

CPAP1s:

```
          10          20          30          40          50          60
|             |             |             |             |             |
MsCPAP1_A  CAHVPVHPGMYANVETGCAQAYHVC HDGR---EGHQG--ASF*LC*TNGTLFDQAKFACDWWYN---VDC
MsCPAP1_B1 CDE-QYPYGGFFADMETRCQAWHYCDIDG---RQAS-----FLCPNGTVFSQGVASCDWWFN---VRC
MsCPAP1_B2 CKT-QRYKGGFFADTETRCQVWHYCDLNG---GQAS-----FLCPNGTIFSQAGLTCDDWWFN---VRC
MsCPAP1_C  CQG-RAAG-YYADLETGCVQVYHMC---D---GLGR-QFS-YT*C*PNTTLFQQRMLICDHWYM---VNC
MsCPAP1_D  CEG-RPRG-YYADV DAGCQAYHFCWRQH---LVST-DL---CSNGTLFNEQFQVCDHFYN---VRC
MsCPAP1_F  CDD-KIPG-YYADPETS*CQVWHWC*VPSI---GGNQM--Y*SFLC*GGIGTVFNQRT*RVCDYFYK---VDC
MsCPAP1_G  CVG-KQTG-YYADEALNCEVFHYCQDS-----VKHSWICPDGFTFHQVHLICMPPTH---DNIC
MsCPAP1_H  CDG--LHDGFYASVPHKCQVYHHC*LFG-----TR---YDFLCANYTAFDQKTFICHFVSE---VDC
MsCPAP1_I  CKG-RILGAYYADAKSGCKAFHVCVRVA---GGGIRDFR-FFC*PPGTLFHQEAQCTDWGDDDDLAC
MsCPAP1_J  CKN--VPTGYADLETDCQVFHICDTS---RKIS-----FLCPNGTIFSQSHLICDWWFK---VDC
MsCPAP1_K  CGDQKYFPGLYGDESLGCMVFHVCALTD---DGLVM--K*SFLC*PESTLFDQ*TILKCNWWFY---VDC
MsCPAP1_L  CES-QAYPGYYADVETRCQAFHVC*SNN---KTYD-----FLCPNGTIFSQEVFV*CVWWDQ---FDC
MsCPAP1_M  CAG-KVIGGYADLETSCQMFHVC*TVGQ---QDEPMD-*IKFLC*LN*GT*VF*DQ*ET*RV*CE*RV*DE---VDC
MsCPAP1_N  CEN-RTYG-YYADVNDNCQVFHICLPTQLPSGRAVTYRYSFIC*PNETVFNQ*EV*MV*CTR*PID---AIDC
MsCPAP1_O  CAG-REPG-YYADIETNCQVFRVC---T---VGSTYGFQSF*LC*PNGTLFNQ*VV*FV*CDWWMN---VNC
*          :          *          : :          *          *          :          *          *
```

