

## SUPPLEMENTARY MATERIAL

### Chitinolytic enzymes of the hyperparasite fungus *Aphanocladium album*: genome-wide survey and characterization of a selected enzyme.

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Table S1. HMMER prediction of the main domains in GH18 sequences.

	Id	Length	HMMER					
			LysM	C-R	GH18	CBM	Pept M508	P-E
1	<a href="#">KAJ6787801.1</a>	336			33-313			
2	<a href="#">KAJ6781922.1</a>	445			30-317	415-441		
3	<a href="#">DAA05865</a>	392			31-307	360-388		
4	<a href="#">KAJ6780968.1</a>	757			31-312	378-405	529-732	
5	<a href="#">KAJ6788767.1</a>	324			38-310			
6	<a href="#">KAJ6787922.1</a>	315			30-253			
7	<a href="#">KAJ6780669.1</a>	423			137-380			
8	<a href="#">KAJ6780036.1</a>	330			24-312			

9	KAJ6780631.1	348			13-289		
10	KAJ6787472.1	365			42-298		
11	KAJ6779939.1	369			21-352		
12	KAJ6782108.1	363			1-335		
13	KAJ6782480.1	392			22-380		
14	KAJ6785755.1	574			31-338		
15	DAA05854	492			100-451		
16	KAJ6782844.1	540			157-501		
17	KAJ6786186.1	394			4-349		
18	KAJ6783291.1	428			42-388		
19	KAJ6787487.1	423			39-383		
20	KAJ6785998.1	1832		141-187	202-541		
21	KAJ6779834.1	532			153-493		
22	DAA05857	1533	308-355		520-848		
23	KAJ6783597.1	742			15-358		
24	KAJ6781350.1	671			86-435		
25	KAJ6786554.1	1495			496-844		1380-1481
26	KAJ6789350.1	754			152-343		
27	KAJ6787215.1	1373	403-445		606-949		
28	KAJ6784990.1	1418	349-396	411-476	490-841		
29	KAJ6784672.1	1279	295-337	420-486	501-852		

Legend (Pfam IDs are reported in brackets): LysM=LysM domain (PF01476); C-R=Chitin recognition protein (PF00187); GH18=Glycosyl hydrolases family 18 (PF00704); CBM= Fungal cellulose binding domain (PF00734); Pept\_M508= Peptidase M50B-like (PF13398); P-E=Pathogen effector; putative necrosis-inducing factor (PF14856).

**Table S2. HMMER prediction of the main domains in GH3 sequences**

	Id	Length	HMMER				
			WSC	GH3-N	GH3-C	AT	F-III
1	KFG78085	909		28-357			
2	KAJ6788372.1	932		21-350			
3	AGC24356	858		8-336		552-655	
4	KAJ6789110.1	539		6-330			
5	KAJ6787877.1	370		32-364			
6	KAJ6782998.1	369		47-366			
7	KAJ6785893.1	870	32-113	169-461	499-724		
8	KAJ6786934.1	830		5-277	312-703		736-808
9	KAJ6780833.1	760		46-324	369-634		681-747
10	KAJ6787866.1	802		55-341	388-659		717-791
11	KAJ6786079.1	777		85-334	382-642		700-766
12	KAJ6785739.1	893		54-358	419-672		796-870
13	KAJ6782204.1	948		166-420	485-751		868-939
14	KFG84234	879		85-354	414-673		
15	KAJ6788989.1	883		97-356	416-677		804-873

Legend (Pfam IDs are reported in brackets): WSC=WSC domain for carbohydrate binding (PF01822); GH3-N=Glycosyl Hydrolase family 3 N-terminal domain (PF00933); GH3-C=Glycosyl Hydrolase family 3 C-terminal domain (PF01915); AT=Acetyl Transferase (GNAT) family (PF00583); F-III=Fibronectin type III-like domain (PF14310).

**Table S3. HMMER prediction of the main domains in GH20 sequences**

	Id	Length	HMMER			
			GH20-2	β-AH	GH20	β-AG
1	<a href="#">KAJ6784096.1</a>	848	157-304		307-638	
2	<a href="#">KAJ6785798.1</a>	741	32-167		170-339	
3	<a href="#">KAJ6780494.1</a>	661	48-191			197-508
4	<a href="#">KAJ6785933.1</a>	514	23-92		97-448	
5	KFG80340	620		27-171	193-564	
6	<a href="#">KAJ6783033.1</a>	633		28-184	207-577	
7	<a href="#">KAJ6780076.1</a>	577		16-163	188-528	
8	<a href="#">KAJ6789215.1</a>	751		204-335	360-628	
9	<a href="#">KAJ6787434.1</a>	574		20-161	186-526	
10	KFG85702	579		21-166	191-530	
11	<a href="#">KAJ6780083.1</a>	579		19-165	190-529	

Legend (Pfam IDs are reported in brackets): GH20-2=Glycosyl Hydrolase family 20 domain 2 (PF02838); β-AH=beta acetyl hexoaminidase like (PF14845); GH20=Glycosyl Hydrolase family 20 catalytic domain (PF00728); β-AG=beta-N-acetylglucosaminidase (PF07555).

**Table S4. HMMER prediction of the main domains in GH75 sequences**

	Id	Length	HMMER	
			GH75	A-L
1	<a href="#">KAJ6785337.1</a>	1093	667-836	877-1092
2	<a href="#">KAJ6783761.1</a>	252	80-249	
3	<a href="#">KAJ6781651.1</a>	299	82-251	
4	BAA12799	304	82-254	
5	<a href="#">KAJ6788818.1</a>	300	81-253	
6	<a href="#">KAJ6786595.1</a>	273	52-234	
7	ADG96019	304	100-244	
8	<a href="#">KAJ6781485.1</a>	256	105-249	
9	AA041660	238	72-235	
10	<a href="#">KAJ6783315.1</a>	232	70-231	
11	<a href="#">KAJ6787168.1</a>	234	70-231	
12	ABY77913	217	53-214	

Legend (Pfam IDs are reported in brackets): GH75=Fungal chitosanase of glycosyl hydrolase group 75 (PF07335); A-L=Alginate Lyase (PF08787).

**Table S5. Summary of the Phyre2 analysis for the GH3 sequences of *A. album***

GH3 sequence	Model	Enzyme	Cnf	Cvr	Id	Organism
KAJ6786934.1	3AC0	$\beta$ -glucosidase	100	97	49	<i>Kluyveromyces marxianus</i>
KAJ6780833.1	4IID	“ “	100	94	47	<i>Aspergillus aculeatus</i>
KAJ6788989.1	5NBS	“ “	100	95	62	<i>Neurospora crassa</i>
KAJ6788372.1	4ZM6	$\beta$ -N-acetylglucosaminidase	100	89	30	<i>Rhizomucor miehei</i> CAU432
KAJ6782204.1	4IID	$\beta$ -glucosidase	100	85	46	<i>Aspergillus aculeatus</i>
KAJ6785739.1	4D0J	“ “	100	91	42	<i>Rasamsonia emersonii</i>
KAJ6787866.1	“ “	“ “	100	91	45	“ “
KAJ6785893.1	7VC7	$\beta$ -xylosidase	100	84	51	<i>Phanerochaete chrysosporium</i>
KAJ6787877.1	6K5J	$\beta$ -N-acetylglucosaminidase	100	88	31	<i>Paenibacillus</i> sp. str. fpu-7
KAJ6789110.1	4ZM6	“ “	100	94	39	<i>Rhizomucor miehei</i> CAU432
KAJ6782998.1	6K5J	“ “	100	88	31	<i>Paenibacillus</i> sp. str. fpu-7
KAJ6786079.1	4D0J	$\beta$ -glucosidase	100	93	43	<i>Rasamsonia emersonii</i>

Model = PDB model; Cnf=confidence (%); Cvr=coverage (%)

**Table S6. Summary of the Phyre2 analysis for the GH20 sequences of *A. album***

GH20 sequence	Model	Enzyme	Cnf	Cvr	Id	Organism
KAJ6780076.1	3NSN	$\beta$ -N-acetylglucosaminidase	100	90	31	<i>Ostrinia furnacalis</i>
KAJ6780083.1	“ “	“ “	100	90	31	“ “
KAJ6785933.1	3RCN	“ “	100	93	48	<i>Paenarthrobacter aureus</i>
KAJ6783033.1	5OAR	“ “	100	79	67	<i>Aspergillus oryzae</i>
KAJ6780494.1	6PV5	GH84 Hydrolase	100	83	32	<i>Clostridium perfringens</i>
KAJ6787434.1	3NSN	$\beta$ -N-acetylglucosaminidase	100	91	33	<i>Ostrinia furnacalis</i>
KAJ6784096.1	6JQF	“ “	100	72	24	<i>Akkermansia muciniphila</i>
KAJ6785798.1	“ “	“ “	100	82	25	“ “
KAJ6789215.1	3LMY	“ “	100	62	30	<i>Homo sapiens</i>

Model = PDB model; Cnf = confidence (%); Cvr = coverage (%); Id = identity (%)

