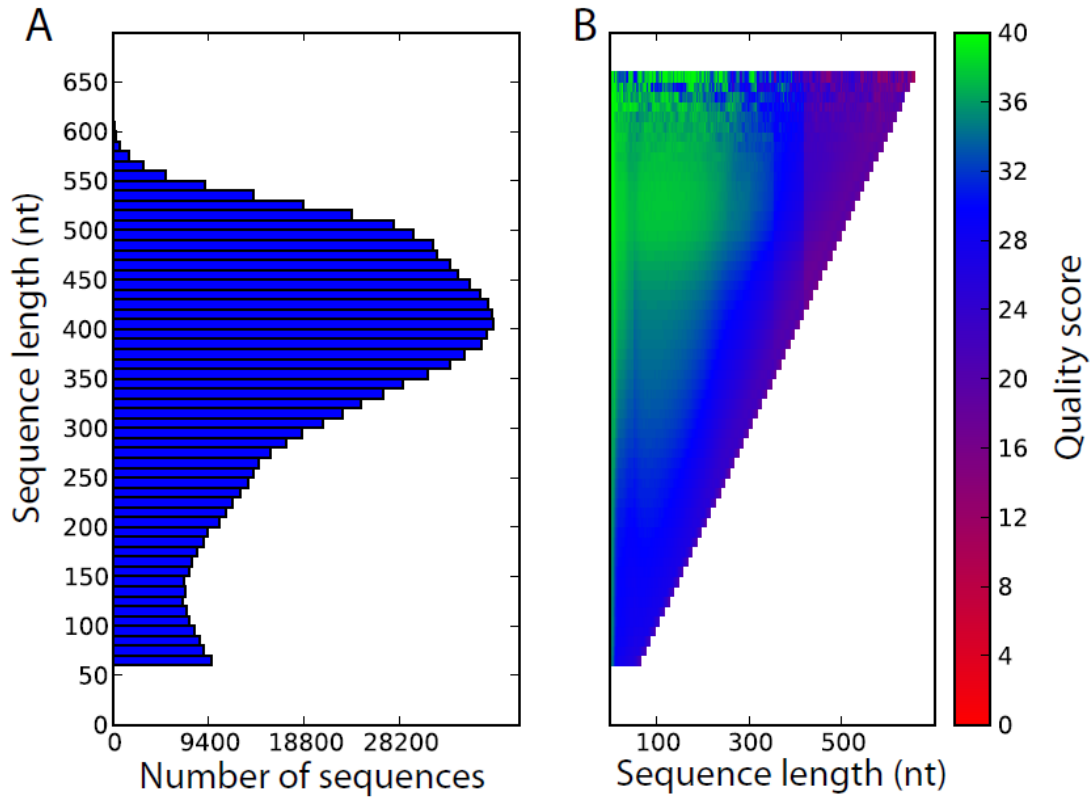


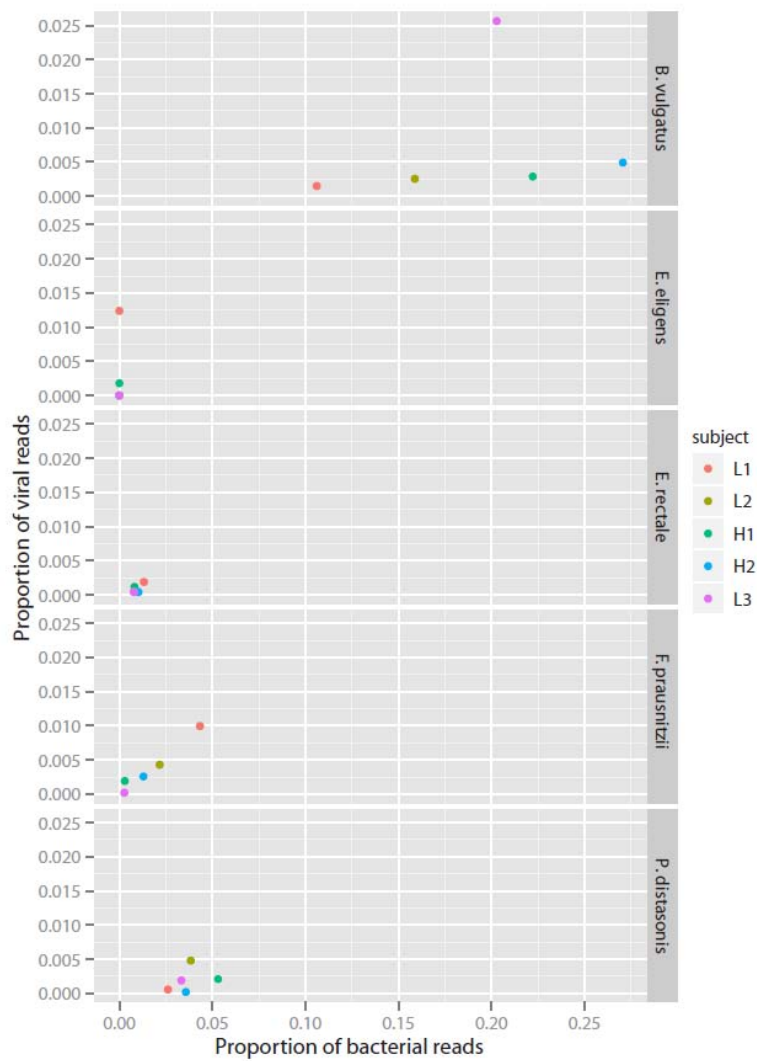
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Supplementary Figures



Supplementary Figure 1: Quality scores of VLP DNA sequence reads used in shotgun metagenomic analysis. (A) Histogram of read length by 10nt bin. The majority of sequences fall within the 300-500nt range. (B) Heatmap of sequence quality scores binned by sequence length (y-axis) and sequence position (x-axis). The average quality score (454 Q20 score) at a certain position is given by color (indicated in legend). The bins on the vertical axis from (A) are the same as in (B).



Supplementary Figure 2: Comparison of reads from five common bacterial genomes among complete metagenomic and VLP data sets. The proportion of reads are shown from total DNA shotgun sequences (x-axis) and VLP sequences (y-axis) that have significant similarity (E-value $< 10^{-5}$) to the indicated genomes. Reads are pooled by subject (as in Figure 3), shown in color.

Supplementary Tables

Supplementary Table 1: Sequencing depth and PHACCS richness by sample

Sample	Number of sequences	PHACCS Richness
1013d1	33660	785
2011d1	110930	115
2011d8	133299	61
2012d2	64976	21
2012d7	158690	42
2012d8	18083	52
2016d1	115154	71
2016d2	28610	78
2016d7	13869	83
2016d8	18053	44
2019d1	25206	44
2019d8	17382	38
2020d1	37184	28
2020d2	81213	35
2020d7	16337	19
2020d8	63567	21

Supplementary Table 2: Hits to ARDB among VLP contigs

