

Supplementary Files

# **Proteomics Computational Analyses Suggest that the Antennavirus Glycoprotein Complex Includes a Class I Viral Fusion Protein ( $\alpha$ -Penetrene) with an Internal Zinc-Binding Domain and a Stable Signal Peptide**

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Table S1. Genbank accession numbers used for sequence and structural analyses.

Genus	Virus	Abbreviation	glycoprotein	nucleoprotein	RdRp	Zinc-binding protein
<i>Antennavirus</i>	Wënling frogfish arenavirus 1	WIFAV-1	YP_009551553.1	AVM87642.1	YP_009551555.1	Not encoded
	Wënling frogfish arenavirus 2	WIFAV-2	YP_009551607.1	YP_009551604.1	YP_009551605.1	Not encoded
<i>Hartmannivirus</i>	Haartman Institute snake virus 1	HISV-1	AKN10683.2	AKN10684.1	AKN10711.2	Not encoded
	Haartman Institute snake virus 2	HISV-2	AZI72593.1	AZI72594.1	AZI72627.1	Not encoded
	Veterinary Pathology Zurich virus 2	VPZV-2	AZI72595.1	AZI72596.1	AZI72628.1	Not encoded
	Old schoolhouse virus 1	OScV-1	AZI72579.1	AZI72580.1	AZI72620.1	Not encoded
<i>Reptarenavirus</i>	CAS virus	CASV	YP_006590086.1	YP_006590087.1	YP_006590093.1	YP_006590092.1
	University of Giessen virus	UGV	AZI72713.1	AZI72714.1	YP_009508466.1	AZI72641.1
	Golden Gate virus	GGV	YP_006590090.1	YP_006590091.1	YP_006590089.1	YP_006590088.1
	Rotterdam virus	ROUTV	YP_009019194.1	YP_009019195.1	YP_009019197.1	YP_009019196.1
<i>Mammarenavirus</i> (Old World)	Lassa virus	LASV	NP_694870.1	NP_694869.1	AEY85215.1	AEY85214.1
	Lujo virus	LUJV	YP_002929490.1	YP_002929491.1	AFP21519.1	AFP21518.1
	Ippy virus	IPPYV	YP_516230.1	YP_516231.1	YP_516233.1	NC_007906.1
	Wenzhou virus	WENV	YP_009113206.1	YP_009113207.1	YP_009113209.1	AUF72662.1
<i>Mammarenavirus</i> (New World)	Junin Virus	JUNV	ACS12870.1	ACS12871.1	AEB32439.1	AEB32438.1
	Machupo virus	MACV	YP_089665.1	YP_089666.1	YP_089660.1	AIG51561.1
	Guanarito virus	GOTV	ALE15097.1	AAT88083.1	ALE15099.1	NP_899220.1
	Oliveros virus	OLVV	YP_001649210.1	YP_001649211.1	YP_001649214.1	YP_001649215.1

	California (Pichinde) virus	CALV	AAB58485.2	AAD31540.2	AER45496.1	AER45495.1
	Flexal virus	FLEV	YP_001936019.1	YP_001936020.1	YP_001936024.1	YP_001936023.1
	Whitewater Arroyo virus	WWAV	YP_001911113.1	YP_001911114.1	YP_001911120.1	YP_001911119.1
	Ebola virus	EBOV	AAD14585.1	ALT19749.1	AAD14589.1	Not encoded