## Figure S1

### B

KAJ6780631.1	-----	0
KAJ6787472.1	-----	0
KAJ6780036.1	-----	0
KAJ6787922.1	-----	0
KAJ6780669.1	MNWLKESIQLPFGGRKNSEASQTGTTASSTTDITSQAGWVDPEKAEAAANMQAASAKPET	60
KAJ6788767.1	-----	0
KAJ6787801.1	-----	0
KAJ6781922.1	-----	0
DAA05865.1	-----	0
KAJ6780968.1	-----	0
KAJ6780631.1	-----	0
KAJ6787472.1	-----MRWSLFSVVS-----LLAPLL-----QASPVGDVQAS---	27
KAJ6780036.1	-----MVGASPLT---	8
KAJ6787922.1	-----MHATSLIFAANI-----I	13
KAJ6780669.1	VAADDEKTTTKRQWPLWMKLAIAGCIFAVVVGLSVGLVGLTRHKHNGSPGGDSSSSSGD	120
KAJ6788767.1	-----MLFSTSAIA--AFAALT-----SLGAAAPANEGA	27
KAJ6787801.1	-----MR--SSATFTALVAIT-----A	15
KAJ6781922.1	-----MR--SLS--LLAGLG-----L	12
DAA05865.1	-----MP--SISSFTSALGLL-----S	15
KAJ6780968.1	-----MV--SSSSVASVANLL-----A	15
KAJ6780631.1	-----MPPLPIGPTPLPRLITYYQTLHDGDGK--PISILPL----ITQPSIAVTHVILA	48
KAJ6787472.1	---AQASASTQAISELPRLIIFYQTTHDQSGR--PISMLPL----INEKGIALTHLIVC	77
KAJ6780036.1	--RRADTCATKGRPAGKVLQGYWENWDGSSNGVHPGFGWTPIQNPDIRKHGYNVINAAFP	66
KAJ6787922.1	ASFTLASR-ARPRDASKKLAVYWGANDYQ-----LTLDVAVCSD-DSYNIVNLAF	61
KAJ6780669.1	SSSGSGSS-GGSPQRPKLAVYWGSKFNT-----IPLDDVCE-PSYDIVNLAF	168
KAJ6788767.1	S-----T-LRTRGAGGKLVVYWGAEEDN-----LSLMDVCND-PTYDIVNLAF	69
KAJ6787801.1	SVSAAPHTITSRADSGAQNVVYWGQNG---GG--VVENNDLATYCTKSAGIDIVVLSFL	69
KAJ6781922.1	TSLAAASPLAARQAPGARNVVYWGQNG---GG--TIENNDSLAYCQNSGIDIVVLAFL	66
DAA05865.1	LLPA--ARAGWNQNSNDNIVVYWGQNS---G--SVGQNRLSYCCQNAPDVDVINISFM	66
KAJ6780968.1	MLPV--AMAAFNPGSNKNIAVYWGQNSYNQSGG--PLAQQLRGTYCQNT-DLSIIPAFM	70
	*: ; .	
KAJ6780631.1	AIHINEDPDG-----LTLND-----HSPDHERHQTAWAELR-----VLQAA-GIRVMVLL	92
KAJ6787472.1	SLHINKDS-E-----IHLND-----YPPGDHPHYTLWNETA-----HMKKA-GVKVMGMI	120
KAJ6780036.1	VI-YPDGTA---LWEDGMD-----TGVKVASPSDMCAAKAA-GATILMSI	106
KAJ6787922.1	SH-FFSAGGYPTLFLSPLNTASEAQAARGATDLRDGTSIPALQKC--RDS-GKKILLAM	117
KAJ6780669.1	SY-FFGNGQYPRLAIPSLNGSSEAQRLAGAVDLQDGTALVPAIKK--QAN-GKLVLLSM	224
KAJ6788767.1	AY-FNKAGGYPGLEMSGLDGPSAAQRKAGATGLKDGSPVPAIKK--QAN-GKLVILSM	125
KAJ6787801.1	YK-YGA-GQKIASGVIGQSCS-----IGDSGEGQNCDDLTKAIDTC--KSN-GVKVIMSL	119
KAJ6781922.1	YQ-FGRDGGTIPSGTIGQSCF-----ISNSGEGQNCDALNAAIAKC--QGA-GVKMILSL	117
DAA05865.1	VG-ITNL--NLNLANVGNCT---AFPPQAPNLLNCPQVAADIIEC--QQTYGKTIMMSL	117
KAJ6780968.1	NG-ITPA--ITNFANAGDNCT---AFPDNGNVLSCPQIEEDIKSC--QSKYGKTISLSL	121
	. : * : :	
KAJ6780631.1	GGAAGKTYQRLDGSPDDESPAELARFERYYA-----PLRDLLRARGIDGIDLVEEEMS	146
KAJ6787472.1	GGAAPGSFDSSSLD-----GDQETFEKYYG-----QVKGVITKFGLEGMDLDVEQPMS	168
KAJ6780036.1	GGATAAI--DLSSSAVADKFV-S-----TIVPIKKYNGDGIDIDIESGLT	149
KAJ6787922.1	GGAPGYSDVRLNDDQGRQIA-NTLWNLFGG--GTEDAELRPFGAFKLDGFDIDNESGDA	174
KAJ6780669.1	GGAAGYSDVSGSDGTGQLVA-DLIWNLFGL--GGKKPEIRPFGNVVLDGVDFDNE	281
KAJ6788767.1	GGATDYSNVRLSNDAAAGEKVA-DQVWNLFGL--GTDHKELRPFGDVKL	182
KAJ6787801.1	GGAS-GA-YSLSSKEEAEAIQ-QLWEAYGNLNGGNGSVPRPFGKTFVNGWDFDIESNSG	176
KAJ6781922.1	GGAS-SS-YALSSQSQAQIG-QYLWDSYGN--SGNTTVKRPLGNVVDGDFDFDIELNGG	172
DAA05865.1	FGST-YSESGFSSSSAAVAAA-QEIWAMYGPVQSGN-STPRPFGDAVVDGDFDFDLEPIE	174
KAJ6780968.1	GGAT-YSQGWSSSSAAESAA-QMVWDMFGPVGSGK-NVDRPFGSAVVDGDFDFDESS-A	177
	*: . : * * * *	
KAJ6780631.1	-LAGIVRLI-----DRLRADF---GPQFIITLAPVAASLLDPTANLS---GFDYEAL	191
KAJ6787472.1	-QSGITRLI-----ERLRQDF---GSGFIITLAPVASAL-RNSANLS---GFNYKTL	212
KAJ6780036.1	GSQDIKTLSTSQSNLIRVDGILA-QMPSNFGLTMAPETAYVTGGSVTYGSIWGSYLP	208
KAJ6787922.1	--TGYMAMI-----DQFRSNFATDTSREYTLAAPGCGFPGD-----SI	211

KAJ6780669.1	--TGYEAMA-----QHFRSHFASDPSKQYYMTAAPQC	PFTAD-----DE	318
KAJ6788767.1	--TGYLAMT-----KRFRANMAKDASKKYLTAAPOC	PFPDQ-----SE	219
KAJ6787801.1	-NQFYPDMI-----AKLRGNFASDSSNQYFITGAPQC	PIPEP-----NM	214
KAJ6781922.1	SSQYYQYMI-----AKLRQNFAKDSSKKYYIAGAPQC	PIPEP-----NM	211
DAA05865.1	--NNMEPFA-----AELRSLIDASTSKKFYLSAAPQC	PYPDV-----SD	211
KAJ6780968.1	--NNLPAPG-----AKLRSLMDSAGGKKYYLSAAPQC	VFPDA-----AV	214
	: : : : : **		
KAJ6780631.1	EVMR--GREVAWYNTQFYCGWGDFSST-----	VMYDMMLRKGWAP-----	229
KAJ6787472.1	NTAV--GSKISFYNGQFYSGFGTMART-----	DDYVKIVDNGFAA-----	250
KAJ6780036.1	KKYVD--NGRLWWLNMQYYNGDMYGCSCG-----	DSYKAGTTQGFIAQTDCLNNGLTIGG	260
KAJ6787922.1	TPEI--AGAVDHVWIQFYDTKYCLIGD-----	DTFYG-KVRTWSQ-----	248
KAJ6780669.1	ELSL--FQHLDYVSVQFYNNNVCNVQ-----	SGFET-SVRRWSE-----	355
KAJ6788767.1	PLSV--CKLLDYVWVQFYNNNGDCNIAQ-----	SGFNA-AVKNWSK-----	256
KAJ6787801.1	NEIIT-KAHFDYLFVQFYNNNPGCSVD-----	GTINFEDWKKNVANT-----	254
KAJ6781922.1	GEIIS-TSQFDWLFVQFYNNNNYTVPCALPINGNAPFN	YNNWTSFIST-----	259
DAA05865.1	ESFLDGQVPFDWVNVQFYNNNGCGVSHYP-----	ADFNWATWDNNAKT-----	254
KAJ6780968.1	GAALD-AVAFDFVMIQFYNNWCGVSNFQEGASSQNA	FNFDVWDKWAKGS-----	262
	. * : *		
KAJ6780631.1	-----EKVVVGLVTNPAN-----	GPGFIAWDSLQOTLAIL-RQRPHNFGGIMGWEY	274
KAJ6787472.1	-----SKVVAGQLTDPSN-----	GGGYIPYSQNLNATIAL-RKKYQIGGVMGWEY	295
KAJ6780036.1	VTIKVPYDKQVPGLPAQPGA-----	GGGYMSTSDVSSVLNHY---NGNLKGLMTWSL	309
KAJ6787922.1	---AVKG-DIYGATARNT-----	DQVGYLEPHALLTALHKVEAMGLPNYSGAMLWEA	298
KAJ6780669.1	---AIGNTTLLVGALASNAD-----	KDEGYVDAKTFNSVLGKVKAMNLPNYGGVMLWEA	406
KAJ6788767.1	---GIGNAKLFIGGLASGSD-----	GDQGYVDSNTFIKAIKGVAMNLPNYGGAMLWEA	307
KAJ6787801.1	---PSSSAKIFIGVPASPLGATGTESGAKYYLEPTKL	ASLVGEH--KSDAAFGGVMMWAA	309
KAJ6781922.1	---PSKDAKIFIGVPASTLASNGSPNGATYYATPEQL	ATIVNDY--KSDAHFGGIMMWSA	314
DAA05865.1	--SANKNAKVLIGTPANVGGANAG-----	SFPTDSQLSGAISLA--KGSSSFGGVMLWDM	305
KAJ6780968.1	---KNPNVKLLLGIPAAPGA--GG-----	GYTSGSKLKAAINYS--QKYSSFGGVMLWDM	310
	* : : * * *		
KAJ6780631.1	YNSLPGDRERPWEWARTMTAMI---RSH-CLAPAPPV	ATP-PRPEEKP----AAVVDID	324
KAJ6787472.1	FNSQPGGTKEPWKWAQVMTQIL---RPN-AVPKLSIT	AD-AD---H-----LTNTYE	340
KAJ6780036.1	NWDGSKNWSFGDN-----	VKGTLGTA-----	330
KAJ6787922.1	ELAMKN-KNYQKT-----	LRAGL-----	315
KAJ6780669.1	ELAAKN-GNYQKK-----	IKAEL-----	423
KAJ6788767.1	QLSRNN-GNFAKK-----	IRSSL-----	324
KAJ6787801.1	GFSDAN-VNNGCTYAQEAKHILTGSAC-----		336
KAJ6781922.1	GFSDSN-VNNGCTYAQEAKHILVNGGPCGSNGPPP	PTSTPPTSTAPPTGTPPSTSTTST	373
DAA05865.1	AQLFT---NQGYL--A---KIVADLGSASSPPPP	PASTTLQ-----TIT	340
KAJ6780968.1	SQLYS---NNGFL--G---EVLSDISGGPATTPPP	STTTQPPGTTTQPPGTT---TTCT	358
	. :		
KAJ6780631.1	ADA---PGGEELEIP--APFEYYSDGAEE-----		348
KAJ6787472.1	HTV---SGGSPNARPASPGINYYDMVNA-----		365
KAJ6780036.1	-----		330
KAJ6787922.1	-----		315
KAJ6780669.1	-----		423
KAJ6788767.1	-----		324
KAJ6787801.1	-----		336
KAJ6781922.1	HPCASHTSSSPPVSSPRGTVPQWQVRRNEERRDGE	FANIKKCGGKGYNPTCEVPPFT	433
DAA05865.1	RSS--TASTGPTNPPSGGSVPQWG-----	QCGNGYTGTQCQAPYK	380
KAJ6780968.1	STT--TPASTSTPPPTSGGLDQYA-----	QCGGQGYSGPTVCKAPYT	398
KAJ6780631.1	-----		348
KAJ6787472.1	-----		365
KAJ6780036.1	-----		330
KAJ6787922.1	-----		315
KAJ6780669.1	-----		423
KAJ6788767.1	-----		324
KAJ6787801.1	-----		336
KAJ6781922.1	CVKLGEWWSSCR-----		445
DAA05865.1	CVATSEWWSSCQ-----		392
KAJ6780968.1	CVKQNTLPSRLTSATSSHLHLAQATTLLQLLFFIAL	RSVAFTFCDDPRVHSSPGSLTRA	458
KAJ6780631.1	-----		348