Contig	Length (bp)	Antibiotic Resistance Type	Hit_iden	Hit_len (aa)
contig00634	1,194	ABC Transporter	46%	232
contig00657	881	ABC Transporter	34%	140
contig01021	500	ABC Transporter	32%	162
contig06524	880	ABC Transporter	37%	68
contig03567	885	ABC Transporter	39%	85
contig01701	3,122	Beta-lactamase	99%	286
contig00391	525	Multidrug efflux protein	29%	162
contig00550	511	Multidrug efflux protein	26%	162
contig01145	568	Multidrug efflux protein	24%	106
contig01539	859	Multidrug efflux protein	27%	109
contig01901	804	Multidrug efflux protein	28%	178
contig02693	599	Multidrug efflux protein	28%	76
contig03536	1,190	Multidrug efflux protein	43%	155
contig07132	508	Multidrug efflux protein	40%	169
contig07327	713	Multidrug efflux protein	46%	119
contig08309	602	Multidrug efflux protein	54%	62
contig10091	1,333	Multidrug efflux protein	34%	210
contig00563	630	Penicillin-binding protein	39%	152
contig03310	553	Permease	39%	51
contig00100	634	Permease	30%	111
contig03101	812	Proton antiporter	26%	279
contig07515	3,286	RND efflux protein	31%	87
contig02106	779	RND efflux protein	27%	88
contig04115	631	Streptogramin acetyltransferase	53%	32
contig09622	4,052	Undecaprenyl pyrophosphate phosphatase	25%	207
contig06721	628	VanR	40%	60
contig05915	4,483	VanR	31%	223
contig01497	544	VanR	27%	118
contig02637	648	VanR	33%	173
contig01120	590	VanS	22%	129
contig02490	761	VanS	31%	97
contig02579	1,075	VanS	26%	234
contig07378	529	VanS	24%	172