	Sudan virus	SUDV	ACR33190.1	AWK96640.1	ALT19784.1	Not encoded
<i>Ebolavirus</i>	Bundibugyo virus	BDBV	AKB09565.1	AKB09560.1	ACI28627.1	Not encoded
	Bombali virus	BOMV	ASJ82208.1	QAT98503.1	QAT98511.1	Not encoded
	Marburg virus	MARV	CAA78117.1	CAA78114.1	ABA87130.1	Not encoded
<i>Marburgovirus</i>	Ravn virus	RAVV	ABS17551.1	ACD13016.1	ACD13022.1	Not encoded

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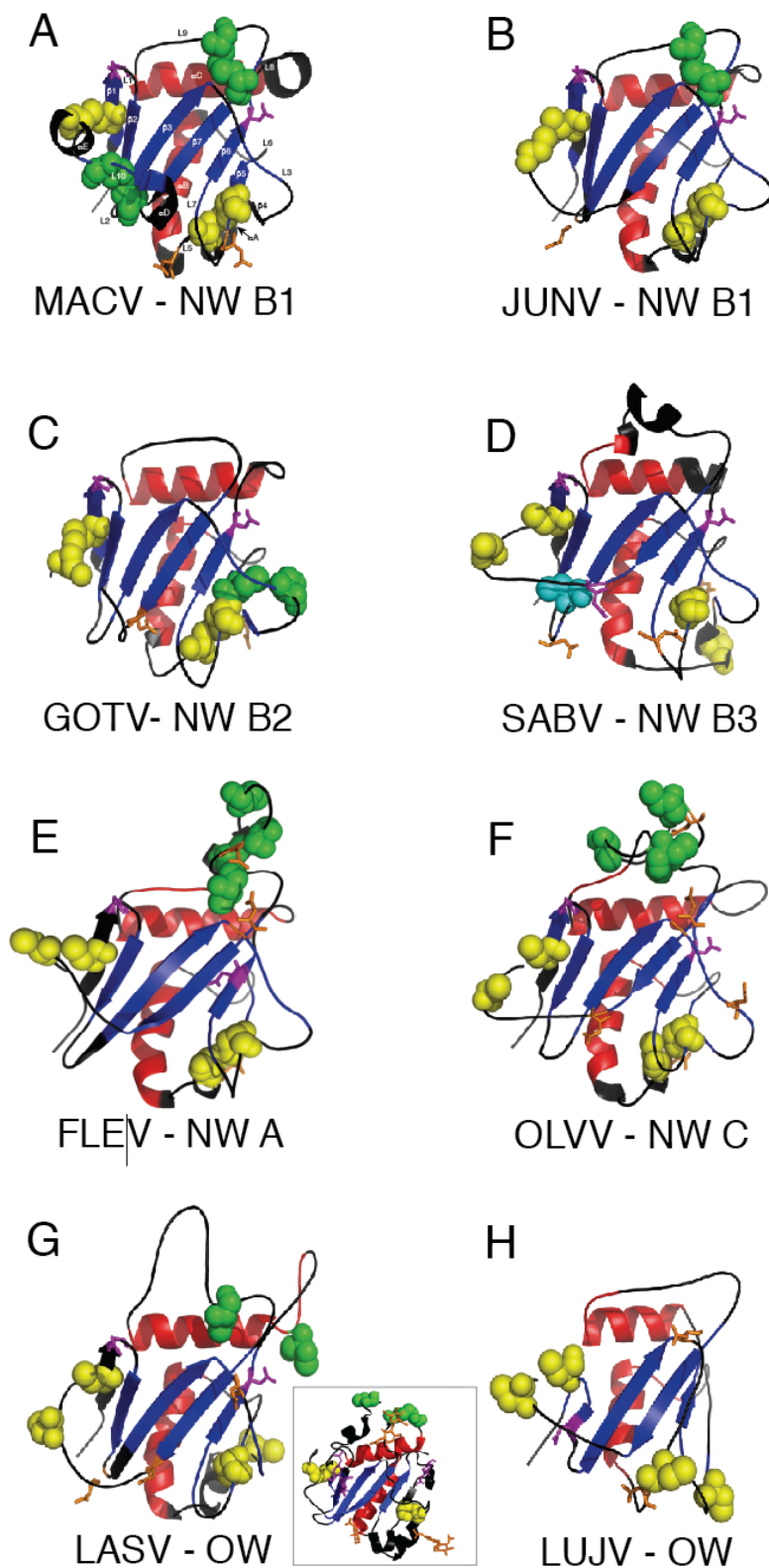


Figure S1. Conserved structure of mammarenaviruses glycoprotein 1. Shown are commonly placed  $\alpha$ -helices (red) and a  $\beta$ -sandwich (blue arrows) that comprises the receptor-binding domain. There are two conserved cysteine linkages (yellow) and two conserved N-linked glycans (purple). Virus abbreviations: Machupo MACV, Junin JUNV, Guanarito GOTV, Sabia SABV, Flexal FLEV, Olivaros OLLV, Lassa LASV, Lujo LUJV. Inset: crystal structure of LASV GP1 in the prefusion trimer (PDB 5VK2). Old World OW, New World NW. A, B, C designate sublineages.

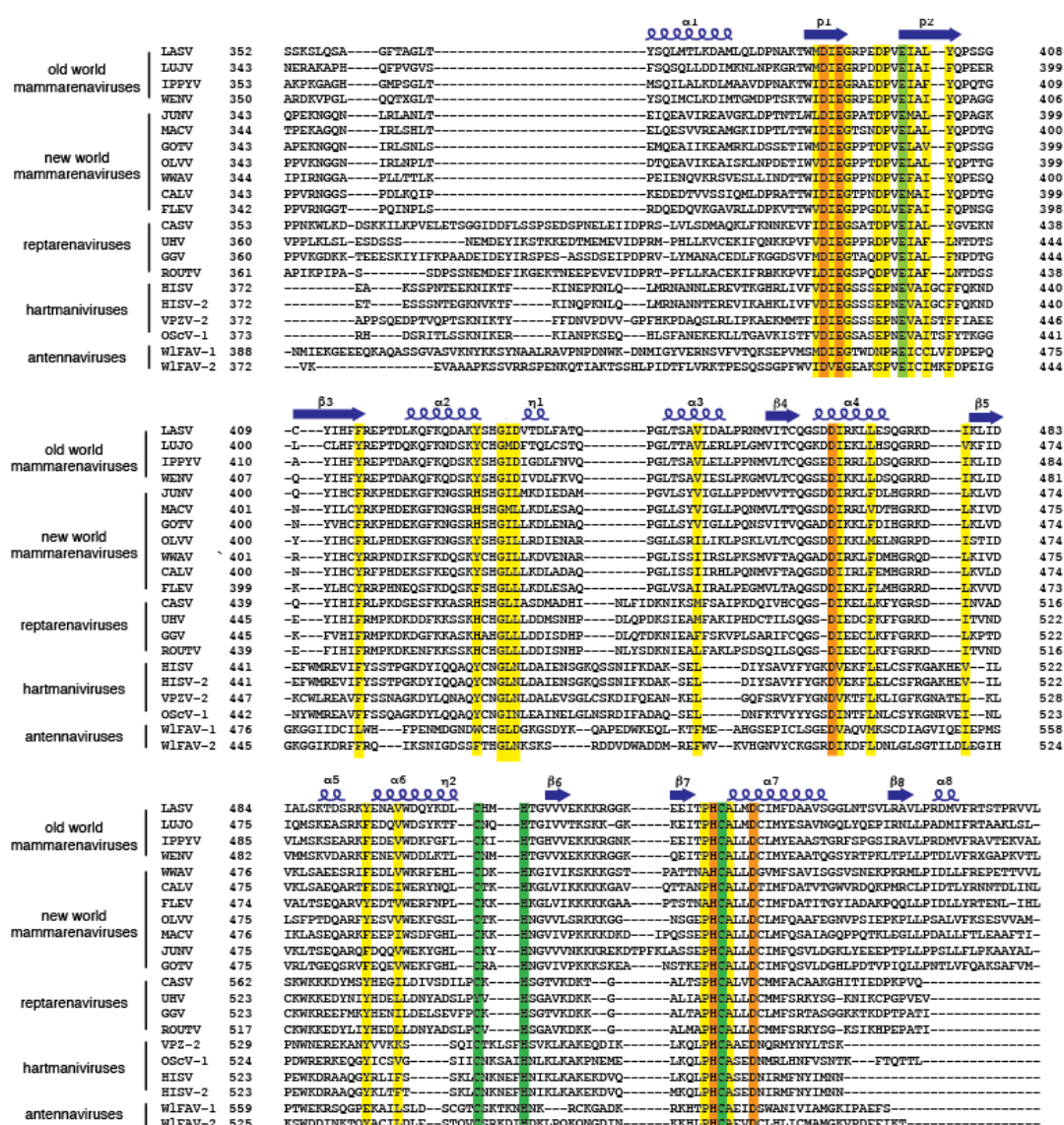


Figure S2. Amino acid sequence alignments of the C-termini of nucleoproteins from representative members of the four arenavirus genera. Residues that are conserved (identical or chemically similar) are highlighted in yellow. Virus abbreviations as in Figure 5. Blue springs represent helical structures and blue arrows are beta sheets. Conserved residues in the active site of the endonuclease (DEDDh box) are highlighted in orange and residues that comprise a conserved metal binding domain are highlighted in green.

old world mammarenaviruses	LASV	1024	ETQF---CFKLLMANTMGRYTHYSKRLNFKDFMGKLDVVRLICEENSEALSKALSLNCTTAMLNKLFCYQSQSPQYDVGDPDRGLFQLSVYSVGQGNRLVIGDRLR	1139
	LUJV	1049	DWFK---CFKTLIASDVRNRVYDRKSRRLGTFDAALGKSTRSISEENSEALSKALSLNCTTAMLNKLFCYQSQSPQYDVGDPDRGLFQLSVYSVGQGNRLVIGDRLR	1164
	IPFV	1010	EYFH---CFKSLQKQDANKLGGKSHYSQNLFNFDFGMDGDDGIKSEENSEALSKALSLNCTTAMLNKLFCYQSQSPQYDVGDPDRGLFQLSVYSVGQGNRLVIGDRLR	1125
	WNV	1027	EYFH---CFKSLQKQDANKLGGKSHYSQNLFNFDFGMDGDDGIKSEENSEALSKALSLNCTTAMLNKLFCYQSQSPQYDVGDPDRGLFQLSVYSVGQGNRLVIGDRLR	1142
	JUV	1021	EYFH---CFKTLIQDGDQLQGYEHRKSRRLGTFDAALGKSTRSISEENSEALSKALSLNCTTAMLNKLFCYQSQSPQYDVGDPDRGLFQLSVYSVGQGNRLVIGDRLR	1116