KAJ6787472.1	-----	365
KAJ6780036.1	-----	330
KAJ6787922.1	-----	315
KAJ6780669.1	-----	423
KAJ6788767.1	-----	324
KAJ6787801.1	-----	336
KAJ6781922.1	-----	445
DAA05865.1	-----	392
KAJ6780968.1	AYYQLAKTALLRRFEASYIMAPSFSTSSGILETHNPVRIFGQKPEPSPGLSLASRSLQHP	518
KAJ6780631.1	-----	348
KAJ6787472.1	-----	365
KAJ6780036.1	-----	330
KAJ6787922.1	-----	315
KAJ6780669.1	-----	423
KAJ6788767.1	-----	324
KAJ6787801.1	-----	336
KAJ6781922.1	-----	445
DAA05865.1	-----	392
KAJ6780968.1	NHTQQVTLGVIAAYVVVIAILWNVPYIKNILWPFKMLVIAFHEFGHAITAVFTGGRVKSI	578
KAJ6780631.1	-----	348
KAJ6787472.1	-----	365
KAJ6780036.1	-----	330
KAJ6787922.1	-----	315
KAJ6780669.1	-----	423
KAJ6788767.1	-----	324
KAJ6787801.1	-----	336
KAJ6781922.1	-----	445
DAA05865.1	-----	392
KAJ6780968.1	SLDPNEGGVTKMVGGISAITLPAGYLGSSIIGALLTFCGFNIVASKIASIVLGVCFLTL	638
KAJ6780631.1	-----	348
KAJ6787472.1	-----	365
KAJ6780036.1	-----	330
KAJ6787922.1	-----	315
KAJ6780669.1	-----	423
KAJ6788767.1	-----	324
KAJ6787801.1	-----	336
KAJ6781922.1	-----	445
DAA05865.1	-----	392
KAJ6780968.1	WWGKRDWLTVLTVLLAVALLVACWFIKHAEALRFVVLFIGVMSSLYSVWDICDDLILRKV	698
KAJ6780631.1	-----	348
KAJ6787472.1	-----	365
KAJ6780036.1	-----	330
KAJ6787922.1	-----	315
KAJ6780669.1	-----	423
KAJ6788767.1	-----	324
KAJ6787801.1	-----	336
KAJ6781922.1	-----	445
DAA05865.1	-----	392
KAJ6780968.1	NSSDASVFAKRYGGSSQCWGIIWSIISVLIMAVGIVAGLAAFSQSFAQQQEDSKHFIPT	757

## A

KAJ6779939.1	-----	0
KAJ6782108.1	-----	0
KAJ6782480.1	-----	0
KAJ6785755.1	-----	0
KAJ6786186.1	-----	0
KAJ6783291.1	-----	0
KAJ6787487.1	-----	0
DAA05854.1	-----MFRLLCIGLPLL---AR-----VAVAVPATLSERCDA PNP---PASSLT---	38
KAJ6782844.1	MLQSAIILPLLALGVRGAPAGSGDGVSAACRVVWVPVSVDTTVQAPSATNTATSPLTDGR	60
KAJ6779939.1	-----	0
KAJ6782108.1	-----	0
KAJ6782480.1	-----	0
KAJ6785755.1	-----MD-----	2
KAJ6786186.1	-----	0
KAJ6783291.1	-----MLKLLKNSVAVTAA-----	14
KAJ6787487.1	-----MLSFVKKSIALVAA-----	14
DAA05854.1	-----ESVAAISSGPLPFDTEMGDVETVHRE---PFDVAVPG	72
KAJ6782844.1	AGAAYSSGRENKFVLPQGASSTKPDTTAAIQSTSTTMDRPSKVTSAVTRTASSNKLSPGTG	120
KAJ6779939.1	-----MKTSP L T L L A A A S T A A A A P R N V M Y F D Q W H T A T ---LPP	36
KAJ6782108.1	-----MYLTGQHNV I ---PED	13
KAJ6782480.1	-----MHLGSIYS----AVLAFTTTGVLGKNIVGYPSWKRQY----AD	36
KAJ6785755.1	-----SSSVASASLPSTPTLQTRFPPELGQVMYMNNAVYFHNSHI-ARDETPA	48
KAJ6786186.1	-----MSYRSVAYYVNWAIYARKHLPQ	22
KAJ6783291.1	-----LYAFTA----LATLIT----SDSTIGKRESGYVNAVYYTNWAIYLRNFQPS	57
KAJ6787487.1	-----LQAVTA----LATPIS----SEAGVEKRGSGFANAVYFTNWGIYGRNFQPA	57
DAA05854.1	-----SSGVSI EHG HG ----SEVVGF GPTSRKKNVVYYADWSIYDA AFLPQ	118
KAJ6782844.1	TSTSTITVTKTITRSGQKPAYTPG-----TDQDDGVEIKGRKNVVYFTNWSGYGANYTAA	175
* 		
KAJ6779939.1	KDVTAGVTHVITAFAP----DGTFNWGS---SYTPFMSL-----	68
KAJ6782108.1	VQLRKEITHVVLAFVR----SEMFNVESPHPDYPLFTSV-----	48
KAJ6782480.1	NMDLSLYTHINF AFAI PAQ-DGSFSFDGDWFL-----PG----	69
KAJ6785755.1	KLDYGFINLVYAYASVAP-DGIVNLGDEWADIRAPVDG-----VEGGLGS	93
KAJ6786186.1	DLPAENITHVLVSFANVRSENGEVFMTDGWADTDIHWEGDS----WNDSGTNIYGCCLKQ	77
KAJ6783291.1	DLIVSDITHILYSFMNLR T-DGVVYSGDTYADYEKHYPGDS----WTEGVKNAYGCVKQ	111
KAJ6787487.1	DLPASEITHVLVSFMNVRA-DGTIFSGDTYADYEKHYAGDS----WNDVGTNAYGCVKQ	111
DAA05854.1	QLPAEDITHLLYAFAGIED-DGSVVSMDPWAD E EKMLSVPGGPGRNDTQGLNDVHGA VEQ	177
KAJ6782844.1	EFFANDVTHLLYAFGDISS-TGEVIPSDSWIDIQKQFAGPQ---KRDV---QAQGNIGQ	227
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KAJ6779939.1	SDIRALFDQGTKVCMAIGGWGDDT--GFGTAAASDES R KRYAKNVAEALNTLG YDCVVDV	126
KAJ6782108.1	KEVREKFPP TTKILVAIGGWGNSL--GFEEAALDDASRKRWRTRNVKHMVETTGA DGV D I D	106
KAJ6782480.1	-VVS KLHDKGVKALMSVGGWTGSN--YFSTILKDQTAGANLVANIVSYVKANS L D G I D I D	126
KAJ6785755.1	LMQLKQRYRHLKVL LSI GGP AAS--GVFVSIASNPATRN NFAYTAAGLVVASGL D G V D I S	151
KAJ6786186.1	LNILKKRRNRNFKVMLSIGGW TYSS--NFPAPASTPEGRDTFAKSCVELVKNLGF D G I D I D	135
KAJ6783291.1	LYLLKKQNRNVK VILSIGGWNWRA--NFPAASSSAETRKTFAQS AVELMKDWGF D G I D I D	169
KAJ6787487.1	LYLLKKQNRNMKVMLSIGGWTWST--NFPAAASSAATRKTFAQSAVGFMKDWGF D G I D I D	169
DAA05854.1	VFLKKRHRHMKTL LSI G G W N M S Q S G K F A P V L N T N E G R I R F A K T A V N L L A N W G L D G I D I D	237
KAJ6782844.1	IFGLKKQNRNLKVLISVGGFTYSEAGKFVPATNTTEGRQRFARS AVKLIANWGF D G I D I D	287
* : : * * * . . : . * : * : .		
KAJ6779939.1	WEYPGGNGEDYKQNPNSGKTAEIETYPLLLKEIKAVIGD-----K-ELSIAPVPGKV	176
KAJ6782108.1	WEYPGGRDDYKVI TNDQREWEIDAYHLLLKELRETIGR-----NKIISIAPVPLE	157
KAJ6782480.1	WEYPGR LGNNCAYD---PQSDAQNF LAFLQTLRQKLD AEFGRK---KLLTLAMRVQP	179
KAJ6785755.1	WHVPAD-----PVQGANFLALAQAVRSKLQG-----GRMLTAALPAN-	188
KAJ6786186.1	WEYPKS-----AEEAGHFVELLA E VRKQLDEYSARAADNYHFELSVACPA G-	181
KAJ6783291.1	WEYPSN-----DTEAQNMV LLLQAVREELDSYAAHYADGHHFLLSIAAPAG-	215
KAJ6787487.1	WEYPAD-----ATQ AQNMV LLLQAVRSELD SYAAQYAKGHHFLLSIAAPAG-	215
DAA05854.1	WEYPIN-----EREAVGFVDLLRECRKALDEYASLHNQRYHYLLTA AVSAA-	283
KAJ6782844.1	WEF PKD-----KSEAA NFV SLLQEIRYELDKYASDNNQKYHYLLTVATSAG-	333
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KAJ6779939.1	GDMIAFTAQVQPKISETVDFVNVMTYDLMNRRDTSTDHSSVS-----GSLATV	225
KAJ6782108.1	RDLMAFTANTVQPKIVQVDFINIMTYDLINRRDVTVVQHSGVA-----DSRASI	206
KAJ6782480.1	FDGPNGLSDVSAFAKVVDYGNLMQYDINGGWNSVTGPLAPFNFESGRGA--QVSFVSAI	237
KAJ6785755.1	--PAVLQHIIDLAVAAESLDFINLQTYNLHHAQPGRSILCPSQLYSMAKDEP---STSTVA	242
KAJ6786186.1	--PDNFQKLNI PGMDAYLDFWNLMAYDYAGSWDQVSGHQANLYPCNDNPACTPFSTTA	239
KAJ6783291.1	--PEKYKKRLADLGKVL DYINLMAYDFAGSWSNYTTNANLYANPQNPNATPFNTEDAV	273
KAJ6787487.1	--PDNYNKLKFAELGKVL DYINLMAYDYAGSWSNYTGHDANIYANPQNPNATPYNTDDAV	273
DAA05854.1	--QQHYKWLDMPAIDRYLDAWHLMAYDYAGSWDDLSDGQSNVFDATNPHRTRANSDQAV	341
KAJ6782844.1	--PSKYKLLNLGAMDKFVDSWHL MAYDYAGSWDSTTGHQANVYDPDSNTASTKFNTEQAV	391
	. : * : * : : . .	
KAJ6779939.1	ETYSLRGMPAAKMNLGFAFYAKWFTTKDGATCDQATGCPTAVLEDANGGD-TGK-----	278
KAJ6782108.1	QRYLDRGVPRSMANLGLGYVVKWVMTDP-CERDDILGCPTQLLEDPDSGNLGR-----	259
KAJ6782480.1	DAWTAAGWPAQQLNAGYAFYGLSTTALEDMTKDPT-----NQYQPPQSSTVPLGDKEDASW	292
KAJ6785755.1	GYILSRNFPAQKLLLGIPTFGTSFPGCDGPGQ-----AYDPAE-----	280
KAJ6786186.1	DYYTQNGVAPDKLVLGMPLYGRAFENC DGIGK-----PFQGVG-----	277
KAJ6783291.1	KAYVSEGIPANKIVLGMPIYGRSFQQT EGIGK-----PYNGIGE-----A--	313
KAJ6787487.1	QAYINGGV PANKIVLGMPIYGRSFQQT EGIGK-----PYNGIG-----	311
DAA05854.1	NDYVAAGVNPEKIIILGIPLYGRSFMNTDGP GK-----PYEGVG-----	379
KAJ6782844.1	NDYIAAGIAPEKIIILGLPLYGRSFMQTS G MGQ-----SFNGTG-----	429
	. * :	
KAJ6779939.1	-----SGAVT FEKE-----NYSGAFLNAMNNGKADNEKGQWYWDASAKV	318
KAJ6782108.1	-----TAAFSWHDN-----VPSELSASF SRALNRGR--YFEDGSYGYWDEQEH	301
KAJ6782480.1	YDACAGATSNSGTWQWKHL LDQGVLSAPT TASAPWV-----RQWDNTTQT P WLFNPQTSI	347
KAJ6785755.1	-----SQSMDYLG L P VAGRQ-----EGIDRRRISAYCAGG-PEG	313
KAJ6786186.1	-----QGTWEQGVYDYKKLPLEGAE-----EHQDDASGATYCYNPQSRT	316
KAJ6783291.1	--SFGQGSWENG VWDYKALPRAGAT-----VT CDDTAKGCYSYNANTQE	355
KAJ6787487.1	-----SGSWENGIWDYKALPKAGAT-----VKCDDTAKGCYSYDPSTKE	350
DAA05854.1	-----KGSIEKGVWLYRDLPRPGSV-----VNLNRDI I AAYSYDNATRE	418
KAJ6782844.1	-----EGGVEAGVWLYKDLPRPGAT-----VTVDS DVLAAYSYDPKERM	468
	: .	
KAJ6779939.1	YWTWLTPEFIAKKMTDIVKAKGLGGVMA-----WSLAQDSHDWSH-IKA	361
KAJ6782108.1	WWSFDTPDVIARKMKELVGS MGLGGVFA-----WGLGEDATDFAR-LAA	344
KAJ6782480.1	FISYEDPVSLKV K V-DYAASKGLAGAMV-----WSVNMDSSN-TLLKV	389
KAJ6785755.1	FIAYDNPD TVKEKA-DFCKQKGFGWTT PKGASDDATPEHWPRCVWGASARSSR-CSLACV	371
KAJ6786186.1	LVTYDTPQLAKTKA-QF I KERGLGGGMW-----WESSADKAGGDSL IQT	359
KAJ6783291.1	LISFDT PSMISTKV-EWLKGNGLGGS MF-----WEASADKKGSDSLIGT	398
KAJ6787487.1	LISFDT PAMISTKV-SWLK GKGLGGS MF-----WEASADKKGSDSLIST	393
DAA05854.1	LVTYDNMETTTLKA-EYLGKKGLGGAVF-----WEASGDRSGDES LIKA	461
KAJ6782844.1	LITYDNKESANLKA-QYLMKKGLGGAVF-----WDASGDKPGNGSLIST	511
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KAJ6779939.1	LQS---GIKS--L-----	369
KAJ6782108.1	TVD---GIRA--LHNSRDAGKDE-----L-----	363
KAJ6782480.1	LRG-----	392
KAJ6785755.1	VTARADKIAAPDLASQQAMATSSADADAASRTSLSPPRNPTAGATETTTDQKRRGVVQQL	431
KAJ6786186.1	VVGEFGGPGA--LKQ QENC-----ISYPETKYDNL-----RNLGPDN-	394
KAJ6783291.1	SRQ---GLGS--LDGTQNY-----LHYPNSTYDNI-----KKGMN--	428
KAJ6787487.1	SHQ---GLGS--QDSTQNY-----LDYPNSKYDNI-----KKGMN--	423
DAA05854.1	VAR---KMAL--LDISMNM-----LSYPQSQFSNI-----RNATRW--	492
KAJ6782844.1	LAR---SIWP--LESSQNM-----LEY PKSEYANI-----RANS----	540
KAJ6779939.1	-----	369
KAJ6782108.1	-----	363
KAJ6782480.1	-----	392
KAJ6785755.1	SAADCSVGDDSGAVTSSIAFGGSVPVAAAAAEHISSETEQQPPPPPPFEPLFALLTNT	491
KAJ6786186.1	-----	394
KAJ6783291.1	-----	428
KAJ6787487.1	-----	423
DAA05854.1	-----	492
KAJ6782844.1	-----	540
KAJ6779939.1	-----	369
KAJ6782108.1	-----	363