Supplementary Table 3: Contigs identified as contributing to dynamic change of the gut virome in response to dietary intervention

contig00162
contig01456
contig03157
contig03682
contig03774
contig03879
contig03910
contig04369
contig06422
contig06560
contig07054
contig07735
contig07978
contig08085
contig08277
contig08306
contig08513
contig08597
contig08619
contig08636
contig08861
contig09479

Supplementary Table 3: continued

contig09485
contig09559
contig09583
contig09667
contig09732
contig09799
contig09814
contig09817
contig10006
contig10077
contig10121
contig10178
contig10215
contig10265
contig10376
contig10570
contig10609

Supplementary Table 4: Database of pfam IDs organized by general function

Pfam ID	Function
pfam05954_Phage_GPD_PhagelatecontrolgeneDp...	PhageRegulation
pfam09669_Phage_pRha_PhageregulatoryproteinR...	PhageRegulation
pfam01381_HTH_3_Helix-turn-helix.Thislargef...	PhageRegulation
pfam07409_GP46_PhageproteinGP46.Thisfamily...	PhageOther
pfam05840_Phage_GPA_Bacteriophagereplicationg...	PhageOther
pfam09681_Phage_rep_org_N_N-terminalphagerepl...	PhageOther
pfam05435_Phi-29_GP3_Phi-29DNAterminalprotei...	PhageOther
pfam05565_Sipho_Gp157_SiphovirusGp157.Thisf...	PhageOther
pfam08706_D5_N_D5Nterminallike.Thisdomain...	PhageOther
pfam09039_Mu_I-gamma_MuDNAbinding_Igammasu...	PhageOther
pfam06854_Phage_Gp15_BacteriophageGp15protein...	PhageOther
pfam05973_Gp49_PhagederivedproteinGp49-like...	PhageOther
pfam07505_Gp37_Gp68_PhageproteinGp37/Gp68.H...	PhageOther
pfam08010_Phage_30_3_BacteriophageproteinGP30...	PhageOther
pfam08890_XkdN_PhageXkdN-likeprotein.Thisf...	PhageOther
pfam09355_Phage_Gp19_PhageproteinGp19/Gp15/Gp...	PhageOther
pfam09524_Phg_2220_C_ConservedphageC-terminus...	PhageOther
pfam10123_Mu-like_Pro_Mu-likeprophageIprotei...	PhageOther
pfam12363_DUF3647_Phageprotein.Thisfamilyo...	PhageOther
pfam04883_DUF646_Bacteriophageproteinofunkno...	PhageOther
pfam05895_DUF859_Siphovirusproteinofunknown...	PhageOther
pfam00242_DNA_pol_viral_N_DNAPolymerase(viral...	PhageOther
pfam06199_Phage_tail_2_Phagemajortailprotein...	PhageTail
pfam05069_Phage_tail_S_Phagevirionmorphogenes...	PhageTail
pfam04984_Phage_sheath_1_Phagetailsheathprot...	PhageTail
pfam10145_PhageMin_Tail_Phage-relatedminortai...	PhageTail
pfam06841_Phage_T4_gp19_T4-likevirustailtube...	PhageTail
pfam04985_Phage_tube_PhagetailtubeproteinFl...	PhageTail
pfam05489_Phage_tail_X_PhageTailProteinX.T...	PhageTail
pfam03406_Phage_fiber_2_Phagetailfibrerepeat...	PhageTail
pfam03906_Phage_T7_tail_PhageT7tailfibrepro...	PhageTail
pfam03903_Phage_T4_gp36_PhageT4tailfibre.	PhageTail
pfam05100_Phage_tail_L_Phageminortailprotein...	PhageTail
pfam08813_Phage_tail_3_Phagetailprotein.Thi...	PhageTail
pfam05709_Sipho_tail_Phagetailprotein.This...	PhageTail
pfam09684_Tail_P2_I_Phagetailprotein(Tail_P2...	PhageTail