	MACV	1025	EYFH---CFKTLIQDGDQLQGYEHRKSRRLGTFDAALGKSTRSISEENSEALSKALSLNCTTAMLNKLFCYQSQSPQYDVGDPDRGLFQLSVYSVGQGNRLVIGDRLR	1140
new world mammarenaviruses	GOTV	1011	EFFF---CFVTLIQAGFDQRLQGYEHRKSRRLGTFDAALGKSTRSISEENSEALSKALSLNCTTAMLNKLFCYQSQSPQYDVGDPDRGLFQLSVYSVGQGNRLVIGDRLR	1126
	OLVU	1034	DLFE---CFVTLIASGFDQRLQGYEHRKSRRLGTFDAALGKSTRSISEENSEALSKALSLNCTTAMLNKLFCYQSQSPQYDVGDPDRGLFQLSVYSVGQGNRLVIGDRLR	1149
	WRV	1020	DYFE---CFVTLIASGFDQRLQGYEHRKSRRLGTFDAALGKSTRSISEENSEALSKALSLNCTTAMLNKLFCYQSQSPQYDVGDPDRGLFQLSVYSVGQGNRLVIGDRLR	1135
	CALV	998	DYFE---CFVTLIASGFDQRLQGYEHRKSRRLGTFDAALGKSTRSISEENSEALSKALSLNCTTAMLNKLFCYQSQSPQYDVGDPDRGLFQLSVYSVGQGNRLVIGDRLR	1113
reptarenaviruses	FLEW	1013	DFFE---CFVTLIVSDFDQRLQGYEHRKSRRLGTFDAALGKSTRSISEENSEALSKALSLNCTTAMLNKLFCYQSQSPQYDVGDPDRGLFQLSVYSVGQGNRLVIGDRLR	1128
	CASV	957	DIFS---SFRLLNAGFNQFQTYTHRSQGSQSLILKLDYRKKMMISKRINSEALSKALSLNCTTAMLNKLFCYQSQSPQYDVGDPDRGLFQLSVYSVGQGNRLVIGDRLR	1072
	URV	952	EFFS---SFRLLNAGFNQFQTYTHRSQGSQSLILKLDYRKKMMISKRINSEALSKALSLNCTTAMLNKLFCYQSQSPQYDVGDPDRGLFQLSVYSVGQGNRLVIGDRLR	1067
	GGV	983	EFFS---SFRLLNAGFNQFQTYTHRSQGSQSLILKLDYRKKMMISKRINSEALSKALSLNCTTAMLNKLFCYQSQSPQYDVGDPDRGLFQLSVYSVGQGNRLVIGDRLR	1098
hantmaniruses	ROUTV	842	EYFS---SFRLLNAGFNQFQTYTHRSQGSQSLILKLDYRKKMMISKRINSEALSKALSLNCTTAMLNKLFCYQSQSPQYDVGDPDRGLFQLSVYSVGQGNRLVIGDRLR	1097
	HISV-1	846	FDLSEHC---TLKIKINIDRLII---LQAGLKQTKQMLSRNTAIELLNLIRKAKIKNEII---SELFCIDLLEIPNMLALYDVGDPDRGLFQLSVYSVGQGNRLVIGDRLR	946
	HISV-2	822	FDLSEHC---TLKIKINIDRLII---LQAGLKQTKQMLSRNTAIELLNLIRKAKIKNEII---SELFCIDLLEIPNMLALYDVGDPDRGLFQLSVYSVGQGNRLVIGDRLR	946
	VP2V-1	852	FDLSEHC---TLKIKINIDRLII---LQAGLKQTKQMLSRNTAIELLNLIRKAKIKNEII---SELFCIDLLEIPNMLALYDVGDPDRGLFQLSVYSVGQGNRLVIGDRLR	952
antennaviruses	Oscv-1	850	FDLSEHC---TLKIKINIDRLII---LQAGLKQTKQMLSRNTAIELLNLIRKAKIKNEII---SELFCIDLLEIPNMLALYDVGDPDRGLFQLSVYSVGQGNRLVIGDRLR	950
	W1FAV-1	947	DFTFAELLRCLLRKRRDFNKGANLIL---TKRKEELVRRKSRVSKRTTSTIALMDLRLQ---GEQT---TLESKR---GATPLPTGQANVIGDGPTELIQGLE	1046
	W1FAV-2	940	DHLTATAGLLLLRKRDFPKGRKRAI---QRVDELRIRGRTRYSKRTTSTAALMDLRLQ---GEQT---TLESKR---GATPLPTGQANVIGDGPTELIQGLE	1041
	LASV	1139	TNMFRLIIEYFAELGLQGGCCILNKEEFNALILGM---KLVNSLAHSGYQMSKRWPMKPFLLVTLVQL---LIFLKLQDQDKRDIYDGL	1230
old world mammarenaviruses	LUJV	1165	TNMFRLIIEYFESLQGLGQCCILNKEEFNALILGM---KQCIREGNLGYNRDKWPMKPFLLVTLVQL---LKYTKD---PDKPIEHLSTL	1261