KAJ6782480.1	-----	392
KAJ6785755.1	TTGATVHPRIHYIFSDDDTSIPTDTAAHQHGDADHRSLVVALQPPDDHNDGAESNEIHD	551
KAJ6786186.1	-----	394
KAJ6783291.1	-----	428
KAJ6787487.1	-----	423
DAA05854.1	-----	492
KAJ6782844.1	-----	540

KAJ6779939.1	-----	369
KAJ6782108.1	-----	363
KAJ6782480.1	-----	392
KAJ6785755.1	PGALRSGSASQSQDTTPTTSA	574
KAJ6786186.1	-----	394
KAJ6783291.1	-----	428
KAJ6787487.1	-----	423
DAA05854.1	-----	492
KAJ6782844.1	-----	540

## C

KAJ6785998.1	-----	0
KAJ6779834.1	-----	0
KAJ6783597.1	-----	0
KAJ6789350.1	-----	0
DAA05857.1	-----MPWISPGGIACWLASATAIVSF---H--G--VSATANEVDA	34
KAJ6784990.1	MQ-----YHTSAALTALAGLGLFPLASGIT-S	27
KAJ6787215.1	MRLTIFTGATLLASTAHVSATVQSGLRPVSLAARMSASDFA-NVDTGGDELAAWLKASA	59
KAJ6784672.1	MRR-----TPSQVAA-----AVSLLASVATAVTESY	26
KAJ6781350.1	-----	0
KAJ6786554.1	--M-----APSWFNAALGATSVLLSTNALVAASSPSRIGASI	35

KAJ6785998.1	-----	0
KAJ6779834.1	-----	0
KAJ6783597.1	-----	0
KAJ6789350.1	-----	0
DAA05857.1	FQSQLNLCPLACSDKS-----PEQWSVYSSFERLSQCDQPVLFDLAIHTPINDKTNVLI	89
KAJ6784990.1	FGDYADLCPVACTSN-----PSQWTKYHSLDRLAGCEADLFLDFNTLLKQVDSN--TVF	79
KAJ6787215.1	QSAIVKACPEACSELKDGEDGTTGLSLIPDENMLSRCNETMLVDLVVKSK-----DSKAI	114
KAJ6784672.1	QGQYPDDCPQLCEVAGPARGN---WTHVHHLKDLSSCKNDMIFDFNVHNLVDDPNTILTI	83
KAJ6781350.1	-----	0
KAJ6786554.1	SYRGSERCPRSCADAGADSFA---WDSFRSMDEVDQCGNPMLFNFALADRVDEHGRNHRI	92

KAJ6785998.1	-----	0
KAJ6779834.1	-----	0
KAJ6783597.1	-----	0
KAJ6789350.1	-----	0
DAA05857.1	RACTTSPAAGGSQPMASIVK-----REAEACGGSFVESKVPLLISQNPQG	134
KAJ6784990.1	RTCSLASDAKPPTELAE LTSNNK-----LSVSDDCGATVKQNVTIATSSAGAV	128
KAJ6787215.1	RACMGDYGENVKAAAFKADSSKAALCDTPNYNLTSTMTFSG-----F-PQSIQGTSE	166
KAJ6784672.1	RACTTISNETYD-----TRSQFIRDEGVSQSSLV-ISDSCGAKTVKSPLTPRVGNGL--	135
KAJ6781350.1	-----	0
KAJ6786554.1	YACTTSSESFKK-----ISQAQVLAAEP-----ADEVDAE--FEVGRGD--	129

KAJ6785998.1	-----	0
KAJ6779834.1	-----	0
KAJ6783597.1	-----	0
KAJ6789350.1	-----	0
DAA05857.1	ATAFPFGNGLVTILEGLKEYRQKAVATSGCTGDNNIMLG YFDGAVVGTYAGKALSSATIPS	194
KAJ6784990.1	QDQSASTIVSSDIETAAKNLATYLYKH-ASCGSSTLFSKVNNAVVGIFYSGADVQASAAA	187
KAJ6787215.1	GTSEQSFDAKDAISALQQVSRHLQTEEPSCTDNVIKFGYKSAAVGFVGEHHQHGLTK	226
KAJ6784672.1	MNRSNSTLSTTDVASAAARLQSYINKG-SQCGTTILFAKSGSAVVGLHAGSHITKSSVSE	194
KAJ6781350.1	-----	0