Supplementary Table 4: continued	
pfam10618_Tail_tube_Phagetailtubeprotein.T...	PhageTail
pfam00877_NLPC_P60_NlpC/P60family.Thefuncti...	PhageTail
pfam06995_Phage_P2_GpU_PhageP2GpU.Thisfami...	PhageTail
pfam10665_Phage_Gp9_PhageproteinGp9.This...	PhageTail
pfam03864_Phage_cap_E_Phagemajorcapsidprotei...	PhageCapsid
pfam02305_Phage_F_Capsidprotein(Fprotein)....	PhageCapsid
pfam05065_Phage_capsid_Phagecapsidfamily.Fa...	PhageCapsid
pfam06152_Phage_min_cap2_Phageminorcapsidpro...	PhageCapsid
pfam11133_Phage_head_fibr_Headfiberprotein....	PhageCapsid
pfam11114_Minor_capsid_Minorcapsid.Minorcap...	PhageCapsid
pfam10124_Mu-like_gpT_Mu-likeprophagemajorhe...	PhageCapsid
pfam04233_Phage_Mu_F_PhageMuproteinFlikepr...	PhageCapsid
pfam05133_Phage_prot_Gp6_Phageportalprotein_...	PhagePortal
pfam04860_Phage_portal_Phageportalprotein.B...	PhagePortal
pfam05136_Phage_portal_2_Phageportalprotein_...	PhagePortal
pfam05521_Phage_H_T_join_Phagehead-tailjoinin...	PhagePortal
pfam12236_Head-tail_con_Bacteriophageheadtot...	PhagePortal
pfam05352_Phage_connector_PhageConnector(GP10...	PhagePortal
pfam07484_Collar_PhageTailCollarDomain.Thi...	PhagePortal
pfam06890_Phage_Mu_Gp45_BacteriophageMuGp45p...	PhageBaseplate
pfam04717_Phage_base_V_Phage-relatedbaseplate...	PhageBaseplate
pfam04865_Baseplate_J_BaseplateJ-likeprotein....	PhageBaseplate
pfam06810_Phage_GP20_Phageminorstructuralpro...	PhageOtherStructural
pfam09675_Chlamy_scaf_Chlamydia-phageChp2scaf...	PhageOtherStructural
pfam00589_Phage_integrase_Phageintegrasefamil...	PhageIntegrase
pfam02899_Phage_integr_N_Phageintegrase_N-ter...	PhageIntegrase
pfam04531_Phage_holin_1_Bacteriophageholin.T...	PhageHolin
pfam05105_Phage_holin_4_Holinfamily.Phageho...	PhageHolin
pfam09682_Holin_LLH_Phageholinprotein(Holin_...	PhageHolin
pfam07022_Phage_CI_repr_BacteriophageCIrepres...	PhageRepressor
pfam03374_ANT_PhageantirepressorproteinKilAC...	PhageAntiRepressor
pfam10668_Phage_terminase_Phageterminasessmall...	PhageTerminase
pfam03237_Terminase_6_Terminase-likefamily.T...	PhageTerminase
pfam03354_Terminase_1_PhageTerminase.Themaj...	PhageTerminase
pfam03592_Terminase_2_Terminasesmallsubunit....	PhageTerminase
pfam04466_Terminase_3_Phageterminaselargesub...	PhageTerminase
pfam05876_Terminase_GpA_Phageterminaselarges...	PhageTerminase
pfam06056_Terminase_5_PutativeATPasesubunito...	PhageTerminase

