

Supplemental data

Figure S1. Amino acids alignment through MUSCLE (Multiple Sequence Comparison by Log-Expectation) of the sequences used to generate the phylogram in **Figure 1**. According to BLOSUM62 matrix, the residues in color are the most conserved. Average BLOSUM62 score: low (0.5) in grey, mid (1.5) in turquoise and max (3.0) in blue.

```
HcrVf2_M.f      MERTmrsvllltrflaIat--tfsiglcngnpgwplCkvseRraLLmfKqdkl--Dpv-----nRLASvvaeddSDCCSwitGvVCDh-vtGHiheLhLNsSyd-
CF-9_S.pim      --mdcvklvflMlytlfclq---alssslphl-----CpeDQalsLLQfKNMft-inpNaSDYCYDrttyvdiqsyprtlSW-Nk-stsCCSwdGVhCde-ttGqVtALDLrcsqLq-
CF-4_S.hab      --mgcvklvfflMlytlfclq---vssssslphl-----CpeDQalaLLefKNMft-vnpNaSDYCYD-----rRtlSW-Nk-stsCCSwdGVhCde-ttGqVtALDLrcsqLq-
LEPR3_B.ju      MKgsvksfslipIsfcflfLrdefavparhl-----ChpqQReaileLKNeFqIqkpcS-----gwtvSW-an-NSDCCSwdGirCda-tfGdVieLnLgncILh-
LEPR3_B.na      MKgsvksfslipIsfcflfLrdefavparhl-----ChpqQReaileLKNeFhIqkpcS-----dRtvSW-vn-NSDCCSwdGirCda-tfGdVieLnLgncILh-
LEPR3_B.ra      MKgsaksIslipIsfcflfLrdefavparhl-----ChpqQReaileLKNeFqIqkpcS-----gwtvSW-vn-NSDCCSwdGirCda-tfGdVieLnLgncILy-
BAD68095.1      MastlpqLLiLiLiLiLYcsiqtvanttIipvh-----ChphQaealLLQKssFi-----n-----pnLSSW-kl-ntDCCNheGVTCdt-ssGqVtaLDLSyylnlqsp-
AES86946.1      --mrhivfLlffipfslIiSsnkfLVnGy-----ChghehSLLQLKNSli-FnpTKS-----skLvhW-NqsdDCCqmhGVTCdt--qGHVtLDLSqSIS-
GbVe_G.bar      --mtmspfswiffnafLvaaFftihlvVSGQ-----CqrDQgqLLLeLKss--FnsTsl-----gKlqkW-Nq-ttDCCfndGVTCdt--asGrVigLDLSNqSIS-
LuVe11_L.u      --mtsngltwflLmytLV-----GsqvgsVSGQ-----CaggQOSSLQLLKqgFnt-ssSSIS-----rnLArW-ds-sLDCCNmpGigCDpGglGrVtrLnLsGEMIT-
LuVe14_L.u      MKqqlqLlwyLlmpILYtl-----VSGR-----CagPQOSSLQLLKqgFntvssSSS-----rnLArW-ds-tiDCCNmpGigCDpGglGrVtrLnLsGEMIT-
LuVe12_L.u      MKlhlLaLsIVlVgsLVsl-----VSGR-----CagPQhSLLQLKqgLI-FDqSyS-----aKLAKW-Na-stDCCNmpGigCDpGglGrVtrLnLsGEMIT-
LuVe13_L.u      MKfqllaLsIVlVgtLVsl-----VSGR-----CagPQhSLLQLKqgLV-FDqSyS-----aKLsgW-Na-stDCCNmpGigCDpGglGrVtrLnLsGEMIT-
mVe1_M.lon      ---manLflsVlmisIita-TtfttIsySqQ-----ClhhQKTsLLQLKNeIk-FDSSNS-----tkLvwW-NrkNnDCCNmpGigCDpGglGrVtrLnLsGEMIT-
ACB99693.1      ---manLflsVlmisIita-TtfttIsySqQ-----ClhhQKTsLLQLKNeIk-FDSSNS-----tkLvwW-NrkNnDCCNmpGigCDpGglGrVtrLnLsGEMIT-
StVe_S.tor      ---mrflhflwLlflipfFqILSGieifLVsqQ-----ClDhQKSLLLKngtLIq-YDSSIS-----tkLArW-NqntSeCCNmpGigCDpGglGrVtrLnLsGEMIT-
S1Ve1_S.ly      MKmmttlyflwLlvpLFqILSGndifLVsqQ-----ClDQKSLLLQLKqSfQ-YDSTIS-----nKlerW-NhntSeCCNmpGigCDpGglGrVtrLnLsGEMIT-
Ve1_S.lyco      MKmmatlyflwLlvpLFqILSGyhiFVsqQ-----ClDQKSLLLQLKqSfQ-YDSTIS-----nKlAKW-NdmtSeCCNmpGigCDpGglGrVtrLnLsGEMIT-