KAJ6786554.1	--EDGGIAPEVAVSSLTGFLGQYVRQGLAQNGTTMIYGSFSGAAAGLYVGHGLNGGAVSA	187
KAJ6785998.1	-----	0
KAJ6779834.1	-----	0
KAJ6783597.1	-----	0
KAJ6789350.1	-----	0
DAA05857.1	I-VDYLLEEDKEQGSAPFGMLAQICDHDS-DMDHTAGVAVALKADIG-SVQSALLSWNQG	251
KAJ6784990.1	M-----LE-RFGTSLSSGPTILQTCNLNSDIGADTTVGVSGLNLQELGGSLHSSVRAWVNG	241
KAJ6787215.1	TVIDEVIKSLEDKG-TSETTGFECHPDRLGADYSAGIILTSAGNLY-KAKDVLATWASG	284
KAJ6784672.1	-----LLDT-FDAQLGQNRLSLEVCGANV-T-SSTFGIAAAEFGSLG-AVQAAVKGWADG	245
KAJ6781350.1	-----	0
KAJ6786554.1	TALQHLEDVSKHANSSQGILGVQMCSDY-DSDHTFGFIATTNGTGFG-AIQDAMLSWYGG	245
KAJ6785998.1	-----MGSWSRIFLTTLITPSLGAV--ITSW-----PRSVDAPELPGAGTCRAIVSP	45
KAJ6779834.1	-----MRLFR TALLAL-----LAT-----E-----AAASS	20
KAJ6783597.1	-----	0
KAJ6789350.1	-----	0
DAA05857.1	ECAKAQSGTTLRELVISQVPLPS-INAKASNISLAEAPGRKAQALDSKVDGKYCKMRTI-	309
KAJ6784990.1	TCVEGSGTASMPHMLSVLVSTTT-----SSNSTPVAANRRGECRDTQV-	286
KAJ6787215.1	ACVSSQN-SWMEVTV--RLPPPAKLETNTTSNSTASSNLQSRQLKTLPRGDCKTTTV-	340
KAJ6784672.1	ECLGDGT-ALPRMDLSVLVSTIDK--NATFY---LNGTLA-SRSLKHLPRGDCRTEQV-	296
KAJ6781350.1	-----	0
KAJ6786554.1	DCVKFGT-SDKVKSKAHFASPLM-----SS---IQGSNSTNSTAHFSKRGE CRTVQV-	293
KAJ6785998.1	FDYSAKNRRDDEL PVC SADNLTLDN GISSIGQSELSL FGR-----	85
KAJ6779834.1	FIEQAIA-SGQLKPSNSHPNS-----KSDASL--A-----	47
KAJ6783597.1	-----	0
KAJ6789350.1	-----	0
DAA05857.1	-----AAGDSCASIAKACKVSV--ADFFKYNGVKG-----	337
KAJ6784990.1	-----HTGDSGSLATRCGISG--PDFEKYNSGV-----	313
KAJ6787215.1	-----DKGMCYDLAKCGISS--NDLTKYNPQKNFCSTLVVDQKVCSSGT	385
KAJ6784672.1	-----QEHDSCAAVASRCGISV--DDLQKYNNGA-----	323
KAJ6781350.1	-----	0
KAJ6786554.1	-----KQGTGCP ELAKMCGISG--PDFTKYNPGK-----	320
KAJ6785998.1	-----QVVGNTDYTCGPDRPCKNKAC	106
KAJ6779834.1	-----ATGDS PDYHCRKDKPCALGCC	68
KAJ6783597.1	-----	0
KAJ6789350.1	-----	0
DAA05857.1	-----NGNDWCRKLQAGRNICC	354
KAJ6784990.1	-----KNLCSTLKDQYVCC	328
KAJ6787215.1	LPATIP PAGNGLC KTK EVVAHDT CGSLAAKGLTPQDFSKINTKTGLCSSLAPQNVCC	445
KAJ6784672.1	-----SDWCNKLM PKQH VCC	338
KAJ6781350.1	-----	0
KAJ6786554.1	-----TFCNDLMPGQH VCC	334
KAJ6785998.1	CPKK--TGQCNYGEEACGTSGISPN DVCWSN-----CDA-	138
KAJ6779834.1	GPLDDEGN GICGMGPKFCG-----KGCTSS-----CDQ-	96
KAJ6783597.1	-----	0
KAJ6789350.1	----MPELRPKPNEDGSCATYPVDHNDGCSMI AVARQLTVDDLEEFN-KNTWGWQGCEA-	54
DAA05857.1	SSGS---SKPLPEANGDCFSYTIKAGDDCSSIGMPWNLT PKDIEGFNQV TWGWRGCPN-	410
KAJ6784990.1	SSGTL PDHRPKPGSDGSCNVHKIEKNDGCWAIADKFGITQDDIEKFN-KKTWGWAGCDH-	386
KAJ6787215.1	SYGKL PDRRPKPNADGTCATYTTQPNDDCSVIAAKRDLVAKDIEEFN-KNTWGWKGCEI-	503
KAJ6784672.1	GEGTL PDYRPQPNSDGTCANYQIHDNDTCYVIADGN YLKSDDIEEMN-KSTWGWSGCEH-	396
KAJ6781350.1	-----	0
KAJ6786554.1	SAGKL PDYKPKPSKDGSCATVKVEKGLDCSSIGASYGLTKKEIEGFNAKKTWGWNGCDGG	394
KAJ6785998.1	-----KSECGKN-----AKV---PGQK CPLNVCCGKW	162
KAJ6779834.1	-----KSECDAG-----WGMQWSKAGPCPLNVCCSEY	123
KAJ6783597.1	-----	0
KAJ6789350.1	-----PMPNPVENAECGPTVPGTKPPPA---GISLADLNQCPLKVC CNIW	96
DAA05857.1	-LTVGLKICLSKGSPPMPAPVSNVACGPGQKPGTVRPESVKDAFELAKLNPCLNSCCNVW	469
KAJ6784990.1	-LQPDQLICLSTGRPPFPLPVEGAKCGPMKPGSKPIAG---DDYSKVSFCPLNACCDVW	442

KAJ6787215.1	-VFKDFKMCVSKGDPMPAPVSNVAVCGPTVPGTPQPPK---GTELKTLNECPLKACCNVW	559
KAJ6784672.1	-LQVGQIIICLSKGDPPMPAQVQGTTCGPQVPGTKRPTD---GTALADLNPCPLNACCDVW	452
KAJ6781350.1	-----MPDPIADAVCGPQVAGTKKPID---MSKISELNPCLNACCDVW	41
KAJ6786554.1	RLWAGTVICVSKGTPPMPSVDPKAVCGPQKSGSKKPKD---MSKISELNPCLNACCDVW	451
KAJ6785998.1	GFCGMTEDYCDAE--DHGA-----TGGCQSNCDQPGPKNK-ASDQLNRVIGYYEAWRH	212
KAJ6779834.1	GFCGTTQDFCNGK--KVTS-----P-----SCSAS-AGSANKRIIGYYEGWNH	163
KAJ6783597.1	-----MDI ISSA-PPK-EFISIGYFEGYGL	23
KAJ6789350.1	GHCGFSDDFCTVSKSKSGAPGTAALGINGCVSNCGRIYVGSPSAPE-KPLRIGYFEAWNK	155
DAA05857.1	GQCGIDALFCTKADGPTGNPGTAPAGSNGCISNCGTGI VNNAKPPSGGFRRIGYYEAFNW	529
KAJ6784990.1	GFCGITSDFCTKT PADTGAPGTAKEGTNGCISNCGTDIKKSD-PPS-SLMKVAYYEAWNF	500
KAJ6787215.1	GQCGLTDDFCTYAPSKSGAPG TSA-LQNGCVSSCGRELKKG P-APD-KMKVAYFEAWNG	616
KAJ6784672.1	GFCGTTDEFCTKT PSDTGAPGTAKPGTNGCISNCGRDLVNNDKAPD-EFRRVGYEAFGM	511
KAJ6781350.1	GQCGITDEFCTDT--GTGAPGTAAPNTNGCISNCGTKIVKGS--VS-EFRSIAYYEGFSF	96
KAJ6786554.1	GQCGTTDEFCTDT--GNGAPGTAKKDTNGCISNCGTKIITGN--QK-EIRSIAYFEGYAF	506
	. :.*.*.:	
KAJ6785998.1	DSKCQDMGLDDIPVNSLTHLYFSFAFITPGEYNIVGMNGLPNRFLTDFTSLKNNPGLKT	272
KAJ6779834.1	QRSCDTMKPSEIPLGYTHINFALIHPTQFTIDAMDDKTGSLYREVTLGKSKDPGLKV	223
KAJ6783597.1	TQPCDRVDVRTIDVKKYTHIQFAFSTVTANTFEVDMGPTL--NQFYFFKQLN----GVKR	77
KAJ6789350.1	NRNCLTMDNH-----	165
DAA05857.1	ERPLHMESKLSNTDKYTHMHWAFFGDIKSD-FSVYINDTH--HQWDGFMGLK----NVKR	582
KAJ6784990.1	DRSCLHMNVDAIKG-DYTHIHFAFATVDKN-WGVSLDKN-TQKQFNRFKSVK----GPKK	553
KAJ6787215.1	NRPCLHMDVTDIDTSLYTHIHFAFAEVTRD-YNVDISKVQ--KQFDKFKSMT----GIKK	669
KAJ6784672.1	NRPCMMNGVKEIDVNHYSIHFAFATVTAS-FQVDISDSK--EQFGDFVQMK----NIKK	564
KAJ6781350.1	SRKCLYQDALQIDGSQYTHLHFGFGDISPD-FQISIGDEMATYEFNNFRFIR----GPKK	151
KAJ6786554.1	NRKCQYQDAFQIDPKKYTHLHFGFGTISKD-LKPSIDDYATNYEFNNFRMIS----GPKR	561
	*	
KAJ6785998.1	IIAVGGWTHNDPGPLQKVFSTMTVKETRAKFIKNLSFLRLNAFDGVDFDWEYYPGADDR	332
KAJ6779834.1	WIAIGGWAFNDPGPTQSTFSLVSKAPAAQELFFNSLITFLINNNDGVDIDWEYYPADDR	283
KAJ6783597.1	ILSFGGWTFSTDPATYGI FRTG-VTPEHRQTMANNIAKFIIDQGLDGVDIDWEYYPAPDI	136
KAJ6789350.1	-----ELDGIDIDWEYYPGSY--	180
DAA05857.1	IVSFGGWGFSTGVASYDVL RKA-MTPENRGHFVSNVVAFAKKMGIDGIDLDWEYYPGAPDI	641
KAJ6784990.1	ILSFGGWAFSTEPDTYQRF RDA-TKAENREKFATNVVKFLNDNSLDGLDFDWEYYPGAPDI	612
KAJ6787215.1	II SFGGWDFSALPGTFDILREA-VK PANRNVFKQNVVKFVKDNGLDGVDLDWEYYPGAPDI	728
KAJ6784672.1	II SFGGWDFSTKPE TFQRFRDA-TK PENRDAFIASLVDFASKNAIDGLDFDWEYYPGAPDI	623
KAJ6781350.1	II SFGGWEFSNAPSTYDIFRRG-VQDGNREILAKNIAKFVNDNGLDGVDIDWEYYPGATDI	210
KAJ6786554.1	ILSFGGWDFSTGPDYTI FREG-TK KENRETLATNLAKFVEKYQLDGIDIDWEYYPAPDI	620
	:**.*:*****.:	
KAJ6785998.1	GGVP-----EDGVNFTQFLKELDDENNKP KKYIVSFTAPT SYWYLRHFDLKAIE-HVDY	386
KAJ6779834.1	GGKP-----EDFKNFVSFI AKLRARLNASGKDFGLSLTL PSSYWYMQHFDIIALEPYVDW	338
KAJ6783597.1	PGIPAAD-PAEGANYLKFMIALRGV---LPKDKSLSFAAPASSWYLGFPFIAIITKIVDY	192
KAJ6789350.1	-----LSASKSVSFAIPASYWYLKAFPIAMMSKRFDY	212
DAA05857.1	PGIPKGL-PSDGP NYLET LRALRKA---LPSKYSLSIAVPASYWYLRPFPIREMSETVDY	697
KAJ6784990.1	PNVPPGS-TDEGSNYLAFLKVLK G---LDKSKSISIALPSSFWYLQAYPVKELNSVVDY	668
KAJ6787215.1	PDIPSD- PHNGVNYMFLKQLKSA---LG-DKSVSFAAPSSYWYMRSPV DLMARDIDY	783
KAJ6784672.1	PDIPPGD-KGEGDNYLEFLKDLKAK---LPSDKSVSIALPASYWYLKQYPVKKMADIVDY	679
KAJ6781350.1	PGTPAGDPKTEGINYLKFLVLKEM---LP-NKSVSIAAPASYWYLNFPKIRISQIVDY	266
KAJ6786554.1	PGVPPGD-KSEGKNYLEFLKLLKSK---LK-GKSVSIAAPASYWYLGFPFIKDIGKVVDY	675
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KAJ6785998.1	VNVMSYDLHGVDSSNP-----IGSHIYGHTNLTEMKLA FDLFWRNDVPANKLNMGLG	439
KAJ6779834.1	FNMMTYDIHGTWDGTTIPS-----LGPRVQAHTNLTEIELAMELLWRNNINPERVTMGLG	392
KAJ6783597.1	VVYMTYDLHGQWDYGNKWSSPGCPGNSCLRSHVNM TETINALSMITKAGAPSNKIAVGLT	252
KAJ6789350.1	IVFMT-----DALAMITKAGVPANKIALEIA	238
DAA05857.1	IVY MAYDLHG-----NGNCLRSHVNQTEVVLALSMITKAGVSASKVVVGES	743
KAJ6784990.1	FIYMTYDLHGQWDYDNKFTTPGCANGNCIRSHVNITETK TSLAMVTKAGLSSNKVVVGVS	728
KAJ6787215.1	II FMTYDLHGQWDYGNKWTSPGCDTGNCLRSHVNDTETKDSLIMITKAGVPTNKVVVGVA	843
KAJ6784672.1	FIYMTYDLHGQWDVG NKYATPDCATGNCLRSHINKTETMDSLILITKAGVESRKIVVGIS	739
KAJ6781350.1	II YMTYDLHGQWDAGNPNAQPGCS DGMCLRSQVNL TETMSSLSMITKAGVNSGKVVGVT	326
KAJ6786554.1	II FMTYDLHGQWDADNKNSQIGCPGGNCLRSHVNL TETRNSLSMITKAGVDSGKVVGVT	735
	. *:	
KAJ6785998.1	FYGRAFQLADSSCDKPGCLFKGG----ATKGACSGESGILSYREIREILDKNK---MTF	491
KAJ6779834.1	FYGRSFTLKDP SCTAPGCPFGSP----GKPGECTGTGGVLSAGEINRAIKKGG---K-M	443