Consensus: CX₁₄₋₁₆CX₅CX₉₋₁₈CX₁₂CX₇₋₁₀C

CPAP3s - First domain:

```
          10          20          30          40          50
|             |             |             |             |
MsCPAP3_A1  CPGKDG--QYEDDRQC*DKFYEC*VDGVATTKLC*PDGLVFDPTIR--KINKC*DQPFNVD-C
MsCPAP3_A2  CPEKSG--FYDPYQC*DL*YK*CSK*GQSEARLCPDGLVFSDENP--SKERC*DIPSNVD-C
MsCPAP3_B   CP-EDG--FFADAEQC*DKY*YEC*RNGE*II*EKLC*PDGMVFN*NDYDP--LDEK*CDL*PFNLD-C
MsCPAP3_Ca  CPDDFG--FYPHHISC*DKY*WK*CDNGVAELKTC*GNGLAFDATDSKYL*TENC*DYLHNVE-C
MsCPAP3_Cb  CPDDFG--FYPHHISC*DKY*WK*CDNGVAELKTC*GNGLAFDATDSKYL*TENC*DYLHNVE-C
MsCPAP3_D1  CPEHYGVQAYAHPEL*CDQ*FFL*CTNGTLT*VET*CENGL*LD*FGKGA--VHNHC*NYHWA*VD-C
MsCPAP3_D2  CKTKSR--VVADDKY*CDKY*WE*CDNGQSIQYDC*PNGLV*FAGK*HRG-VTEG*CDY*PWR*SNY*C
MsCPAP3_E1  CKELNE--RHPVSGS*CDRY*IE*CINGTAE*EKLC*PDGLRFN*PNVN-FDVYPC*QYPNEVA-C
MsCPAP3_E2  CPRRNG--YFKYDSS*CDTY*VE*CRDHK*SHRMMCPDGLN*YNP*NIE-WPEYPC*SF*PE*DMP-C
MsCPAP3_E3  CGKTNS--FNSVPNE*CDTY*VE*CKDGV*SKKH*YCPDGLV*FKP*STK-WSDYPC*VAI*SEYK-C
*          *          :          *          : :          *          *          :          *          *
```

Consensus: CX₁₂₋₁₄CX₅CX₉CX₁₅₋₁₇CX₇₋₈C

CPAP3s - Second domain:

```
          10          20          30          40          50
|             |             |             |             |
MsCPAP3_A1  CPRRNGFFAHP--DASVCNIEFFN-CIEGEATEVKCTAGLHFDEYSGT*CVWPEAAGRQGC
MsCPAP3_A2  CPRQNGYFKHP--DPQACDKFY*Y-CSDGIPNELP*CPPGLYFDEETS*NC*DW-KEAVNRQC
MsCPAP3_B   CPRQNGYFSHE--DPKECGK*FY*Y-CVDGKFNMIT*CPDGLVYNDKTGIC*TWPDEAKKKG
MsCPAP3_Ca  CARLYGIFPDE----TKCDVFNW-CWNGEASRYQC*SPGLAYDRESRVCMW--ADQVPEC
MsCPAP3_Cb  CARLYGIFPDE----TKCDVFNW-CWNGEASRYQC*SPGLAYDRESRVCMW--ADQVPEC
MsCPAP3_D1  CEYQFGIY*PDS----HEC*STSY*IK*CAYGI*PEQEP*CTPGLVYDERIHG*CNWP-DLLQVFC
MsCPAP3_D2  CDWLYGIFGHE----TSC*TRYWT-CWNGTATEQLCIGGLLYNENAHSC*DW--PENVDGC
MsCPAP3_E1  CPHQFGYFKIG--DARNCSG*FERT-CVNGVGYDFV*CPDGLAFSS*SETYRCEW--PDEVADC
MsCPAP3_E2  CPQOYGFY*PHPSATDVN*CAPY*KM-CVAGVAFDMK*CAAGLAFNPDI*GRCDW--ADRV*PS*C
MsCPAP3_E3  CPHRNGYFLK*---DSD*CSQ*YV*V-CKAGKPT*IMN*CAPGLVFN*IKEAAC*DW--PANV*PS*C
MsCPAP3_E4  CPHENGY*YV*GVP---NSD*CSQ*YIV*-CEQKATLMN*CPKGLVFN*EAI*SDC-----
*          *          :          *          :          *          *          :          *          *
```