AAT51733.1      MKmmatlyfpmVLlpslqLlSGyhiFVsqQ-----ClDQKSLLLQLKqSfQ-YDSTIS-----nKlAKW-NdmtSeCCNmpGigCDpGglGrVtrLnLsGEMIT-

HcrVf2_M.f      wefnfsggklnpsLlSLk---hLnYLDLSNndFNGTQIPs-ffGsmTslThNLNlayseLgiIPhKlgnLssLryLnLsSf-----ygsnLKVnL---qwIsG
CF-9_S.pim      GkfhS-----nSsLFqLs---nLkrLDLSFNnFtGSIIsp-kfGefsdLThLdLSHssFGIIPseichskLhVtricdq-----yglSLvpyNfEILLkN
CF-4_S.hab      GkfhS-----nSsLFqLs---nLkrLDLSFNnFtGSIIsp-kfGefsdLThLdLSHssFGIIPseichskLhVtricdq-----yglSLvpyNfEILLkN
LEPR3_B.ju      GeLns-----kntilkQLSPLFQaLDLSdNyFs-gnIPs-sLGNLskLTdLdLSKnaFGaIPssLgnLsnltLn-----eltfghNfEILLkN
LEPR3_B.na      GeLns-----kntilkQLSPLFQaLDLSdNyFs-gnIPs-sLGNLskLTdLdLSKnaFGaIPssLgnLsnltLn-----eltfghNfEILLkN
LEPR3_B.ra      GqLns-----kSIIlgfQSLPFLatLDLSdNyFs-gnvPs-sLGNLskLTdLdLSKnaFGaIPssLgnLsnltLn-----eltfghNfEILLkN
BAD68095.1      GGLD-----pAvFNlt---tLrnLsLagNdFNrtVlPsfGfqrLTklrLdLSeAGFGQIPigiahLknLraLDLSfn-----yLffqePsfQIVaL
AES86946.1      GGLD-----SSALFSLQ---YLQsLnLaFnhFr-SvIPq-dLhrLhNLrYLNLSNAGFGQvPeeiShLkRLVlDfSsk-----fisIqnLKLEKPNigmLVQV
GbVe_G.bar      GaIDD-----SSgLFrFQ---hLQgLnLaYnrIm-atFPT-GfdkLNLsYLNLSNAGFGQIPavISRmTRLVtLDLSv-----sllgrstLEKPKLELVQV
LuVe11_L.u      GGFdn-----SmaLFrLQ---YLQvLDLSFNsFd-rtIPA-GIGNLTLNkYLNLSNAGFGQIPaeiSsLKLVLdLSm1-----YfpgvLSKLEPNLsgLVkN
LuVe14_L.u      GGFgn-----SmaLFrLQ---YLQvLDLSFNnFN-TtpPa-GIGNLTLNkYLNLSNAGFGQIPaeiSsLKLVLdLSm1-----YfpgvLSKLEPNLsgLVkN
LuVe12_L.u      GGLD-----SkALFSLQ---YLQsLDLSNnyFN-TnvPn-dLanLTsLrYLNLSNAGFGQvPasISRmTSLVSLDLSfdqefmvlIdsfqdgtsnvypimslqyPNLgeLVEN
LuVe13_L.u      GGLnd-----SSsLFrLQ---YLQtdLMSFNyFq-TtvPi-nLanLTsLrYLNLSNAGFGQvPasISRmTSLVSLDLSfdqefmvlIdsfqdgtsnvypimslqyPNLgeLVEN
mVe1_M.lon      GGIDD-----SSsLFrLe---FLEKLnLaYnvFNrtQIPr-GIqNLTYLThNLNLSNAGFGQvPlqLSfLTRLVsLDIskf-----ddmgrPLeLrPNLsqLVQV
ACB99693.1      GGIDD-----SSsLFrLe---FLEKLnLaYnvFNrtQIPr-GIqNLTYLThNLNLSNAGFGQvPlqLSfLTRLVsLDIskf-----ddmgrPLeLrPNLsqLVQV
StVe_S.tor      sGIEEn-----SSALFSLQ---YLEKLnLaYnrFs-vgIPv-GISNLTLNkYLNLSNAGFGQIPmmlSRLTRLVtLDLStl-----rgrgiePKLErPNLEtLIQV
S1Ve1_S.ly      sGIEEn-----aSALFSLQ---YLEsLnLaYnkFN-vgIPv-GIGNLTLNkYLNLSNAGFGQIPmmlSRLTRLVtLDLStl-----rgrgiePKLErPNLEtLIQV
Ve1_S.lyco      sGIEEn-----SSALFSLQ---YLEsLnLadNmFN-vgIPv-GIaNLTLNkYLNLSNAGFGQIPitLSRLTRLVtLDLSti-----lPffdgPKLEPNLshfIEI
AAT51733.1      sGIEEn-----SSALFSLQ---YLEsLnLadNmFN-vgIPv-GIDNLTLNkYLNLSNAGFGQIPitLSRLTRLVtLDLSti-----lPffdgPKLEPNLshfIEI

HcrVf2_M.f      LsLkKhldLssVn1---skaSdWlQvt---nmLPsLveLdmSDCldqipltpnptfSLvLdLsrNSfncIprWvFsLkNLvSLhSfGgFQspiPsisqnt-sLreIDLsFNsIs1