KAJ6783597.1	SYGRSFKMLTSGCTGPMCTFAGP--QSQAQPGRCCTGTAGYISQNEIDYVLRNNP--SAQK	308
KAJ6789350.1	TYGRSFKMAAGCWCWGPMLFTGTNRISNAEGRCTKTAGYISNAEIQEI IQYGN--VNKQ	296
DAA05857.1	SYGRSFKMAKAGCTGPLCKFTGANGKSEAAAGRCTNARGYLANAEINEIISKSK-GHPKT	802
KAJ6784990.1	SYGRSFERLKLPGCFTPDCLFTGSPTQSDAFQGRCTNTSGYISNAELKEIADKKKYSYVKS	788
KAJ6787215.1	SYGRSFKMEKAGCDGPMCKFTGSARVSNAAHGRCTDTGGYISNAEIAEIIDSGK--VTRQ	901
KAJ6784672.1	SYGRSFRMSDPSCSGPMCTYTGTDRHSEAYQGRCTGTSGYISNAEMQEI IQDHNHYGTINN	799
KAJ6781350.1	SYGRSFAMAEAGCHGAQCKYTGSRQLQSNAAKGECTDTSGYISNAEIGKILADPS-RVNEH	385
KAJ6786554.1	AYGRSFAMSDGSGCHGPDCTFTGTRLHSNANKGECTDTAGYISNAEIKKIAKDKK-RVVKS	794
	***:* : . * * : * . * *: * :: * :	
KAJ6785998.1	VHDKEAGVKYLYNN--DQWVSFD	548
KAJ6779834.1	VLDKPSAAQIVTFGG--DQWVSFD	499
KAJ6783597.1	THDAESNSDILVDDT--TEWVSYM	364
KAJ6789350.1	WEA--VGSHVLVYND--TEWVAYM	350
DAA05857.1	WYDKDTASDYLVDYND--VEWVAYM	858
KAJ6784990.1	WYDKDSDSNIMVYGDGPKHDWVAYM	847
KAJ6787215.1	WKA--AGSDILVYSG--TEWVAYM	955
KAJ6784672.1	YYDSSSDSLILEYGDGNAVDWVAYM	858
KAJ6781350.1	YIDAGSNSNVLYDN--TEWVAYM	441
KAJ6786554.1	YMDSTSNSNVLYDN--NQWVAYM	850
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KAJ6785998.1	QAVLDPKPLGDFKSIDKGGDNNWTGTNEKCYVTAC-GEGCKAGEIKITDEYCAKKKVSTLC	607
KAJ6779834.1	-ALFGNTGHKKRKTTRDPKD---NDYNLKCFAAGGI-NGG-----	532
KAJ6783597.1	-----PDPSTIDANGPSLLADGLTDLKLHSSCLPYREIOWTA-----WD	402
KAJ6789350.1	-----TGMDQQLDESFI-----EIRCDGQYTTFDAVE-----	377
DAA05857.1	-----HTEPPQGGPGAN-----ETGCINVFNDNMIWDWNPSIEAAIG	895
KAJ6784990.1	-----GGSPDDPTNDPS-----KLTCKDAKMSYKKQDI-SPIYFPTY	883
KAJ6787215.1	-----DGDDDDDG-MHGSAD--YFGECTGSYDSLESLEKAKDSIPDY	995
KAJ6784672.1	-----GGDDS-DMPDIDMSDG--DNINCPADMAPGSLEDLSNANNLPMR	899
KAJ6781350.1	-----DGVKDWANFRLQIKAG--NN-----PLTHAGDRGTGNWTKLT	475
KAJ6786554.1	-----KGFDPDWGAFTVSLKSR--KD-----PYEDVGKRSGNWTRLD	884
KAJ6785998.1	CPLSGAPDPKDCTWRGGTTRWCNCRCHDDEVMTMSKYGGGHDCWDGQIAHCKKSALGEY	667
KAJ6779834.1	-----	532
KAJ6783597.1	-----DAG-----TIAKAPYNWSRFNK-YQKVL----	424
KAJ6789350.1	-----RA-----LQA-----M----HDA--LDR-YKKLVDGGY	398
DAA05857.1	CTNILQPSPLSTTVTL-TAYT-----TLT-----LQSGTKLSTSVVSA-PFSISEVSY	941
KAJ6784990.1	GDAL-----TT-----YVV-----IVNLTPHKFKI-----TSTSHY	909
KAJ6787215.1	CVDQ-----YA-----TQV-----QQAMLRDAIKRYD----DLVNGDY	1024
KAJ6784672.1	CQAL-----YA-----LDI-----LYNTLEDSLFLD-----TNSQDY	927
KAJ6781350.1	CDDK-----YW-----TEK-----LDYTPAERWAGLD----AK----	499
KAJ6786554.1	CTAD-----GA-----TDT-----LHYTSDERWENLD-----AA----	908
KAJ6785998.1	NVC-KWRGVGEKCHAGELPMTFSGTVLNILEDIAKVILRVVGRAYPLTALTGELLKVLVD	726
KAJ6779834.1	-----	532
KAJ6783597.1	-----NN-----YLGKKSQGVPIITD---AIWKNFERHSEIHGHPREGLR IYL-	465
KAJ6789350.1	DDKF--NY-----YSNYIKMLVPMQIDE-----FMASGKADD-----YF-	430
DAA05857.1	QPFI--ID-----YPDLLSKS-DGQM-----ITYNTPQIT-PD----PITI-	975
KAJ6784990.1	QYDIDFKDV-----YPGSMQGA-----FSRGNGGSPVDDHA----EIYY-	945
KAJ6787215.1	NHYF--DV-----YAGYVKSQVPSQIED-----FMGSKDAQK-----YF-	1056
KAJ6784672.1	DDKF--GY-----YEQWVKDGDIDSRIDK----FLNFRDDVK-DAPG----IDFF-	965
KAJ6781350.1	-----DAW-----TDIIND----WKQYRKERP----N----SA----	520
KAJ6786554.1	-----NAW-----KDMVAD----WKRYRAKTS----G----VN----	929
KAJ6785998.1	ELHLDTKKLYCCPEEELKKWKNCWAYGKPGNC-----FDGHCPDMKTVQITDSYFG	777
KAJ6779834.1	-----	532
KAJ6783597.1	-NIY-----CDQY-----ALPRKFT-----EKPKEERCNKLNRD--	493
KAJ6789350.1	-TCQGTMYGYHC-----SDCQWG--GCLDSRRAEDCKSGMYTEKVKCPDTLKY--	476
DAA05857.1	-RIPDG-----WTVTGGHLASPGSGPGSSSGPSSKPAKATSTTSD--	1014
KAJ6784990.1	-DVEGTDKK-----FVIRL-----TNND--	962
KAJ6787215.1	-KCTETGKPNCC-----GSCRYFCEEDDVKNCDRTPGCDS-----NKSGETRID--	1099
KAJ6784672.1	-DCKYT-----WGTK-----EGT--	977
KAJ6781350.1	-----	520
KAJ6786554.1	-----	929