	IPFV	1126	TNMFRLIIEYFESLQGLGQCCILNKEEFNALILGM---KLVNSLAHSGYQMSKRWPMKPFLLVTLVQL---LIFLKLQDQDKRDIYDGL	1216
	WNV	1143	TNMFRLIIEYFAELQGLGQCCILNKEEFNALILGM---RIVSLSAQSTLSENRDQWPMKPFLLVTLVQL---DLKSFQKTEVLDGKNIDSTL	1233
	JUV	1127	TNMFRLIIEYFESLQGLGQCCILNKEEFNALILGM---KLVNSLAHSGYQMSKRWPMKPFLLVTLVQL---LIFLKLQDQDKRDIYDGL	1216
	MACV	1137	TNMFRLIIEYFESLQGLGQCCILNKEEFNALILGM---KLVNSLAHSGYQMSKRWPMKPFLLVTLVQL---LIFLKLQDQDKRDIYDGL	1230
	GOTV	1150	TNMFRLIIEYFESLQGLGQCCILNKEEFNALILGM---KLVNSLAHSGYQMSKRWPMKPFLLVTLVQL---LIFLKLQDQDKRDIYDGL	1216
new world mammarenaviruses	OLVU	1127	TNMFRLIIEYFESLQGLGQCCILNKEEFNALILGM---KLVNSLAHSGYQMSKRWPMKPFLLVTLVQL---LIFLKLQDQDKRDIYDGL	1216
	WRV	1136	TNMFRLIIEYFESLQGLGQCCILNKEEFNALILGM---KLVNSLAHSGYQMSKRWPMKPFLLVTLVQL---LIFLKLQDQDKRDIYDGL	1216
	CALV	1129	TNMFRLIIEYFESLQGLGQCCILNKEEFNALILGM---KLVNSLAHSGYQMSKRWPMKPFLLVTLVQL---LIFLKLQDQDKRDIYDGL	1216
	FLEW	1150	TNMFRLIIEYFESLQGLGQCCILNKEEFNALILGM---KLVNSLAHSGYQMSKRWPMKPFLLVTLVQL---LIFLKLQDQDKRDIYDGL	1216
reptarenaviruses	CASV	1073	TNMFRLIIEYFESLQGLGQCCILNKEEFNALILGM---KLVNSLAHSGYQMSKRWPMKPFLLVTLVQL---LIFLKLQDQDKRDIYDGL	1162
	URV	1068	TNMFRLIIEYFESLQGLGQCCILNKEEFNALILGM---KLVNSLAHSGYQMSKRWPMKPFLLVTLVQL---LIFLKLQDQDKRDIYDGL	1157
	GGV	1099	TNMFRLIIEYFESLQGLGQCCILNKEEFNALILGM---KLVNSLAHSGYQMSKRWPMKPFLLVTLVQL---LIFLKLQDQDKRDIYDGL	1188
	ROUTV	1098	TNMFRLIIEYFESLQGLGQCCILNKEEFNALILGM---KLVNSLAHSGYQMSKRWPMKPFLLVTLVQL---LIFLKLQDQDKRDIYDGL	1187
hantmaniruses	HISV-1	961	TNMFRLIIEYFAELQGLGQCCILNKEEFNALILGM---KLVNSLAHSGYQMSKRWPMKPFLLVTLVQL---LIFLKLQDQDKRDIYDGL	1065
	HISV-2	947	TNMFRLIIEYFAELQGLGQCCILNKEEFNALILGM---KLVNSLAHSGYQMSKRWPMKPFLLVTLVQL---LIFLKLQDQDKRDIYDGL	1065
	VP2V-1	1141	TNMFRLIIEYFAELQGLGQCCILNKEEFNALILGM---KLVNSLAHSGYQMSKRWPMKPFLLVTLVQL---LIFLKLQDQDKRDIYDGL	1071
	Oscv-1	953	TNMFRLIIEYFAELQGLGQCCILNKEEFNALILGM---KLVNSLAHSGYQMSKRWPMKPFLLVTLVQL---LIFLKLQDQDKRDIYDGL	1069
antennaviruses	W1FAV-1	1047	TNMFRLIIEYFAELQGLGQCCILNKEEFNALILGM---KLVNSLAHSGYQMSKRWPMKPFLLVTLVQL---LIFLKLQDQDKRDIYDGL	1132
	W1FAV-2	1042	TNMFRLIIEYFAELQGLGQCCILNKEEFNALILGM---KLVNSLAHSGYQMSKRWPMKPFLLVTLVQL---LIFLKLQDQDKRDIYDGL	1127
old world mammarenaviruses	LASV	1231	LWVHRLVEYFVNVAAMKFSIKAQLGKREK---KQSTIEDFFYSNFO---VGVVPHISSILMNGQCCILNCTDFALISERFYNYAISK---CGGTIDAYTS	1330