Consensus: CX₁₂₋₁₆CX₅₋₆CX₉CX₁₂CX₈₋₁₀C

CPAP3s - Third domain:

```
          10          20          30          40          50          60          70
|             |             |             |             |             |             |
MsCPAP3_A1  CPKE-----QQVDAQGLPVAHPK*FPHN-DC*QRFYV*CLNGIEPRDLG*CQVGEVY----NEESQK*CDAPENVRGC
MsCPAP3_A2  CPDG-----EVMGPNGRALPHPTFPHPE-DC*QKFYI*CRG*GVQ*PQKGS*CP*SGKVY----NEDTFM*CDEPEKVPGC
MsCPAP3_B   CPAV-----NETFG--LTHPRYADPE-DC*QFFYV*CINGNT*PRRSG*CKL*GQAF----DDVHK*CEWARKVPEC
MsCPAP3_Ca  CPAP-----GEVSNAG---SFSRHAHPE-DC*RKYI*I*LEGVA-REYGC*PIGT*VFKIG*DSGTGN*CEDPEDVPGC
MsCPAP3_Cb  CPAP-----GEVSNAG---SFSRHAHPE-DC*RKYI*I*LEGVA-REYGC*PIGT*VFKIG*DSGTGN*CEDPEDVPGC
MsCPAP3_D1  CPAKV-----PAHTPAAKFWPFRFPVPG-DC*HRLIT*CEV*GQP-RLIT*CEAGKVF----DDQNL*TCEDPELVPHC
MsCPAP3_D2  CN-----EDPNG-----NVPLGK-SC*NRYWQC*QGGY*P-RLQRC*PAMLVF----DRRSLR*CVV-PPT*E*EC
MsCPAP3_E1  CPEV-----PISKELGPPAGFRFYGSDN-DC*QKYFLC*IDGR*P-RVLS*CGGESGF----DELTSS*CVSADEVPTC
MsCPAP3_E2  CP-----EIPIDADGDPIDIVLNYSYSPN*CTSFFS*CDK*GRA-RFLS*CDLGLAF----DESIGR*CRD-ADLV*QC
MsCPAP3_E3  CP-----AVEADSDTDEIFKY*SYK*-S*CKKYVAC*QGGY*P-RLLS*CDVGLHF----SEKEEM*CVDKSKV*TDC
MsCPAP3_E4  CHPDALKDF*TCPSVDDADNDMITKYRYN-SC*TNYVAC*QHGF*P-RLLS*CSAGLRF----DQDQ*QC-----
*          *          :          *          *          :          *          *          :          *          *
```

Consensus: CX₁₃₋₃₀CX₅CX₉₋₁₀CX₁₂₋₁₆CX₇₋₈C

PMPs:

```
          10      20      30      40      50      60
          |      |      |      |      |      |
MsPMP1_A  CVG-----QENFLRIASIEDCVHYYQCYASRS-----YLMQCPEHTWFNEREQVCD----WSDPPARC
MsPMP1_B  CPP-----RHEHHLIHHEYDCKKFYHCKFGMKE---IYPKDCAPGTEFAYELQIC----HYPHIAQC
MsPMP1_C  CVT-----SERPNDPHPTDCSKFYECAPHGP-----TLKDCAPGTLYNPVAMVCDWPAVVI PMRPEC
MsPMP1_D  CVT-----SERPNDPHPTDCSKFYECAPHGP-----TLKDCAPGTLYNPVAMVCDWPAVVI PMRPEC
MsPMP1_E  CG-----QNGSDGVLVAHENCNQFYHCDHGKA-----IAKNCPVGTLYNPHYIEQCD-----
MsPMP1_F  CAL-----TDTFAYATPGTACRHYRCENGTA-----VDRTCPSGSWFDLDRQAC-----ARGAGTC
MsPMP2_A  CPPEQEIDWGLEKLLR-HENCHMFYKCTFGIP-----VPYHCPGGLYFNLETWQCD----WPHNVDC
MsPMP2_B  CE-----GKRAQVP-AKNCNNEFLNCWDGWA-----FEQCEPEGLLFSRE-GYCD----YADNVDC
MsPMP2_C  CDP----EGHVFM LLPHFTNCAK FYMCAHGEE-----VEFACSGGLIFDFAQQT CN----WKWAVDC
MsPMP3_A  CA-----NWDIETIVIAHERCDK FYKCA YGKP-----VPYCCPPGTVFNIEKEACD----WPSNVQC
MsPMP3_B  CAP-----QH QHYLIPHEFDCSKFYQCQHG MKH---VNP INCAPGTEFSFKYQNC-----VHPRQAQC
MsPMP4    CPSN----FHIHLLLPHE TDCSSYYQC SYGMR-----IQRSCASGTHFD PALQRC-----DLPENVKC
MsPMP5    CA-----NWDLEDIFIAHERCDK FYKCA YGKP-----VPHCCPRGTVFNIDKEECD----WPSNVEC
MsPMP8    CEG-----LDGT VVPHKTSCKSKYLECIRGVA-----KELTCQIGNDFDVVTRQCR----PRGIAKC
MsPMP9_A  CR-----PAGSEGV LVAHERCDK FYKCSHGKP-----VALVCP SNLLYNPELGYCD----WPNAVDC
MsPMP9_B  CPP-----GFFGNLPHPDRCDA YFMCMPGGN---ALQLFCIEGFEDPEADRC-----VVI AEGGC
MsPMP14   CT-----N-EGFKGDPNDCAVFYRC TKSGRGKYISYGFRCPPGTVYDPDTEVCN--HPQNTKRSEC
          *          * : *          *          :
```