CF-9_S.pim      LTQRLRELnLesVn1---SSTIPsnFs--ShLTLQlsgteLhGILPERVfHls-nQsLhLSvNpqlt
CF-4_S.hab      LTQRLKvldLesin1---SSTIPsnFs--ShLTLNwLpyteLRGILPERVfHls-dLEfLDLSNpqlt
LEPR3_B.ju      -----afnGeIPSSLgnLsNLTlIkLsqNkLigkiPpslgNLSyLThLTLcanNLvGeiPyylanLshhLtfLniceNs-fs
LEPR3_B.na      LigkipssL-----gnLsNLTlIkLsYnnlIGkiPSSLgnLsNLTlLnLsqNkLigkiPpslgNLSyLThLTLcanNLvGeiPyylanLshhLtfLniceNs-fs
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BAD68095.1      LTditELyLDGvA1---SARGeWghpL---SllKglrVLSmSSCNLSGPIOSSlAKLQSLsIVkLsqNklftVpDWFNFNSNLTlLqLssCtLKGfPPKdIFIQth-tLkvLDmSNnqly
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GbVe_G.bar      LgqVLDLrLDGVD1---SAQGNqWQALaDSSLqNLKLSmSNCFSLSGPFDSSlKLrSLSViRLDtnFefStpIPDFAdFgsLTVLrLrtCgLSgtFPakIFQIP-sLEVLDLSNngLlq
LuVe11_L.u      LgqVLDLrLDGVD1---SAQGNqWQALaDSSLqNLKLSmSNCFSLSGPFDSSlKLrSLSViRLDtnFefStpIPDFAdFgsLTVLrLrtCgLSgtFPakIFQIP-sLEVLDLSNngLlq
LuVe14_L.u      LgqVLDLrLDGVD1---SAQGNqWQALaDSSLqNLKLSmSNCFSLSGPFDSSlKLrSLSViRLDtnFefStpIPDFAdFgsLTVLrLrtCgLSgtFPakIFQIP-sLEVLDLSNngLlq
LuVe12_L.u      LTrLVdLrLDIVtItdhHQGNqWCEALS-SsLPNLeVLSmSNCLLpGDPpSLSKLQhLSVvqLDyNDFSSVPesFayFrNLTSLtmrdCgLKgtFPakIIQIP-sLEVLDLSNngLlq
LuVe13_L.u      LTrLVdLrLDIVtItdhHQGNqWCEALS-SsLPNLeVLSmSNCLLpGDPpSLSKLQhLSVvqLDyNDFSSVPesFayFrNLTSLtmrdCgLKgtFPakIIQIP-sLEVLDLSNngLlq
mVe1_M.lon      LsgLRELCdGVDV---SsQkSEWg1i1s-ScLPNirsLSLryCvsgSGPLheSLSKLQSLsIILdGhNLSVVPnFFANFSsLTTLSLknCsLEGSFPEmIFQKp-tLQnLDLSNngLlq
ACB99693.1      LsvLRELCdGVDV---SsQkSEWg1i1s-ScLPNirsLSLryCvsgSGPLheSLSKLQSLsIILdGhNLSVVPnFFANFSsLTTLSLknCsLEGSFPEmIFQKp-tLQnLDLSNngLlq
StVe_S.tor      sTeLRELyLDGVD1---SAQraEWQSLs-SyLPNLTVLSLrCqisSGPIDSLqLQSLsIILdGhNLSVVPnFFANFSsLTTLSLknCsLEGSFPEmIFQKp-tLQnLDLSNngLlq
S1Ve1_S.ly      sTeLRELyLDGVD1---SAQrtdwQSLs-SyLPNLTVLSLrCqisSGPIDSLqLQSLsIILdGhNLSVVPnFFANFSsLTTLSLknCsLEGSFPEmIFQKp-tLQnLDLSNngLlq
Ve1_S.lyco      sTeLRELyLDGVD1---SsQrtdwQSLs-SyLPNLTVLSLrCqisSGPIDSLqLQSLsIILdGhNLSVVPnFFANFSsLTTLSLknCsLEGSFPEmIFQKp-tLQnLDLSNngLlq
AAT51733.1      sTeLRELyLDGVD1---SsQrtdwQSLs-SyLPNLTVLSLrCqisSGPIDSLqLQSLsIILdGhNLSVVPnFFANFSsLTTLSLknCsLEGSFPEmIFQKp-tLQnLDLSNngLlq
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[illegible]

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CF-9_S.pim -----kn1q111LshNNIsGhIssaICN-----1kt111LDLgSNNLeGTIPqCvVERneyLshIsKn
CF-4_S.hab -----kn1qF11LshNNIsGhIssaICN-----1kt111LDLgSNNLeGTIPqCvVERneyLshIsKn
LEPR3_B.ju -----qpssleyYFSgANNFTGgIPsfICE-----1rsLTVLDLsNNkfngSPrcCgkfSsvLealRqN
LEPR3_B.na -----qpsslyYFSgANNFTGgIPsfICE-----1hsLi1LDLsNNrnfngSIPrcCvkgfSsvLealRqN
