Α	Actinidia_chinensis/1-217 Tabernaemontana_divaricata/1-215 Zingiber_officinale/3-218		
	Homo_sapiens/5-314 Arabidopsis_halleri/1-215	5 EILDTHWELWKKTHRKQYNNKVDEISRRLIWEKNLKYISIHNLEASLGVHTYELAMNHLGDMTSEE 1MFTRSNRKGGGGN	13
	Actinidia_chinensis/1-217 Tabernaemontana_divaricata/1-215 Zingiber_officinale/3-218 Homo_sapiens/5-314 Arabidopsis_halleri/1-215	1 LP SY VDWR S - A G AV VD I K S Q G E C G G - WA F S A I A T V E G 1 LP S F VDWR S - K G A V N S I K NQ K Q C G S CWA F S A V A A V E S 3 LP D S I DWR E - N G A V V P V K NQ G C G S CWA F S A V A A V E G 71 V VQ KMT G L K V P L S H S R S ND T L Y I P EWE G R A P 14 G E E R K NR F T A E E K G K E KMP S K S S K E E S S E L P P SWDWR D Y P G V I G P V M NQ K L E G F C T A SQC	36 38 135
	Actinidia_chinensis/1-217 Tabernaemontana_divaricata/1-215 Zingiber_officinale/3-218 Homo_sapiens/5-314 Arabidopsis_halleri/1-215	36 INK IT S G S L I S L S EQ E L I D C G R T Q N T R G C D C G Y I T D G F Q F I I N D G G I N T E E N Y P Y T A Q D G D C D V A L 37 INK I R T G Q L I S L S E Q E L V D C D T A S H G C N G C WMNNA F Q Y I I T N G G I D T Q Q N Y P Y S A V Q G S C K P Y - 39 I N Q I V T G D L I S L S E Q Q L V D C T T A N H G C R G G WMN P A F Q F I V N N G G I N S E E T Y P Y R G Q G G I C N S T V 136 Q L K K K T G K L I N L S P Q N L V D C V S E N D G C G G G G Y M T N A F Q Y Q K N R G I D S E D A Y P Y C Q E E S C M Y - N 74	99 102
	Actinidia_chinensis/1-217 Tabernaemontana_divaricata/1-215 Zingiber_officinale/3-218 Homo_sapiens/5-314 Arabidopsis_halleri/1-215	199 PTGKAAKCRGYREIPEGNEKALKRAVARVGPVSVAIDASLTSFQFYSKGVYYDESCNSDNLNHAVL	161 164 264
	Actinidia_chinensis/1-217 Tabernaemontana_divaricata/1-215 Zingiber_officinale/3-218 Homo_sapiens/5-314 Arabidopsis_halleri/1-215	165 IV GY GT E G G V DYW I V K N SW D T T WG E E GY MR I L RN V - GGAGT C G I A T MP SY P V K Y - 162 IV GY GT Q S G K NYW I V R N SW G Q NWG NQ GY I WM E RN V A S S A G L C G I A Q L P SY P T K A - 165 VV GY GT E NDKDFW I V K N SW G K NW G E S GY I R A E RN I E NP D G K C G I T R F A SY P V K K - 265 AV GY G I Q K G N K HW I I K N SW G E NWG N K GY I L MA RN K N NA C G I A N L A S F P K M 157 I I GY GY D N G K P Y W I I Q N SY G E G WG N G G F G Y V Y R I K S G Q G S E F F A V A Y P K I R G F P R K P R	217 215 218 314 215
В	Actinidia_chinensis/1-217 Tabernaemontana_divaricata/1-215 Zingiber_officinale/3-218		
	Homo_sapiens/5-314 Arabidopsis_halleri/1-276	5 EILDTHWELWKKTHRKQYNNKVDEISRRLIWEKNLKYISIHNLEASLGVHTYELAMNHLGDMTSEE 1MFTRSNRKGGGGN	
	Actinidia_chinensis/1-217 Tabernaemontana_divaricata/1-215 Zingiber_officinale/3-218 Homo_sapiens/5-314 Arabidopsis_halleri/1-276	1 LP SY VDWR S - A G AV VD I K SQ G E C G G - WA F S A I A T V E G 1 LP S F VDWR S - K G AV N S I K NQ K Q C G S C WA F S A V A A V E S 3 LP D S I DWR E - N G A V V P V K NQ G G C G S C WA F S T V A A V E G 71 V VQ KMT G L K V P L S H S R S ND T L Y I P EWE G R A P D S V D Y R K - K G Y V T P V K NQ G Q C G S C WA F S S V G A L E G 14 G E E R K NR F T A E E K G K E K MP S K S S K E E S S E L P P SW DWR D Y P G V I G P V M NQ K L Q A I C WA I A L V R A V T A	36 38 135
	Actinidia_chinensis/1-217 Tabernaemontana_divaricata/1-215 Zingiber_officinale/3-218 Homo_sapiens/5-314 Arabidopsis_halleri/1-276	36 INKITSGSLISLSEQELIDCGRTQNTRGCDGGYITDGFQFIINDGGINTEENYPYTAQDGDCD 37 INKIRTGQLISLSEQELVDCDTASHGCNGGWMNNAFQYIITNGGIDTQQNYPYSAVQGSCK 39 INQIVTGDLISLSEQQLVDCTTANHGCRGGWMNPAFQFIVNNGGINSEETYPYRGQDGICN 136 QLKKKTGKLLNLSPQNLVDCVSENDGCGGGYMTNAFQYVQKNRGIDSEDAYPYVGQEESCM 80 LLNINLPHENQIVDLSIQHAYNKVHYNKDDGIQNMKRAFSFATGEGFCTASQCTPNTRDNNVFK	97 99 196
	Actinidia_chinensis/1-217 Tabernaemontana_divaricata/1-215	99	154
	Zingiber_officinale/3-218 Homo_sapiens/5-314 Arabidopsis_halleri/1-276	100 S T V N - AP V V S I D S Y EN V P S H N EQ S L Q K AV AN - Q P V S V T M D A A G R D F Q L Y R S G I F T G - S C N I - 197 Y N P T G K A A K C R G Y R E I P E G N E K A L K R AV AR V G P V S V A I D A S L T S F Q F Y S K G V Y Y D E S C N S D 144 <u>K L V C R H P D N</u> I H Y I K V D E F E Y L T N V N D E E L Q A I W V Q - Q P V I G I L R N T N R D F L G I G <mark>S G I</mark> Y R S P S G D V D	257

**Figure S7.** Multiple sequence alignment (MSA) of Papain-like cysteine proteases. Shown are *Arabidopsis halleri* (*Ah*CPL1), *Actinidia chinensis* (PDB: 2ACT), *Tabernaemontana divaricata* (PDB: 1IWD), *Zingiber officinale* (PDB: 1CQD) and *Homo sapiens* (PDB: 1BY8). **A**, MSA showing the *Ah*CPL1 protein generated by mapping to *A. lyrata* exons. **B**, MSA showing the *Ah*CPL1 protein generated based on *A. halleri* exons. Sequence incorperated based on the genome of *A. halleri* instead of *A. lyrata* is underlined in red. Sequence repositioned based on *A. halleri* sequence data is underlined in yellow.