Consensus: CX₁₁₋₁₉CX₅CX₉₋₁₄CX₁₂CX₆₋₁₂C

Chitinases:

```
          10      20      30      40      50      60      70
          |      |      |      |      |      |      |
MsCHT3    CSRQG----YFVHPRSCARFYRCVKFDQYSPEYTVMTPLHLMVFEFDCPAGLAFDSRYEVCVWPGSLPHSQAC
MsCHT5    CNSDQ---DYIPDKKHC DKYWR CVN-----GEA-----MQFSCQHGT VFNVELNVCDWPSN-ATREEC
MsCHT6    CKDEG----FYPHPRDCCKYFWCLD-----SGPSNLGIVAHQFTCP SGLYFNKAADSDFARN---V-IC
MsCHT7    CEEEDGHISYHPDKADCTMYMCEG-----ERK-----HHMPCPQNLVFNYNENVC DWPEN-VEG--C
MsCHT8    CSKEG----YESDPTDCASFYV CVK-DGWG---ALKP-----IKFHC PGSLYWDKNLLVCNYP---NLTEC
MsCHT10   CDS DTP--Y LASDEDSCAHFHCCTG-----GIS-----YRMSCEEQRLYDPSTGFCGHQD----VAKC
          * :          * : *          : *          ::          *          *
```

Consensus: CX₁₁₋₁₅CX₅CX₉₋₂₄CX₁₂CX₇₋₁₁C

Chitin deacetylases:

```
          10      20      30      40      50      60      70
          |      |      |      |      |      |      |
MsCDA1    CKDKD-AGEWFERLVAG-----EGDNCRDVIQCTA-----SGIQAIRCPAGLYFDIEKQTC DWKDAVKNC
MsCDA2A   CESRP-ADEYFRLTT-----EGD-CRDVVRCDKGLNSVTRLASVRC PVGLAFDIDRQTC DWKTHVKNC
MsCDA2B   CESRP-ADEYFRLTT-----EGD-CRDVVRCTR-----SGLKQITCP SGLAFDLKQTC DWKKGVTNC
MsCDA3    CHEN---GRFYRNPDRSEDTLWTKDECAKYILCLD-----GDVFEFH CSPGLLFDVNRQLCDMQQNVHNC
MsCDA4    CPEGTQGNNGFADP-----ATCRRFYQCVD-----GYPYLNRCPSGLYFDDISKYCTFKAEAR-C
MsCDA5A   CP EE---FGYYPHP-----TDCTLYYVCVF-----GGALLESCTGGLMYSHELQTC DWPRNVG-C
MsCDA5B   CP EE---FGYYPHP-----TDCTLYYVCVF-----GGALLESCTGGLMYSHELQTC DWPRNVG-C
          *          :          *          *          *          ** :          : *          *
```

Consensus: CX₁₂₋₂₂CX₅CX₉₋₁₅CX₁₂CX₇₋₈C

Overall consensus: CX₁₁₋₃₀CX₅₋₆CX₉₋₂₄CX₁₂₋₁₇CX₆₋₁₂C