LEPR3_B.ra -----qpsslyYFSgANNFTGgIPsfICE-----1rsLTVLDLsNNkfngSPrcCgkfSsvLealRqN
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LuVe11_L.u -----raLpmt---YVDYShNFNGSIPA---EIsNyLS1a1FFSLsNNs1TGKIPtSICT---aefLqVLDLsNNNLdGSIPnCLHEnvslsVLRgN
LuVe14_L.u ---sLNVLDmHdNqLqGDvPIp1St---LpmtYVDYShNFNGSIPA---EIsNyLS1a1FFSLANNt1sGevPaSICT---aktLqVLDLsNNNLtGpIP-----
LuVe12_L.u ---sLFI1D1HdNqfQGD1PIiqsSp---f---hIDYSYn1fNGSIPtTnkartyLtnAnFFSLsNNr1rGaIPaSIC-----mdleeVLDfSNNNfndTIPdCLVgn-kwLaLIRgN
LuVe13_L.u ---rLNVLD1HdNqfQGD1PIiqsSp---f---hIDYSYn1fNGSIPtTykarnfhsWAnFFSLsNNr1rGaIPaSIC-----nnpLeVLDfSNMynfndTIPdCLarh-nwLaLIRgN
mVe1_M.lon -asLq1LDLHNSNRfKGDLHlfis-----pIGd1tps1yw1SLANNsFsgSPtS1CN---atqLgVLDLs1NqLSGdIapCLLEntgh1qVlgrN
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CF-9_S.pim nLNGvFDLHNSNkIGDLPpPSA---I---YVDYSSNnLnSIPI---DIGNsLa1AsFFSIANNs1TGmIPESICN---isyLqVLDLsNNkLSGTIPpCLLhNStsLGVlgrN
StVe_S.tor -SNLVLDLHNTNRLKGDL1pPSp---I---YVDYSSNnsNnSIPI---DIGKsLgFasFFSVANNgiTG1IPESICd---vsylqL1DfSNNaLSGTIPpCLLEySttLGVlgrN
S1Ve1_S.ly -SNLVLDLHNSNRKGDL1pPcTA---I---YVDYSSNnLnSIPI---DIGKsLgFasFFSVANNgiTG1IPESICN---csylqVLDfSNNaLSGTIPpCLLEySttLGVlgrN
Ve1_S.lyco -SNLVLDLHNSNRKGDL1pPcTA---I---YVnYSSNnLnSIPI---DIGKsLgFasFFSVANNgiTG1IPESICN---csylqVLDfSNNaLSGTIPpCLLEySttLGVlgrN
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CF-9_S.pim M-keiDestgf-----peyisdpydiY-----Yny1t1stKGqdydsVr1ILdsnm1In1SkNRFEghIPs1IGd1vgLrtLNL
CF-4_S.hab M-keiDestgf-----peyisdpydiY-----Yny1t1stKGqdydsVr1ILdsnm1In1SkNRFEghIPs1IGd1vgLrtLNL
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LuVe11_L.u M-Mgdrngmdd---HL-----kFEpfqfTQ1Y-----YQDSt1v1tKGLqMEFVK1ltVFTAI1DfSSNnFEGpIPES1Gk1fnsLYVLNF
LuVe14_L.u M-Mgdrngmdd---HL-----kFEpfqfTQ1Y-----YQDSt1v1tKGLqMEFVK1ltVFTAI1DfSSNnFEGpIPES1Gk1fnsLYVLNF
LuVe12_L.u M-Migaeg1hd---HL-----kYEsVnsTd-----YEnS1TVssKGLqrE1VK1LkVFKS1DfSSNnFDGqIPeVmgKf1AvqVLNL
LuVe13_L.u M-Migaegmhd---HL-----eYKsfnnTd-----YEvS1TVssKGLqrE1VK1LkVFKS1DfSSNnFDGqIPeVmgKf1AvqVLNL
mVe1_M.lon M-VlmsDarfTqr-Hw-----gtfnfLsaSQFY-----YtaAvALT1KrVELELVK1wpdF1AVD1ScndFhgdIPDA1Gd1LtsLYVLNI
ACB99693.1 M-VlmsDarfTqr-Hs-----gtfnfLwtSQFY-----YtaAvALT1KrVELELVK1wpdF1AVD1ScndFhgdIPDA1Gd1LtsLYVLNI
StVe_S.tor M-1vahOnveTahNHI-----qYKf1q1SnEY-----YQDTVTL1K1GHELELVK1LrVFTSIDfSSNRfGmIPDTV1Gd1LtsLYVLNI
S1Ve1_S.ly M-1vahDDyveTgrNHI-----qYKf1q1SnEY-----YQDTVTL1K1GHELELVK1LrVFTSIDfSSNRfGmIPDTV1Gd1LtsLYVLNI
Ve1_S.lyco M-1vahDDyveTgrNHI-----qYKf1q1Sk1Y-----YQDTVTL1K1GHELELVK1LrVFTSIDfSSNRfGmIPDA1Gd1LtsLYVLNI
AAT51733.1 M-1vahDDyveTgrNHI-----qYKf1q1SnEY-----YQDTVTL1K1GHELELVK1LrVFTSIDfSSNRfGmIPDTV1Gd1LtsLYVLNI