	LUJV	1252	LWVHRLVEYFVNVAAMKFSIKAQLGKREK---KQSTIEDFFYSNFO---VGVVPHISSILMNGQCCILNCTDFALISERFYNYAISK---CGGTIDAYTS	1361
	IPFV	1217	LWVHRLVEYFVNVAAMKFSIKAQLGKREK---KQSTIEDFFYSNFO---VGVVPHISSILMNGQCCILNCTDFALISERFYNYAISK---CGGTIDAYTS	1316
	WNV	1234	LWVHRLVEYFVNVAAMKFSIKAQLGKREK---KQSTIEDFFYSNFO---VGVVPHISSILMNGQCCILNCTDFALISERFYNYAISK---CGGTIDAYTS	1333
	JUV	1227	LWVHRLVEYFVNVAAMKFSIKAQLGKREK---KQSTIEDFFYSNFO---VGVVPHISSILMNGQCCILNCTDFALISERFYNYAISK---CGGTIDAYTS	1317
	MACV	1231	LWVHRLVEYFVNVAAMKFSIKAQLGKREK---KQSTIEDFFYSNFO---VGVVPHISSILMNGQCCILNCTDFALISERFYNYAISK---CGGTIDAYTS	1331
new world mammarenaviruses	GOTV	1217	LWVHRLVEYFVNVAAMKFSIKAQLGKREK---KQSTIEDFFYSNFO---VGVVPHISSILMNGQCCILNCTDFALISERFYNYAISK---CGGTIDAYTS	1317
	OLVU	1240	LWVHRLVEYFVNVAAMKFSIKAQLGKREK---KQSTIEDFFYSNFO---VGVVPHISSILMNGQCCILNCTDFALISERFYNYAISK---CGGTIDAYTS	1340
	WRV	1225	LWVHRLVEYFVNVAAMKFSIKAQLGKREK---KQSTIEDFFYSNFO---VGVVPHISSILMNGQCCILNCTDFALISERFYNYAISK---CGGTIDAYTS	1324
	CALV	1203	LWVHRLVEYFVNVAAMKFSIKAQLGKREK---KQSTIEDFFYSNFO---VGVVPHISSILMNGQCCILNCTDFALISERFYNYAISK---CGGTIDAYTS	1302
reptarenaviruses	FLEW	1218	LWVHRLVEYFVNVAAMKFSIKAQLGKREK---KQSTIEDFFYSNFO---VGVVPHISSILMNGQCCILNCTDFALISERFYNYAISK---CGGTIDAYTS	1317
	CASV	1163	LWVHRLVEYFVNVAAMKFSIKAQLGKREK---KQSTIEDFFYSNFO---VGVVPHISSILMNGQCCILNCTDFALISERFYNYAISK---CGGTIDAYTS	1271
	URV	1158	LWVHRLVEYFVNVAAMKFSIKAQLGKREK---KQSTIEDFFYSNFO---VGVVPHISSILMNGQCCILNCTDFALISERFYNYAISK---CGGTIDAYTS	1260
	GGV	1189	LWVHRLVEYFVNVAAMKFSIKAQLGKREK---KQSTIEDFFYSNFO---VGVVPHISSILMNGQCCILNCTDFALISERFYNYAISK---CGGTIDAYTS	1291
hantmaniruses	ROUTV	1188	LWVHRLVEYFVNVAAMKFSIKAQLGKREK---KQSTIEDFFYSNFO---VGVVPHISSILMNGQCCILNCTDFALISERFYNYAISK---CGGTIDAYTS	1290
	HISV-1	1066	LWVHRLVEYFVNVAAMKFSIKAQLGKREK---KQSTIEDFFYSNFO---VGVVPHISSILMNGQCCILNCTDFALISERFYNYAISK---CGGTIDAYTS	1170
	HISV-2	1066	LWVHRLVEYFVNVAAMKFSIKAQLGKREK---KQSTIEDFFYSNFO---VGVVPHISSILMNGQCCILNCTDFALISERFYNYAISK---CGGTIDAYTS	1170
	VP2V-1	1072	LWVHRLVEYFVNVAAMKFSIKAQLGKREK---KQSTIEDFFYSNFO---VGVVPHISSILMNGQCCILNCTDFALISERFYNYAISK---CGGTIDAYTS	1176
antennaviruses	Oscv-1	1070	LWVHRLVEYFVNVAAMKFSIKAQLGKREK---KQSTIEDFFYSNFO---VGVVPHISSILMNGQCCILNCTDFALISERFYNYAISK---CGGTIDAYTS	1174
	W1FAV-1	1133	LWVHRLVEYFVNVAAMKFSIKAQLGKREK---KQSTIEDFFYSNFO---VGVVPHISSILMNGQCCILNCTDFALISERFYNYAISK---CGGTIDAYTS	1232