KAJ6785998.1	GGETCGGQLSRVRTFCESDGE-----PLFLPVPLTNLFEHPPDGGVDTDFTLKTDKS	830
KAJ6779834.1	-----	532
KAJ6783597.1	-DVVAA--TYRFPGTWF-----WSEYYILLCPAFLGKI---PKYQ-----FTDLKDL-	534
KAJ6789350.1	----RE--SGVLPPEHYRL-----MSADYHL-----	495
DAA05857.1	----DG--AGYLLPITFYP-----TLSYRI--PSILTPK---PPAP-----T-KLPD--	1049
KAJ6784990.1	----KG--TGTFERVICDLRGIGIGSRELN--PGQ-----VP-----L-VITG--	997
KAJ6787215.1	----CP--TDVVQHEFLDSSRL--HNATFNL-----	1122
KAJ6784672.1	----TS--CAGMPHFWDYNDRS--WTVEFIL-----	1000
KAJ6781350.1	----KE--TGAFSQFISYLI-----	535
KAJ6786554.1	----TG--TALFSEFFANNFN-----	944
KAJ6785998.1	SDHGSDSDPNDAAFQFVVLVSPESLQVSLDKRDGSHWDVFECNDSVSEGEHTVRMVCNDHT	890
KAJ6779834.1	-----	532
KAJ6783597.1	KKEADSYP---LLQTE-INR-W--SGTKRGVTMYEVA-----	565
KAJ6789350.1	---DDIEG---FW-----KE-W--AKNTASMSHGWPLM-----	519
DAA05857.1	---NDEHP---IN-----TP-S--SSTSSGRPGDGGQS-----	1073
KAJ6784990.1	---SKRAG---FR-----SS---L-LVDGKVAGWMQS-----	1019
KAJ6787215.1	---KDHDG---FF-----KA---IGDKYGIDEEWQF-----	1145
KAJ6784672.1	---KDEKG---FY-----DA---LAAQTGIDKDWITF-----	1023
KAJ6781350.1	-----NPDPHCEDILT-----	547
KAJ6786554.1	-----HTQPIDCGDITV-----	956
KAJ6785998.1	ADSNCHKIGLGHGVPGTILQMPKCGCGPKYAVAKS-----MAPAPGK-DHVKLL-PRHLS	943
KAJ6779834.1	-----	532
KAJ6783597.1	-----HLQDVS-----NNPTCDNNE-----LYDPRRI-	587
KAJ6789350.1	-----IDCARKSDFYFHHYP--KVKDDMKVVPNPKDV-	548
DAA05857.1	-SGTPRPPSNGQNPSST-P-KPPGDGPDPIINTQK---PPGDGPDPIINT---QKPPGDG-	1122
KAJ6784990.1	-IKDTIKD-----RRIKDVVLPGTHDSAMSKISHKL-	1049
KAJ6787215.1	-SRKTMHVSNGCQYAGT-----HVKECQDKQDSHYNFPL-ANNDKIHFVNPKDM-	1193
KAJ6784672.1	--GTKEEPYVCADPSGDAP-LRPGGAATPCHRLT-HTLKNYPTKIDDKDIHVGNPKKF-	1078
KAJ6781350.1	-GNCRNTFDCKSFKGDK-----SGPAAAL-	571
KAJ6786554.1	-SSNCRSAVTCDDFTGER-----TGPAAAL-	980
KAJ6785998.1	HLAGLEPVVYELTFDYDFHRVPRDL---GDTQMRIDFSNQEDYWKNI VAGSV---NRKR	996
KAJ6779834.1	-----	532
KAJ6783597.1	----VLKAQGGYDRDYEFHLANAHSWTLSALGMWM-----MKTFNLSDPPMPRGTQIQ	636
KAJ6789350.1	----IGKSYNEALDLLKYFKI-----ARSAII-----YDSLAAEDLLDAISVSFAF	589
DAA05857.1	----PDPSNAHNT-----PASTKRPG-----DNQH-----PTPTPAPIR	1152
KAJ6784990.1	----ITAADSPNTQTQ---GMS---IYN-----QLRLG---ARWF-----DLRVI	1081
KAJ6787215.1	----IDKGYKNMTTTRDDL DL---LLAA---SQYQIG---MAW---DDAADGTDIPAM	1235
KAJ6784672.1	----IEASMTNITALQDSL LS---SYAAVGLGVYSEG-----KTDVSEIDPVTAYAMPVL	1126
KAJ6781350.1	----IWN SLVKVSSTY---A---NHLL-PLL-----PLL-----PLLP-----	598
KAJ6786554.1	----IWN SFVQINEMY---A---SYAD-ALG-----NAAAEKIDPSLD-----	1012
KAJ6785998.1	DVNGRKRLAKRTLEDVGGNPVRWLEEEFRDDFHFDKIASRELQERWFGK-----SILEW	1050
KAJ6779834.1	-----	532
KAJ6783597.1	QRDGDGSGDETGN DIV-----DQN-DDFDPSQID--PTEFFWMSRLGYVPNRLHLY	685
KAJ6789350.1	TYQSAVEK---MDAIV-----KEV-KTIKKN--D--LKE-----FILDF	620
DAA05857.1	D---IDC---KDDSC-----TRG-RDCESD-----D-----CL---	1173
KAJ6784990.1	SVHGTAGM---EGDYE-----	1094
KAJ6787215.1	SVVSAVDN---MKEIR-----DKG-KEIEKK--E--REQ-----FILNM	1266
KAJ6784672.1	QLQQSIDS---MRDIK-----DIG-EKAKEE--K--KKQ-----LIMTI	1157
KAJ6781350.1	-----L-LPLLL--L--PLH-----LLTL-	613
KAJ6786554.1	-----DFQ-----NTF-APTPE--K--DNE-----WLTI L	1033
KAJ6785998.1	--LAALVKPEIRREFT---YKYDSDVTAKLFDESWDPCGSVE---GVNYDGHLLAQAVL	1101
KAJ6779834.1	-----	532
KAJ6783597.1	VTLVVLVIPPFPVKYICAHDYGVNTAVVIAK-----RA---NMNIKANAKHIVVW	732
KAJ6789350.1	ITGVIMLVP-GIGEAL-GPEMA-----ATRS-----FLRLLGDVGDA-GTLIYGVED---	665
DAA05857.1	-----RG-GDCEG---ENCVEGGKCRGKRCISGGNCK-G-----	1202
KAJ6784990.1	-----FYG---AHVND EK---MSACIGNTG---QSLDDIISDINQF	1126
KAJ6787215.1	VLGILFFIP-FVGEAA-GAAGL--TAV--RT---LCRLIGDLGDI-GMTIYGIVEN---	1312
KAJ6784672.1	LTVVFVMLP-FVGEAL-GPIVG---AASSIAR---IALIISEAGNA-AISIKDIVDD---	1205

KAJ6781350.1	-HLLTLH-----L-LPLLS--ASCLALL--LRFFVHSSLTEPSS-----H----	647
KAJ6786554.1	LDLVSMG----TSMVA-GPFFVG---KVI-GK---LPYFVSKIEDAGANALKDKIAS----	1077
KAJ6785998.1	DI-----EVETSFGFTLIVESLTLPLNLDKSYLTF-----YN	1133
KAJ6779834.1	-----	532
KAJ6783597.1	VL-VPQQVVLf-----	742
KAJ6789350.1	----PSSGLMRG-----FGAFAAVGLSRSGI-LK----A----SESRRGMS	698
DAA05857.1	----PK-----CKTGGPCEGENCEKGGG-CAKTLFGDCGSGGCQGARCFS	1242
KAJ6784990.1	TSENPGEVIFFRRLRYMVGIRKVPISLGPiHWGGDDWSNL--YDD--FLGRMQKVHNRCLN	1181
KAJ6787215.1	----PSDAF-----GAIFGALLGRALD-----HV-----QLG	1335
KAJ6784672.1	----PTSA-----PFAMLGFIVGAAGAGAGG--S-----RLT	1231
KAJ6781350.1	----RPPLI-----VLNCADDYATA--EDG--KVLYT-----	671
KAJ6786554.1	----TSSTILTT-----AITIGSGFIDGSTDDWDPE--AED--HFKNTMSLAMTGWN	1121
KAJ6785998.1	KGRVTGVVTLEALARVT-YEKKKVILNLP-----FPGASFKIPGIATIGPQLTVEGSIDA	1187
KAJ6779834.1	-----	532
KAJ6783597.1	-----	742
KAJ6789350.1	DTEIESGE-----VSGDGSRAVLIDPTSCIPASGI-----	728
DAA05857.1	KRDCFGAQ-----CERLTIKPLPKDPKSTPATPPKPT-----	1275
KAJ6784990.1	IDGDFGAKKMGTfMDMNEKGKCVIFLLSPTD--FSGNPYR--PQY-----	1222
KAJ6787215.1	KAAKSGRE-----LKRKGID-----D-----	1351
KAJ6784672.1	KVETLGDA-----AAVRGA-----	1245
KAJ6781350.1	-----	671
KAJ6786554.1	KIATFGLR-----DLFNGSD-----SSLN--TLS-----	1143
KAJ6785998.1	SLGMAGLVETKLEIAKWEVRQVMPSTDDYKPELIDNSSPS--LDRT-----GDFSGIQKP	1240
KAJ6779834.1	-----	532
KAJ6783597.1	-----	742
KAJ6789350.1	-----S-----DPRIAIHI-----NKYIRILSITPDNIF-----P	753
DAA05857.1	----CLVD-----CPKLPECPDWDPLCHDPCFFSAC-----P	1303
KAJ6784990.1	----GLYD-----AGKLVITDDWADTES-----TKDMVNRETKDQDP	1256
KAJ6787215.1	-----LKGIKENVMKLNN-----	1364
KAJ6784672.1	-----LK-AEDLA-----KFPARFRELDQSQQKIVKKF---	1272
KAJ6781350.1	-----	671
KAJ6786554.1	----DLLS-----GGKFAAGKDYGKGSYDQASSKEANKTLEDNLSKTFYAYAIP	1188
KAJ6785998.1	EFYAGVTASGDVTLRLGAAAEF-----GVRFDDKWKVDPAAAAVVEVSLTTKF	1289
KAJ6779834.1	-----	532
KAJ6783597.1	-----	742
KAJ6789350.1	V-----	754
DAA05857.1	VYRRPTG-KACTTLQTARDCTEFVSSTRVKTKPTTSWSTTTRTLCEt-----	1349
KAJ6784990.1	RKFINIH-IAQWLL-----TS-QGIDAVSWDNYYEAMQVN-----	1289
KAJ6787215.1	-----IRGARMCKL-----	1373
KAJ6784672.1	-----EGKACHL-----	1279
KAJ6781350.1	-----	671
KAJ6786554.1	AIWHASG-HRPFIIDTGLSCDKGKA-ED-VKLKGACWKDTWYRLASP-----	1232
KAJ6785998.1	AAGSSTTGTCPFfTYGLDVGARLFARAIAPQVFGWGGGEVDLTAKWEKSIIEGGTCPD LGP	1349
KAJ6779834.1	-----	532
KAJ6783597.1	-----	742
KAJ6789350.1	-----	754
DAA05857.1	-----MVDCEA-----ADITAT-----TTITTTHTPDp	1372
KAJ6784990.1	-----PLIYS-----HGvN-----	1298
KAJ6787215.1	-----	1373
KAJ6784672.1	-----	1279
KAJ6781350.1	-----	671
KAJ6786554.1	-----DGGYQECaK-----NGCDHVPNP	1250
KAJ6785998.1	IPSKRSLQSLDPPSIDGLSEDRHVTRNKSRLGGADLG-----SYSASDVQSMHS----	1398
KAJ6779834.1	-----	532
KAJ6783597.1	-----	742
KAJ6789350.1	-----	754
DAA05857.1	IESV-----GPAVPYYGVSWSFGEKEKS-----SMLADEEAYFSALETpMTTTTTT	1418