Supplementary Table 4: continued	
pfam06791_TMP_2_Prophagetaillengthtapemeasu...	PhageTerminase
pfam07471_Phage_Nu1_PhageDNAPackagingprotein...	PhageDNAPackaging
pfam09718_Tape_meas_lam_C_Lambdaphagetaillap...	PhageDNAPackaging
pfam05135_Phage_QLRG_PhageQLRGfamily_putativ...	PhageDNAPackaging
pfam05894_Podovirus_Gp16_PodovirusDNAencapsid...	PhageDNAPackaging
pfam07352_Phage_Mu_Gam_BacteriophageMuGamlik...	PhageDNAPackaging
pfam05441_Micro_A_star_MicrovirusA*protein....	PhageDNAPackaging
pfam02914_Mu_transposase_BacteriophageMutransp..	Transposase
pfam01385_Transposase_2_Probabletransposase....	Transposase
pfam07282_Transposase_35_PutativetransposaseD...	Transposase
pfam01527_Transposase_8_Transposase.Transposa...	Transposase
pfam01609_Transposase_11_TransposaseDDEdomain...	Transposase
pfam01610_Transposase_12_Transposase.Transpos...	Transposase
pfam02371_Transposase_20_TransposaseIS116/IS11...	Transposase
pfam01548_Transposase_9_Transposase.Transposa...	Transposase
pfam03050_Transposase_25_TransposaseIS66famil...	Transposase
pfam00872_Transposase_mut_Transposase_Mutator...	Transposase
pfam05598_DUF772_Transposasedomain(DUF772)....	Transposase
pfam10551_MULE_MULEtransposasedomain.Thisd...	Transposase
pfam09299_Mu-transpos_C_Mutransposase_C-termi...	Transposase
pfam12323_HTH_14_Helix-turn-helixdomain.This...	Transposase
pfam01695_IstB_IstB-likeATPbindingprotein....	Transposase
pfam00239_Resolvase_Resolvase_Nterminaldomai...	Resolvase
pfam00521_DNA_topoisolV_DNAgyrase/topoisomeras...	Topoisomerase
pfam01131_Topoisom_bac_DNAtopoisomerase.This...	Topoisomerase
pfam01028_Topoisom_I_EukaryoticDNAtopoisomera...	Topoisomerase
pfam09770_PAT1_Topoisomerasell-associatedprot...	Topoisomerase
pfam09588_YqaJ_YqaJ-likeviralrecombinasedoma...	Recombinase
pfam00154_RecA_recAbacterialDNArecombination...	Recombinase
pfam07508_Recombinase_Recombinase.Thisdomain...	Recombinase
pfam03838_RecU_RecombinationproteinU.	Recombinase
pfam01076_Mob_Pre_Plasmidrecombinationenzyme....	Recombinase
pfam01870_Hjc_Archaealhollidayjunctionresolv...	Recombinase
pfam02075_RuvC_Crossoverjunctionendodeoxyribo...	Recombinase
pfam05766_NinG_BacteriophageLambdaNinGprotei...	Recombinase
pfam01510_Amidase_2_N-acetylmuramoyl-L-alanine...	Amidase
pfam01520_Amidase_3_N-acetylmuramoyl-L-alanine...	Amidase
pfam05382_Amidase_5_Bacteriophagepeptidoglycan...	Amidase