	W1FAV-2	1128	LWVHRLVEYFVNVAAMKFSIKAQLGKREK---KQSTIEDFFYSNFO---VGVVPHISSILMNGQCCILNCTDFALISERFYNYAISK---CGGTIDAYTS	1227
	LASV	1331	DDQISLDFGLVSLQQ---RDPEEFRLIEFYSYIMDQINIVFPQSVIGRVAETRFVFWGDEVELLTVAAALENKCKEPRQLASTIDTDIDQVANGVPHLNLQKRLNL	1447
old world mammarenaviruses	LUJV	1352	DDQISLDFGLVSLQQ---RDPEEFRLIEFYSYIMDQINIVFPQSVIGRVAETRFVFWGDEVELLTVAAALENKCKEPRQLASTIDTDIDQVANGVPHLNLQKRLNL	1468
	IPFV	1317	DDQISLDFGLVSLQQ---RDPEEFRLIEFYSYIMDQINIVFPQSVIGRVAETRFVFWGDEVELLTVAAALENKCKEPRQLASTIDTDIDQVANGVPHLNLQKRLNL	1433
	WNV	1334	DDQISLDFGLVSLQQ---RDPEEFRLIEFYSYIMDQINIVFPQSVIGRVAETRFVFWGDEVELLTVAAALENKCKEPRQLASTIDTDIDQVANGVPHLNLQKRLNL	1450
	JUV	1318	DDQISLDFGLVSLQQ---RDPEEFRLIEFYSYIMDQINIVFPQSVIGRVAETRFVFWGDEVELLTVAAALENKCKEPRQLASTIDTDIDQVANGVPHLNLQKRLNL	1444
	MACV	1332	DDQISLDFGLVSLQQ---RDPEEFRLIEFYSYIMDQINIVFPQSVIGRVAETRFVFWGDEVELLTVAAALENKCKEPRQLASTIDTDIDQVANGVPHLNLQKRLNL	1448
	GOTV	1318	DDQISLDFGLVSLQQ---RDPEEFRLIEFYSYIMDQINIVFPQSVIGRVAETRFVFWGDEVELLTVAAALENKCKEPRQLASTIDTDIDQVANGVPHLNLQKRLNL	1436
new world mammarenaviruses	OLVU	1341	DDQISLDFGLVSLQQ---RDPEEFRLIEFYSYIMDQINIVFPQSVIGRVAETRFVFWGDEVELLTVAAALENKCKEPRQLASTIDTDIDQVANGVPHLNLQKRLNL	1460
	WRV	1325	DDQISLDFGLVSLQQ---RDPEEFRLIEFYSYIMDQINIVFPQSVIGRVAETRFVFWGDEVELLTVAAALENKCKEPRQLASTIDTDIDQVANGVPHLNLQKRLNL	1444
	CALV	1303	DDQISLDFGLVSLQQ---RDPEEFRLIEFYSYIMDQINIVFPQSVIGRVAETRFVFWGDEVELLTVAAALENKCKEPRQLASTIDTDIDQVANGVPHLNLQKRLNL	1422
	FLEW	1318	DDQISLDFGLVSLQQ---RDPEEFRLIEFYSYIMDQINIVFPQSVIGRVAETRFVFWGDEVELLTVAAALENKCKEPRQLASTIDTDIDQVANGVPHLNLQKRLNL	1436
reptarenaviruses	HISV	1171	DDQASVLIQGE---N---AALTELEYLISKLNKISEYVSWGTVEVTFKIVSVGGQLEPPLTLILIPSGFVDFDVLNLTDTTQMGADYCAITQCQNLNLSMCKL	1278
	HISV-1	1171	DDQASVLIQGE---N---AALTELEYLISKLNKISEYVSWGTVEVTFKIVSVGGQLEPPLTLILIPSGFVDFDVLNLTDTTQMGADYCAITQCQNLNLSMCKL	1278
	CASV	1272	DDQASVLIQGE---N---AALTELEYLISKLNKISEYVSWGTVEVTFKIVSVGGQLEPPLTLILIPSGFVDFDVLNLTDTTQMGADYCAITQCQNLNLSMCKL	1389
	URV	1261	DDQASVLIQGE---N---AALTELEYLISKLNKISEYVSWGTVEVTFKIVSVGGQLEPPLTLILIPSGFVDFDVLNLTDTTQMGADYCAITQCQNLNLSMCKL	1377
hantmaniruses	GGV	1292	DDQASVLIQGE---N---AALTELEYLISKLNKISEYVSWGTVEVTFKIVSVGGQLEPPLTLILIPSGFVDFDVLNLTDTTQMGADYCAITQCQNLNLSMCKL	1408
	ROUTV	1291	DDQASVLIQGE---N---AALTELEYLISKLNKISEYVSWGTVEVTFKIVSVGGQLEPPLTLILIPSGFVDFDVLNLTDTTQMGADYCAITQCQNLNLSMCKL	1407
