Supplementary Materials

Figure S1. Multiple sequence alignment of the malpisin family. Signal, pro- and mature peptides are boxed in pink, gray and blue. Color codes and symbol notes used here are the same as those in Figure 2. The arrow labels the position of a phase 0 intron.

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                  Signal peptide                              Propeptide                              Mature peptide

Malpisin1-2   MKSASFPTRLLFIFAILAMAVA-----------------    -----APASLPLSATDPSGLK-VAPPTAPDDIPDAYCP--NISSCRSHCFYLH-FSHGACVG----EGHLTCSCYDI--------
Malpisin2-2   MTVALSIVSHLFLIPAVLAMAVA-----------------    -----APASPTLLAKDLSSFK-VASLTNSNDIPDAYCP--NISSCFSHCYYLH-FSHGACAG----GGHLTCYCYDL--------
Malpisin1-3   MKFSVPVTSSLILVGSGILALVAA----------------    --------AQVLTPPATEIK----AELILRDSTYGCPD-TSLQCREKCISLKLWTTGYCNG------AQCKCMTTF-------
Malpisin2-3   MKFSVSVASSVLLMGCGILTLVVA----------------    ------APAPAPAPPVINLK----TELTLTGGSYGCPG-QSEPCRQACHALK-WDNGYCNG------EKCKCANFF-------
Malpisin1-12  MKFSVQVASSLLLVGCSILGLAAA----------------    ----------VPALVPSEIVRR----SESVVPGGSYGCPG-TSLQCREKCHSIK-WDNGYCDG------PQCKCVNFS-------
Malpisin1-4   MKFSSSVTSNLLLLVAMVMVMVRA----------------    VPVPPSSVVDHNHSSALLKR-----------NNGCPS-NF-PCNSYCSDRG-FAGGYCSV--EDGATHRCLCYGP--------
Malpisin2-4   MKYHLSLISSLLVLVAMVMDMVKA----------------    GPVPPSSVVDHNQSSALIKR-----------DYGCPS-NP-PCSLHCEDSG-YAGGYCSV--KDGTIHKCLCYGG--------
Malpisin1-7   MFSHAMYSSSNSSNSGISFILLLFGAFVSMCLHFVDA---    --------------APAR-----------LCP----GGCQKYCQGLG-YADGDCS----LFPWTHCVCYIQ--------
Malpisin2-7   MLPRILYPPSKPSRSSKLLLFGAVGIMFLHSAGA------    --------------APTR-----------FCH----RDCQSFCQKLG-FKDGGCS----WFPWTHCVCYSQ--------
Malpisin1-8   MQFGGPTVSVIALALALFTSTPA-----------------    ----------------TPLATR-----------ISSCPG-TTERCMQACLVRG-FPDGYCTPITIGILRSWCVCSAKMKG-EN--

Malpisin2-8   MQFKRPTVLIITLTLALLEITVA-----------------    --------------------------TPAASHLSFCPG-TSEMCMQTCTAKG-FPGGFCTPITLGFLRSWCICKSTETS-KN--
Malpisin1-13  MRFSVSIFLSFLLACCILLTLVAA----------------    ----------------------AEPSSDPFPSDCHGCPE-NVQECSQKCQTEK-RGGGHCSG------KDCICAKGL-------
Malpisin1-1   MKSNFLNVLRFILVASTAHMTVHAAPAGAPLL---NA---    -----------------------------GCP--NSSSCVSACFGFK-FNGGGCSG----DG--QCVCYNHPTPAPTPV
Malpisin2-1   MKSNPLSVPRFILLASVALVMVYAAPASVPLLTPAGA---    -----------------------------GCP--NISSCFSTCRGLK-FGRGSCAG----DGHLQCVCYNRPEDA----
Malpisin1-5   MLTFISAFTFLALLHLMASLPLATSALSTSA---------    ------------------------------GHGCWVFDASECNAFCKEYFEKP-GHCGG----FFYQTCYCE---------
Malpisin2-5   MRRLISTLAFLASCSWMVTLPVVTSAVSTSA---------    ------------------------------GHGCWIFDASECNAFCKEYFEKP-GHCGG----FFYQTCYCD---------
Malpisin1-6   MTVSVSKYTLFAFVAMIATALLALPVSA------------    ------------------------------GHDCWTFDSTECDRFCREELHRGGGHCAG----LFNQECQCWN--------
Malpisin1-9   MQFKMNSFTMLASVAIVMAVLMTTSSA-------------    --------------------TIFPSDPSCP--SRPACLRQCVAQN-FHVGRCTG----ARNSKCVCLSKEQV-EAI-
Malpisin2-9   MIQFKINHVVILASMVIALAVLMTTSTA------------    --------------------TMPPLTPSCP--SRSACFQHCVSKN-FYTGRCSG----PRNSRCVCVTQDQA-----
Malpisin1-10  MTKYTSFSLTLTAATALWLISLVDA---------------    ----------------------------NHGCP--FAIFCDEYCKSIN-RSGGYCT------WITTCNCNPT--------
Malpisin2-10  MTTHTFFSRIIAAITVLLLISVVDA---------------    ----------------------------NHGCP--LAFFCDEYCKSIH-RSGGYCT------WITTCNCNPT--------
Malpisin1-11  MLPLLFKSKTVHLALFFVLVLSAVHA--------------    ---------------------------IRICTP---DACMERCLARG-HAHGICSG----RNRWYCHCLGRPNTKQNF-
Malpisin2-11  MFKFKIVFLALCLFLMLSPIHA------------------    ---------------------------RISCTP---DVCMERCLLRG-HTQGMCTG----RNRWYCRCYGAP---KN--
Malpisin1-14  MIKMAKLAMVALVVTVLLVKPAEA----------------    ----------------------------GFGCPD-DERACNDHCKSIN-RNGGYCGG----FLWHTCKCNQS-------
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Figure S2. Multiple sequence alignment of animal defensins. Signal, pro- and mature peptides are boxed in pink, gray and blue, respectively. Color codes and symbol notes used here are the same as those in Figure 2. The GenBank accession numbers of the defensin sequences are *B. floridae* (XP_002596529), *D. melanogast*er (NP_523672), *A. arabiensis* (ABB00945), *A. mellifera*-1 (AADG06005896), *A. mellifera*-2 (AADG06003648), *I. scapularis* (DS766801), *M. martensii* (AYEL01078893), *C. gigas* (AFTI01007260), *C. brenneri* (ABEG02001428), *C. remanei* (AEM44806).