HcrVf2_M.f SñNrFTGrIPsKiGsmagLESLOfSmNqLdGEIPsmtiLTFhshNLNSYNNLTGRIPes tQlQsldqsSFvGN-eLcGaPLNKnCsengvippPtvehdggggyslvedEwfyVyslgVG
Cf-9_S.pim SHNvleGHIPaSFqNLsVLESLOLSsNKiSGEIPQqLASLTFLeVLNLSHnHVGcIPKqQFdsFgntSyQGndGLrGfPLsKlCggedqvttPaeldqeeEeEdSpmisWqgVlvgyG
Cf-4_S.hab SHNvleGHIPaSFqNLsVLESLOLSsNKiSGEIPQqLASLTFLeVLNLSHnHVGcIPKqQFdsFgntSyQGndGLrGfPLsKlCggedqvttPaeldqeeEeEdSpmisWqgVlvgyG
LEPR3_B.ju SgNAFTGHIPSSmGNLSsLESLOLSRNKLTGaIPQEL-----VLHl-----dsrwdt-----
LEPR3_B.na SgNAFTGrIPSSmGNLSsLESLOLSRNKLTGEIPQELgNLsyLaymNFShNqLVGlVPgG tQFRTqpcsSFkdNPGLfGpsLNqaCvdihgktsqpsmSkeEeEdgqeevisWIAAAIG
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BAD68095.1 SrNsFTGrIPsKiGkLvqLESLOLSInqLSeaiPQELASLTsLAIlnNLSYNNLTGQIPqG tQFIsFgnrSFEGNaGLCGrPLsKqCnysgleaarsp-sSsrD---SvgiilFVFvgsG
AES86946.1 SHNAITGHIPSSveNLkhLESMDLSnNsLnGEIPQqLSLsFLaymNLSFNhLVGRIP1G tQlQTFdvDSFaGNeGLCGpPLtKiCeppqa-----setphsQnesfvEwsFIsielG
GbVe_G.bar SHNAFTGsIPsS1GNLSqLESLOLSsNsfdGEIPiqlANLnFisfLNvSnNkLeGQIPrs tQlQsFSeasFENkGLCG1PLttCvngtspkp-----rTtqEfQpAdefDwQFIFigVG
LuVe11_L.u SHNsFTGrIPsVFGNLsQLESsDLSnNKLTGQIPQELteLTFLSaNLNSYNhLVGRIPtGr tQFQTFensSFEGNPnLCGnPtFKsCsdiivt-----ppaqKesgkpsidWeFivpgIG
LuVe14_L.u SHNgFTGeIPStlGNvSgLESLOLSnNKLTGrIPsalteLTFLSaNLNSYNhLVGRIPtGr tQFQTFensSFEGNPnLCGnPtFKsCsdiivt-----ppaqKesgkpsidWeFivpgIG
LuVe12_L.u SHNAFTGHIPsAfGdLSnmESLOLSHnKkGhIPdELtgmKFLeVLNLSdNNLVGRIPtG tQFQTFdntSFgaNPdLCGiPLtKnCtpsspvhgdat-isHen--hSsrVdWdlismAfG
LuVe13_L.u SHNdFTGHIPsAfGdLSnmESLOLSHnKkGhIPEELtgmKFLeVLNLSdNNLVGRIPtG tQFQTFdntSFgaNPdLCGiPLtKnCtpsspvhgdat-isHen--hSsrVdWdlismAfG
mVe1_M.lon SHNAIGGsIPKsIGqLSKLESLOLSRNRLSghvPtELggLTFLsVLNLSYNhLVGeIPnGrQmhTFSaDaFKGNaGLCGrhLeRnCsd-----rSgEiEieneiEwVYFvALG
ACB99693.1 SHNAIGGsIPsFghLSrLESLOLSRNqLTghvPtELggLTFLsVLNLSYNhLVGeIPnGrQmhTFSaDaFKGNaGLCGrPLeRnCsd-----rSgEiEieneiEwVYFvALG
StVe_s.tor SyNAleGPtPKsVgkLqmLESLOLSnHLSGEIPsELASLTFLAaLNvSFNNLFgKIPqG iQlQTFsGDSFEGnRGLCGfPLsnsCksdase----lTpapssqddsYDwQFIFkgVG
S1Ve1_S.ly SHNAleGPtPKsIGkLqmLESLOLSRNHLSGEIPsELASLTFLAaLNLSFNkfFGKIPst tQFQTFsGDSFEGNsGLCG1PLNdsCqngses----lpp1tsQdsddEwFIFAAGV
Ve1_S.lyco SHNAleGPtPKsIGkLqmLESLOLSnHLSGEIPsELASLTFLAaLNLSFNkfFGKIPst tQFQTFsGDSFEGNsGLCG1PLNdsCqngses----lpp1tsQdsddEwFIFAAGV
AAT51733.1 SHNAleGPtPKsIGkLqmLESLOLSnHLSGEIPsELASLTFLAaLiLSFNnLFgKIPst tQF1TFsGDSFEGNRLCG1PLNdsCeskrsefmPlq-ts1Pe-----sdfEwFIFAAGV

HcrVf2_M.f FftGfwivlgsLLvnmplis-illsqllnRivlkmYhviveyv-----
Cf-9_S.pim cglvlglsViyIMwstqYp-awF-srmDlklehiittkmKkhkKry-----
Cf-4_S.hab cglvlglsViyIMwstqYp-awF-srmDlklehiittkmKkhkKry-----