Supplementary Table 4: continued	
pfam00717_Peptidase_S24_PeptidaseS24-like.	Peptidase
pfam08291_Peptidase_M15_3_PeptidaseM15.	Peptidase
pfam04586_Peptidase_U35_Caudovirusproheadprot...	Peptidase
pfam05951_Peptidase_M15_2_Bacterialproteinof...	Peptidase
pfam01343_Peptidase_S49_PeptidasefamilyS49.	Peptidase
pfam08496_Peptidase_S49_N_PeptidasefamilyS49...	Peptidase
pfam10463_Peptidase_U49_PeptidaseU49.Thisfa...	Peptidase
pfam10459_Peptidase_S46_PeptidaseS46.Dipepti...	Peptidase
pfam01551_Peptidase_M23_PeptidasefamilyM23....	Peptidase
pfam00112_Peptidase_C1_Papainfamilycysteinep...	Peptidase
pfam03575_Peptidase_S51_PeptidasefamilyS51.	Peptidase
pfam01434_Peptidase_M41_PeptidasefamilyM41.	Peptidase
pfam07722_Peptidase_C26_PeptidaseC26.Thesep...	Peptidase
pfam02163_Peptidase_M50_PeptidasefamilyM50.	Peptidase
pfam05579_Peptidase_S32_Equinearthritisvirus...	Peptidase
pfam00768_Peptidase_S11_D-alanyl-D-alaninecarb...	Peptidase
pfam00326_Peptidase_S9_Prolyloligopeptidasefa...	Peptidase
pfam05838_DUF847_Predictedlysozyme(DUF847)....	Lysozyme
pfam01476_LysM_LysMdomain.TheLysM(lysinmo...	Lysozyme
pfam01832_Glucosaminidase_Mannosyl-glycoprotein...	Lysozyme
pfam01464_SLT_TransglycosylaseSLTdomain.Thi...	Lysozyme
pfam01471_PG_binding_1_Putativepeptidoglycanb...	Lysozyme
pfam01464_SLT_TransglycosylaseSLTdomain.Thi...	Lysozyme
pfam08230_Cpl-7_Cpl-7lysozymeC-terminaldomai...	Lysozyme
pfam04965_GPW_gp25_Gene25-likelylysozyme.This...	Lysozyme
pfam08282_Hydrolase_3_haloaciddehalogenase-lik...	Hydrolase
pfam07486_Hydrolase_2_CellWallHydrolase.The...	Hydrolase
pfam00702_Hydrolase_haloaciddehalogenase-like...	Hydrolase
pfam00145_DNA_methylase_C-5cytosine-specificD...	Restriction-Modification
pfam05869_Dam_DNAN-6-adenine-methyltransferase...	Restriction-Modification
pfam12047_DNMT1-RFD_CytosinespecificDNAmethy...	Restriction-Modification
pfam08241_Methyltransf_11_Methyltransferasedom...	Restriction-Modification
pfam08242_Methyltransf_12_Methyltransferasedom...	Restriction-Modification
pfam02086_MethyltransfD12_D12classN6adenine-...	Restriction-Modification
pfam02384_N6_Mtase_N-6DNAMethylase.Restrict...	Restriction-Modification
pfam05441_Micro_A_star_MicrovirusA*protein....	Restriction-Modification
pfam07352_Phage_Mu_Gam_BacteriophageMuGamlik...	Restriction-Modification
pfam04471_Mrr_cat_Restrictionendonuclease.Pr...	RestrictionEnzyme