	VP2V-1	1177	DDQASVLIQGE---N---AALTELEYLISKLNKISEYVSWGTVEVTFKIVSVGGQLEPPLTLILIPSGFVDFDVLNLTDTTQMGADYCAITQCQNLNLSMCKL	1284
	Oscv-1	1175	DDQASVLIQGE---N---AALTELEYLISKLNKISEYVSWGTVEVTFKIVSVGGQLEPPLTLILIPSGFVDFDVLNLTDTTQMGADYCAITQCQNLNLSMCKL	1282
antennaviruses	W1FAV-1	1233	DDQASVLIQGE---N---AALTELEYLISKLNKISEYVSWGTVEVTFKIVSVGGQLEPPLTLILIPSGFVDFDVLNLTDTTQMGADYCAITQCQNLNLSMCKL	1344
	W1FAV-2	1228	DDQASVLIQGE---N---AALTELEYLISKLNKISEYVSWGTVEVTFKIVSVGGQLEPPLTLILIPSGFVDFDVLNLTDTTQMGADYCAITQCQNLNLSMCKL	1339
old world mammarenaviruses	LASV	1448	LQYARVDFPFLNCTDVRQWVGNRGRYIMRQEGELIPNA---CSKIRSM---1497	
	LUJV	1459	LQYARVDFPFLNCTDVRQWVGNRGRYIMRQEGELIPNA---CSKIRSM---1497	
	IPFV	1434	LQYARVDFPFLNCTDVRQWVGNRGRYIMRQEGELIPNA---CSKIRSM---1497	
	CASV	1390	LQYARVDFPFLNCTDVRQWVGNRGRYIMRQEGELIPNA---CSKIRSM---1497	
	MACV	1449	LQYARVDFPFLNCTDVRQWVGNRGRYIMRQEGELIPNA---CSKIRSM---1497	
	GOTV	1437	LQYARVDFPFLNCTDVRQWVGNRGRYIMRQEGELIPNA---CSKIRSM---1497	
new world mammarenaviruses	OLVU	1461	LQYARVDFPFLNCTDVRQWVGNRGRYIMRQEGELIPNA---CSKIRSM---1497	
	WRV	1445	LQYARVDFPFLNCTDVRQWVGNRGRYIMRQEGELIPNA---CSKIRSM---1497	
	CALV	1423	LQYARVDFPFLNCTDVRQWVGNRGRYIMRQEGELIPNA---CSKIRSM---1497	
	FLEW	1437	LQYARVDFPFLNCTDVRQWVGNRGRYIMRQEGELIPNA---CSKIRSM---1497	
reptarenaviruses	URV	1429	LQYARVDFPFLNCTDVRQWVGNRGRYIMRQEGELIPNA---CSKIRSM---1497	
	GGV	1409	LQYARVDFPFLNCTDVRQWVGNRGRYIMRQEGELIPNA---CSKIRSM---1497	
	ROUTV	1408	LQYARVDFPFLNCTDVRQWVGNRGRYIMRQEGELIPNA---CSKIRSM---1497	
	WNV	1451	LQYARVDFPFLNCTDVRQWVGNRGRYIMRQEGELIPNA---CSKIRSM---1497	
hantmaniruses	HISV	1279	LQYARVDFPFLNCTDVRQWVGNRGRYIMRQEGELIPNA---CSKIRSM---1497	
	HISV-2	1279	LQYARVDFPFLNCTDVRQWVGNRGRYIMRQEGELIPNA---CSKIRSM---1497	
	VP2V-1	1285	LQYARVDFPFLNCTDVRQWVGNRGRYIMRQEGELIPNA---CSKIRSM---1497	
	Oscv-1	1283	LQYARVDFPFLNCTDVRQWVGNRGRYIMRQEGELIPNA---CSKIRSM---1497	
antennaviruses	W1FAV-1	1345	LQYARVDFPFLNCTDVRQWVGNRGRYIMRQEGELIPNA---CSKIRSM---1497	
	W1FAV-2	1340	LQYARVDFPFLNCTDVRQWVGNRGRYIMRQEGELIPNA---CSKIRSM---1497	

Figure S3. Amino acid sequence alignments of the L protein enzymatic domain from representative members of the four arenavirus genera. Virus abbreviations are as in Figure 5. Residues that are conserved (identical or chemically similar) are highlighted in yellow (not required for polymerase activity) or green (required for polymerase activity).