LEPR3_B.ju -----
LEPR3_B.na FipGiAfgtmeyimvSYKPeWf-----inlfgrtkrRisttrr-----
LEPR3_B.ra FipGiAfgtmeyimvSYKPeWf-----inlfgrtkrRisttrr-----
BAD68095.1 F-----ktnDlsVqEhmldlgs-----
AES86946.1 FffGfgvflPVfclWkkIR-lWYskHVDemLyRf1PrldfvyeqhegkRyktLkmy-----
GbVe_G.bar FgVGAAIfVaPLIFWkTas-kWvDeiVDKilevvlPk1g-RtytcpgdRkvdedenLEEdnKgsDeEdeqsqettEeFhGRYCVFCsKLDqTRKkAIHd1sCTCyDSSsspsSstspff
LuVe11_L.u iivVGfavlPaLlWprFR-nWYwprIDS1liavFPqfrshkanatrrRagerRsg-----
LuVe14_L.u FgaGAAIaVaPLlFskkan-kWLDdHIDRil1vl1PlfgrlytsndwRrvqpeeildhyvyfydDDEEDEdesydeFfGkYCYyCtKLDaTRtmAIHDPKCTCrhSrtgstFSspfsSt
LuVe12_L.u YvfglgaImPaailWsSFR-iWYwpkVDyLLvwmFPklytKdwnnrlvRtrkKksi-----ikDdk-----piilnh
LuVe13_L.u YvfglgaImPaailWsSFR-iWYwpkVDyLLvwmFPklytKdwnnrlvRtrkKksi-----ikDdk-----piilnh
mVe1_M.lon YvVGlgiiVvllLFcrSFR-ykYfdkIDKvvqetFdardrRrrRngtRivrnqvvrsh-----inDgk-----A-nly
ACB99693.1 YvVGlgiiVvllLFcrSFR-ykYfdkIDKvvqetFdardrRrrRngtRivrnqvvrsh-----inDgk-----A-nly
StVe_s.tor YgVGAAVsIaPLLFYkrgr-kycDkHleRmLkImFPrfgfytRfhpkgkvavehyeDEt---pDDtEDDDEggkEas1GRYCVFCsKLDqRKaAIHDPKCTChmSSslisFplApsSs
S1Ve1_S.ly YlVGAAntIsVwFYkpvK-kWFDkHaeKvllwFsr-----
Ve1_S.lyco YlVGAAntIsVwFYkpvK-kWFDkHmeKcllwFsrk-----
AAT51733.1 YlVGAAntIsVwFYkpvK-kWFDkHmeKcllwFsrk-----

HcrVf2_M.f -----
Cf-9_S.pim -----
Cf-4_S.hab -----
LEPR3_B.ju -----
LEPR3_B.na -----
LEPR3_B.ra -----
BAD68095.1 -----
AES86946.1 -----
GbVe_G.bar sp-----
LuVe11_L.u -----
LuVe14_L.u tt-----
LuVe12_L.u Hm-----
LuVe13_L.u Hm-----
mVe1_M.lon -----
ACB99693.1 -----
StVe_s.tor sp1lvichkkf-----
S1Ve1_S.ly -----
Ve1_S.lyco -----
AAT51733.1 -----

Figure S2. Phylogram showing evolutionary relationships between Ve1 homologs (clade B) including candidates proteins in flax, determined by using maximum-likelihood method. Branch lengths are proportional to evolutionary distances, branch values > 0.6 are given at the node to indicate the branch support. In addition, other Ve1 homologs were added to the tree including HLVe1-2A (*Humus lupulus*; Genebank accession: AIE39594.1); HLVe1-2B (*Humus lupulus*; Genebank accession: AIE39594.1), NgVe1 (*Nicotiana glutinosa*, Genebank accession: ALK26499.1), CaVe (*Capsicum annum* var. *annuum*, Genebank accession: AZY92102.1), StuVe1 (*Solanum tuberosum*, Genebank accession: ALK26501.1), StuVe2 (*Solanum tuberosum*, Genebank accession: ALK26503.1), and Ve2 (*Solanum lycopersicum*, Genebank accession: AAK58012.1). Some of them were tested for *Verticillium* resistance (Song *et al.*, 2017), Ve1 homologs providing resistance are indicated in (1) or not in (2).