Supplementary Table 4: continued	
pfam01844_HNH_HNHendonuclease.	RestrictionEnzyme
pfam00929_Exonuc_X-T_Exonuclease.Thisfamily...	RestrictionEnzyme
pfam02195_ParBc_ParB-likenucleasedomain.	RestrictionEnzyme
pfam08722_TnsA_N_TnsAendonucleaseNterminal....	RestrictionEnzyme
pfam05866_RusA_EndodeoxyribonucleaseRusA.Thi...	RestrictionEnzyme
pfam09569_RE_ScaI_ScaIrestrictionendonuclease...	RestrictionEnzyme
pfam09571_RE_Xcyl_Xcylrestrictionendonuclease...	RestrictionEnzyme
pfam07669_Eco57I_Eco57Irestrictionendonucleas...	RestrictionEnzyme
pfam04851_ResIII_TypellIrestrictionenzyme_r...	RestrictionEnzyme
pfam06616_BsuBI_PstI_RE_BsuBI/PstIrestriction...	RestrictionEnzyme
pfam01183_Glyco_hydro_25_Glycosylhydrolasesfa...	RestrictionEnzyme
pfam01555_N6_N4_Mtase_DNA_methylase.Memberso...	RestrictionEnzyme
pfam08774_VRR_NUC_VRR-NUCdomain.	RestrictionEnzyme
pfam00665_rve_Integrasescoredomain.Integrase...	EukaryoticVirus
pfam00910_RNA_helicase_RNAhelicase.Thisfami...	EukaryoticVirus
pfam05955_Herpes_gp2_Equineherpesvirusglycopr...	EukaryoticVirus
pfam01601_Corona_S2_CoronavirusS2glycoprotein...	EukaryoticVirus
pfam00606_Glycoprotein_B_HerpesvirusGlycoprote...	EukaryoticVirus
pfam02689_Herpes_Helicase_Helicase.Thisfamil...	EukaryoticVirus
pfam05109_Herpes BLLF1_Herpesvirusmajorouter...	EukaryoticVirus
pfam07415_Herpes_LMP2_Gammaherpesviruslatentm...	EukaryoticVirus
pfam05297_Herpes_LMP1_Herpesviruslatentmembra...	EukaryoticVirus
pfam02956_TT_ORF1_TTvirallorf1.TTvirus(TT...	EukaryoticVirus
pfam04395_Poxvirus_B22R_PoxvirusB22Rprotein.	EukaryoticVirus
pfam03288_Pox_D5_PoxvirusD5protein-like.Thi...	EukaryoticVirus
pfam05087_Rota_VP2_RotavirusVP2protein.Rota...	EukaryoticVirus
pfam00901_Orbi_VP5_Orbivirusoutercapsidprote...	EukaryoticVirus
pfam00898_Orbi_VP2_Orbivirusoutercapsidprote...	EukaryoticVirus
pfam04582_Reo_sigmaC_ReovirussigmaCcapsidpr...	EukaryoticVirus
pfam05708_DUF830_Orthopoxvirusproteinofunkno...	EukaryoticVirus
pfam03276_Gag_spuma_Spumavirusgagprotein.	EukaryoticVirus
pfam01057_Parvo_NS1_Parvovirusnon-structuralp...	EukaryoticVirus
pfam06317_Arena_RNA_pol_ArenavirusRNAPolymera...	EukaryoticVirus
pfam04513_Baculo_PEP_C_Baculoviruspolyhedrone...	EukaryoticVirus
pfam05541_Spheroidin_Entomopoxvirus_spheroidin...	EukaryoticVirus
pfam05314_Baculo_ODV-E27_Baculovirusocclusion-...	EukaryoticVirus
pfam01443_Viral_helicase1_Viral(Superfamily1)...	EukaryoticVirus
pfam02459_Adeno_terminal_AdenoviralDNATermina...	EukaryoticVirus

Supplementary Table 4: continued	
pfam00242_DNA_pol_viral_N_DNAPolymerase(viral...	EukaryoticVirus
pfam00910_RNA_helicase_RNAhelicase.Thisfami...	EukaryoticVirus
pfam08706_D5_N_D5Nterminallike.Thisdomain...	EukaryoticVirus
pfam05518_Totivirus_coat_Totiviruscoatprotein.	EukaryoticVirus
pfam00799_Gemini_AL1_GeminivirusRepcatalytic...	Plantvirus
pfam01690_PLRV_ORF5_Potatoleafrollvirusread...	Plantvirus
pfam07236_Phytoreo_S7_PhytoreovirusS7protein....	Plantvirus
pfam10439_Bacteriocin_IIC_BacteriocinclassII...	Bacteriocin
pfam11725_AvrE_Pathogenicityfactor.Thisfami...	Pathogenicityfactor
pfam05272_VirE_Virulence-associatedproteinE....	Pathogenicityfactor
pfam00419_Fimbrial_Fimbrialprotein.	Pathogenicityfactor
pfam00652_Ricin_B_lectin_Ricin-typebeta-trefoi...	Pathogenicityfactor
pfam09643_YopX_YopXprotein.YopXisaprotein...	Pathogenicityfactor
pfam05973_Gp49_PhagederivedproteinGp49-like...	Pathogenicityfactor
pfam00144_Beta-lactamase_Beta-lactamase.This...	Lactamase
pfam00753_Lactamase_B_Metallo-beta-lactamasesu...	Lactamase
pfam00078_RVT_1_Reversetranscriptase(RNA-depe...	ReverseTranscriptase
pfam00075_RnaseH_RNaseH.RNaseHdigeststhe...	RNaseH
pfam05183_RdRP_RNAdependentRNAPolymerase.T...	RdRP