old world mammarenaviruses	LASV	1	MGNKQAKA-----PESKDSP-----RA--SLIPDATHLGPQF	30
	LUJV	1	MGQRHSSGSGQPMPK-PSDSDEAR-----RS--ELHSDASHLGPLN	39
	IPPYV	1	MGQNQSRDKQKAIQ---NQPKDTGN-----RA--DIIPDATGMGPEF	37
	WENV	1	MGNKVPKENK-----PATPPPY-----RA--FVIPDTSHLGPTF	32
new world mammarenaviruses	JUNV	1	MGNCNGASK---SNQ-PDSSRATQP-----AAEFRRVAHSSLYGRYN	38
	MACV	1	MGNCNKPPK---RPP-NTQTSSNQF-----SAEFRRTAPPGLYGRYN	38
	GOTV	1	MGNKSKSN---PSSSESQKGAPT-----VTEFRRTAIHSLYGRYN	39
	OLVV	1	MGSKSSKSSGFENVPELGLSHTNQF-----RVSLIREARPSLYGRYN	42
	WAV	1	MGLRYSKEVRDRYGD---KE-PEG-----RIPITLNMFPQTYGRYN	37
reptarenaviruses	CALV	1	MGLRYSKEVRKRHGD---ED-VVG-----RVPMTLNLPPQGLYGRFN	37
	FLEV	1	MGLRYSKAVRDRYGE---RE-TVG-----RVPMTLNLPPQGLYGRFN	37
	CASV	1	MSMCINGTNS--IG---ISNEVVLSTLISSLTLLILLIINTITMFGKALTLKKRLSF	54
	UHV	1	----MSTSTS--IG---LTTEIISIVTFILVIVLVVIQIVSCVTMLSLKGVTLKKRLRF	50
	GGV	1	----MSGSTA--IG---LTTEVISIITFILVIAIFVIEIVSCVTMTLKAITLKKRLSF	50
ROUTV	1	----MSESTA--IG---LTTEVISIITFILVVIIFIVVIVNCVAMMTLKAITLKKRLMF	50	
old world mammarenaviruses	LASV	31	CKSCWFENKGLV-ECNNHYLCLNCLTLLLSVSNRCPICKMPLPTKL-----	75
	LUJV	40	CKSCWKSKKALV-KOYDHYLCLNCLSLLLMGITPRCPFCYRELPKNL-----	84
	IPPYV	38	CKSCWFERRSLV-ACNNHYLCMNCLTLLLSVGERCPICKLPLPQKL-----	82
	WENV	33	CKSCWFESKGLV-ACSNHYLCMNCLTLLLSASDRCPICKLPLPTKL-----	77
	JUNV	39	CKCWFADTNLI-TONDHYLCLRCHQGMRLNSDLCNICWKPLPTTI-----	83
	MACV	39	CKCWFADTNLI-TONDHYLCLRCHQTMRLNSELCNICWKPLPTSI-----	83
	GOTV	40	CKCWFADKNLI-KOSDHYLCLRCLNVMLKNSDLCNICWEQLPTCI-----	84
new world mammarenaviruses	OLVV	43	CKCWFQKNLV-ECSDHYLCLKCISMLRRGQNCIEICGKPIPTHI-----	87
	WAV	38	CKSCWFANKGLL-KCSNHYLCLKCLTLMGRSDYCGICGCVLPKKL-----	82
	CALV	38	CKSCWFVNKGLI-RCKDHYLCLGCLTKMHSRGNLCEICGHSLPTKM-----	82
	FLEV	38	CKSCWFANKGLI-ACSDHYLCLNCLTRMLSRSEFCEICNRPLPTKI-----	82
reptarenaviruses	CASV	55	CTACGKNSSLVKLPCKHK-CCIQCPLAN----LKCPICYEFLWCEKADGGSLESLSLMMK	109
	UHV	51	CQGGKNASLVVLPCKNS-VCMECALK----MRCPVCFEFLWCEENPDGSLTSLALVNR	104
	GGV	51	CQGGKNASLVILPCKNK-VCMECALK----MRCPVCEACLWCEENPDGSLSSALVNR	104
ROUTV	51	CQGGKNASLVILPCKNK-VCMECALK----MRCPVCEACLWCEENPDGSLSSALVNR	104	
old world mammarenaviruses	LASV	76	RPSAAPTAPPTGAADSIRPPPYSP	99
	LUJV	85	DLAEAPSAPPL-----	95
	IPPYV	83	KLTGSPSAPPSPS----PPPYSP	101
	WENV	78	RLSRTPSAPPSPDTP-----	91
	JUNV	84	TVPVEPTAPP-----	94
	MACV	84	TVPVEPSAPP-----	94
	GOTV	85	TVPEEPSAPPE-----	95
new world mammarenaviruses	OLVV	88	AVTTAPTAPPE-----	99
	WAV	83	VFENSPGAPPYEA-----	95
	CALV	83	EFLESPGAPPYEP-----	95
	FLEV	83	IFEESPGAPPYEP-----	95
reptarenaviruses	CASV	110	NLQELP-----	115
	UHV	105	EMGASGTTTRV-----	115
	GGV	105	ERNKVRDNLPEP-----	116
	ROUTV	105	ERNKHRDNPPEP-----	116

Figure S4. Amino acid sequence alignments of Zinc-binding (matrix) proteins from representative members of the mammarenavirus and hartmanivirus genera. Residues that comprise zinc-binding domain 1 are highlighted in yellow. Residues that comprise zinc-binding domain 2 are highlighted in orange or blue. A transmembrane domain in the Z protein of reptarenavirus is highlighted in grey. Reptarenaviruses and antennaviruses do not encode a Z protein.