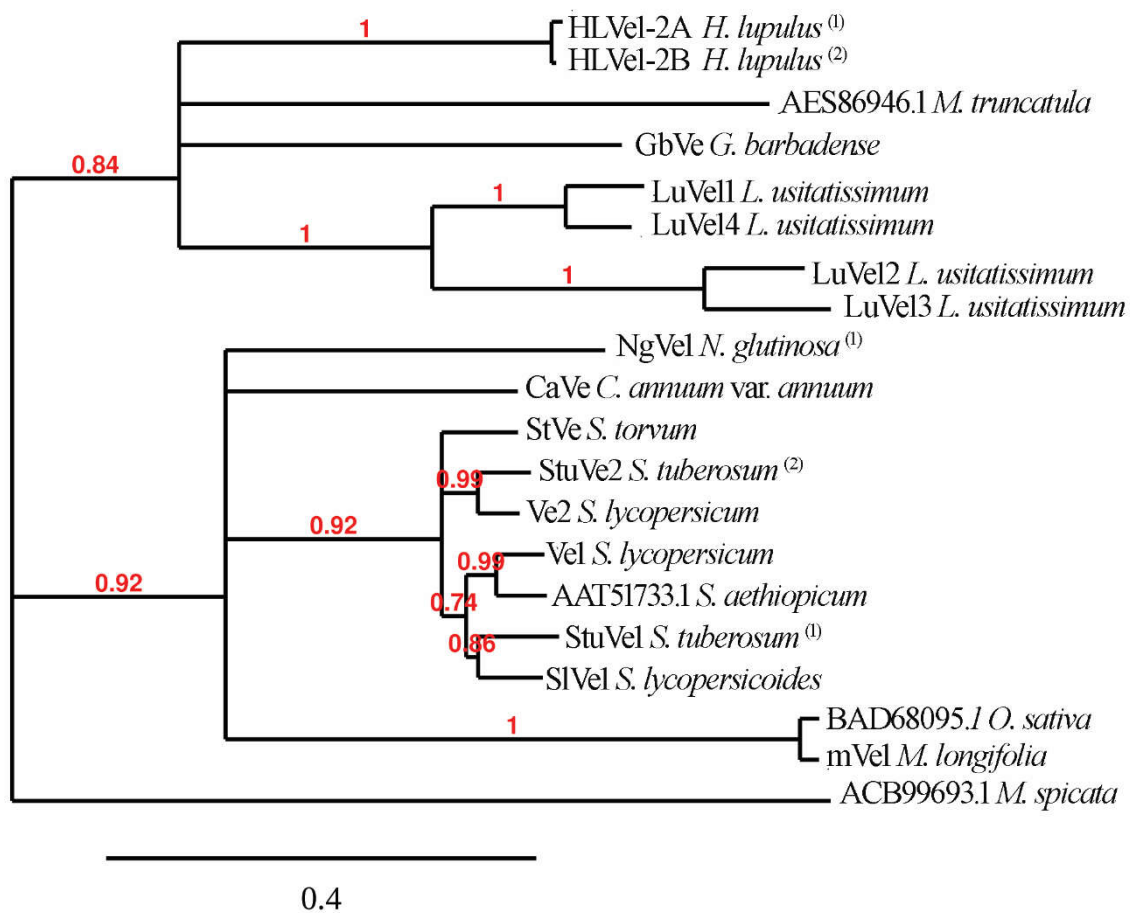


Figure S3. Secondary structure predictions of LuVe11 (up) and Ve1 (down). Colored amino acids indicate structural elements: in grey for coil, in pink for α -helix, in yellow for β -strand and in white for transmembrane segment. Segments B1 to B8 are boxed in green, B20 to B23 in blue and B32 to B37 in red.

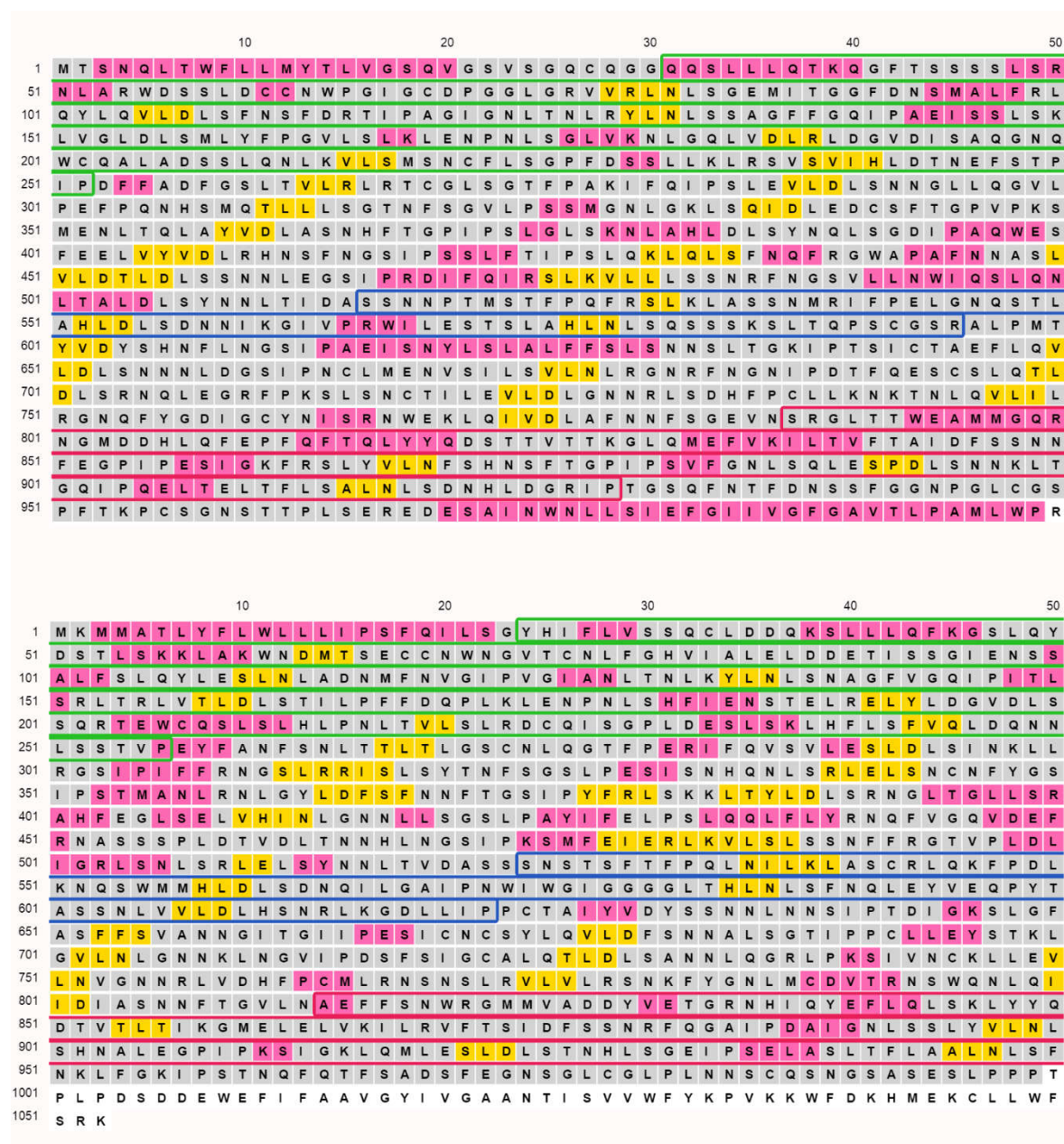


Table S1. Prediction of peptide signal and subcellular localization within the four proteins in flax and Ve1. Values indicate location of each fragment.

Prediction Sequence	Signal peptide	Non cytoplasmic	Transmembrane	Cytoplasmic
LuVe11	1->25	26->974	975->998	999->1039
LuVe14	1->23	24->933	934->954 966->983	955->965 984->1061
LuVe12	1->23	24->1016	1017->1038	1039->1090
LuVe13	1->23	24->994	995->1016	1017->1067
Ve1	1->23	24->1010	1011->1032	1033->1053