KAJ6784990.1	--EMSPTAWPGVLMVDYLGETWYAGHDFAD-TGAELATLAVGLNQY-----MLSENC	1348
KAJ6787215.1	-----	1373
KAJ6784672.1	-----	1279
KAJ6781350.1	-----	671
KAJ6786554.1	CVECDDQFKTPSGVDKLGSDYFSQVSVHD-LIV--GYVRTGTPNFFSTTTSRKLTAKCR	1307
KAJ6785998.1	-----SEEHTSSPAKRGSLVKRGGVYGPAPFSLPVGEFFCPSK-DGEKGMTC	1443
KAJ6779834.1	-----	532
KAJ6783597.1	-----	742
KAJ6789350.1	-----	754
DAA05857.1	SAEPSTTDDTPTETTADGPTSTVGPNDLVCGFALYAAFYRFDIVKM-VGDWVWDEGHK-	1476
KAJ6784990.1	LSSI-----YPPLLDYPEGYKDKSANKAN--NK-	1374
KAJ6787215.1	-----	1373
KAJ6784672.1	-----	1279
KAJ6781350.1	-----	671
KAJ6786554.1	SVRTWLDNDKENGGSANPNPDTLKSLLQDDVTPGFIRMPVCTADRARIAGWASSDS-	1366
KAJ6785998.1	VQAYDALAESNEGGVWQNMKRKDTLVPTSTIDEN---AVAAHFHDH-----	1486
KAJ6779834.1	-----	532
KAJ6783597.1	-----	742
KAJ6789350.1	-----	754
DAA05857.1	LKKELKGCALTGWKYYRR-----DDG-----SREA	1502
KAJ6784990.1	IA--GADEEQWNGFIFANGTVIDHP---SPDV-----GVYNGPHKD	1410
KAJ6787215.1	-----	1373
KAJ6784672.1	-----	1279
KAJ6781350.1	-----	671
KAJ6786554.1	AK--NYPCNANAGYDYCGDSTIENQTSASPVEDCKEMIRLEDGRLPKRWPHVGPLEK	1424
KAJ6785998.1	-QRSHGYR---RHVRGEELHELE-KRAKEKLIKACERTCDIS-----ADFPGGQ	1531
KAJ6779834.1	-----	532
KAJ6783597.1	-----	742
KAJ6789350.1	-----	754
DAA05857.1	-----RFNLPVFLTAGCVESAIKSAGGPGLS-----CIFA	1532
KAJ6784990.1	-DAIITYYS-----	1418
KAJ6787215.1	-----	1373
KAJ6784672.1	-----	1279
KAJ6781350.1	-----	671
KAJ6786554.1	QQAIATYESCKFGVTGKGIHGNVDFKVGAQDVIDLVRDSIDKFGGGKVGSKGTMSCKGN	1484
KAJ6785998.1	LKGKEWGWATKDCGDFNFGSPLLAREPNTDYHTEHVLEAQMIDLFFQYLNKKKKPQDPK	1591
KAJ6779834.1	-----	532
KAJ6783597.1	-----	742
KAJ6789350.1	-----	754
DAA05857.1	T-----	1533
KAJ6784990.1	-----	1418
KAJ6787215.1	-----	1373
KAJ6784672.1	-----	1279
KAJ6781350.1	-----	671
KAJ6786554.1	IKGQKVNWGLY-----	1495
KAJ6785998.1	PGAAKGDTVSFCDYVNVLWDVPAPFVWPQDMDGGIGKKWDPIMHIAAQFPTKTFNKQEFV	1651
KAJ6779834.1	-----	532
KAJ6783597.1	-----	742
KAJ6789350.1	-----	754
DAA05857.1	-----	1533
KAJ6784990.1	-----	1418
KAJ6787215.1	-----	1373
KAJ6784672.1	-----	1279
KAJ6781350.1	-----	671
KAJ6786554.1	-----	1495
KAJ6785998.1	ALESPINTPSKTRAWASGNPWDSKGWTNDIADYAKSRIILQKLRSTMGSRITYQSDSTISQ	1711
KAJ6779834.1	-----	532



KAJ6783597.1	-----	742
KAJ6789350.1	-----	754
DAA05857.1	-----	1533
KAJ6784990.1	-----	1418
KAJ6787215.1	-----	1373
KAJ6784672.1	-----	1279
KAJ6781350.1	-----	671
KAJ6786554.1	-----	1495
KAJ6785998.1	TMKTQTDRIGVVLDALDTLLKANTPAGYTAWEKQDLKDEWHKYMKGQYTTMQSKTRGLV	1771
KAJ6779834.1	-----	532
KAJ6783597.1	-----	742
KAJ6789350.1	-----	754
DAA05857.1	-----	1533
KAJ6784990.1	-----	1418
KAJ6787215.1	-----	1373
KAJ6784672.1	-----	1279
KAJ6781350.1	-----	671
KAJ6786554.1	-----	1495
KAJ6785998.1	NDWLPLKLLKAWCSQAEKDKWEAKPTDSGTLKTEKEEHRAFIKAIEDFDTKWNGLAVWNNP	1831
KAJ6779834.1	-----	532
KAJ6783597.1	-----	742
KAJ6789350.1	-----	754
DAA05857.1	-----	1533
KAJ6784990.1	-----	1418
KAJ6787215.1	-----	1373
KAJ6784672.1	-----	1279
KAJ6781350.1	-----	671
KAJ6786554.1	-----	1495
KAJ6785998.1	L 1832	
KAJ6779834.1	- 532	
KAJ6783597.1	- 742	
KAJ6789350.1	- 754	
DAA05857.1	- 1533	
KAJ6784990.1	- 1418	
KAJ6787215.1	- 1373	
KAJ6784672.1	- 1279	
KAJ6781350.1	- 671	
KAJ6786554.1	- 1495	

**Fig. S1. Clustal alignment of *A. album* GH18 chitinases.** The alignment of the 26 *A. album* sequences and the three *H. jecorina* sequences (DAA05865, DAA05854, DAA05857) was subdivided for the subgroups A, B and C (see Figure 1) in order to better indicate the specificities of the three subgroups. Boxed sequences correspond to the conserved motif DXXDXDXE, typical of GH18 sequences. Yellow highlighted C's (in the B sequences) correspond to C residues 46, 93, 185 and 214 in hevamine (P23472), a lysozyme/chitinase identified in rubber tree (*Hevea brasiliensis*). Green highlighted sequences in A and C groups indicate the typical extra  $\alpha/\beta$  region of about 70 amino acids described in plant and fungal Class V chitinases (Taira, 2009, Kamerewerd 2011).

## Figure S2

```

KAJ6787877.1 ----- 0
KAJ6782998.1 ----- 0
KFG78085.1 ----- 0
KAJ6788372.1 ----- 0
AGC24356.1 ----- 0
KAJ6789110.1 ----- 0
KAJ6785893.1 -----MMPSKYNALAVLLASSAYARTCLPAYEAQTSYVG-----CYHDPNSPR 43
KAJ6786934.1 ----- 0
KAJ6780833.1 ----- 0
KAJ6787866.1 ----- 0
KAJ6786079.1 ----- 0
KAJ6785739.1 ----- 0
KAJ6782204.1 MTSVAKPGDDGLLPSK-----PKYGSEEDSGDSDIELEELRDEVDAD 42
KFG84234.1 ----- 0
KAJ6788989.1 ----- 0

KAJ6787877.1 -----MRI-VEIASSLGLLLA----- 15
KAJ6782998.1 -----MHL-PLTHSLLALTIV----- 15
KFG78085.1 -----MAAANLNPKKPNSS----- 14
KAJ6788372.1 -----MTSNNAN----- 7
AGC24356.1 ----- 0
KAJ6789110.1 ----- 0
KAJ6785893.1 DLSGPLLTVGKL-----NSPQYCANICGAAGYSYSGVEYTVQCFCGYKIESTSIKADES 97
KAJ6786934.1 ----- 0
KAJ6780833.1 -----MKSPNSYCLAGL----- 13
KAJ6787866.1 -----MVAATKLLSVATAGWAVASAAAA----- 23
KAJ6786079.1 -----MLLPLLAGLALVHPA-V----- 16
KAJ6785739.1 -----MVQKTT-----ITSVAG-ALALFS--- 18
KAJ6782204.1 LLPGTRPGVSKKRHRRTASDHFLARIL---NWRLRKRTVFIVSIVGVLVVLGGLFG--- 96
KFG84234.1 -----MKSLSIFAALLT-AVVDAGLTS--- 22
KAJ6788989.1 -----MKTASFVAALLA-VGTDAAHFG--- 22

KAJ6787877.1 -----THAKPCAGA--ASDLDILAGQHVIYSFPTS- 43
KAJ6782998.1 -----SAASGSVKP--ACDLDILAGQHVIYSWDYTL 44
KFG78085.1 -----SSSDGSDLDPL--WQNLDWAVGQMLIMGWDGTE 45
KAJ6788372.1 -----NGAESADIDPI--YQNLDWAIGQTLIMGWDGTE 38
AGC24356.1 -----MTVGN--DDNLDKEIGQLLMCGFDGLE 25
KAJ6789110.1 -----MV--TPEQRKKVGQLFAVGFDHDTT 22
KAJ6785893.1 QCNADCPADPSKKCGGGMNINIYKINNP-SANPPLSPSPDCTRDPLCSNDVCDTSKSI 156
KAJ6786934.1 -----MAD 3
KAJ6780833.1 -----LLPAAVAGRATSPDVYPT--PQ GK-GE-----GPWAAAY 44
KAJ6787866.1 -----ASDGVITNDTYFYGQSPPVYPS--PEMS-SS-----GAWAEAQ 58
KAJ6786079.1 -----SNQIYFRAEPDAYQNSPEVLPS--PQIS-GQ-----NEWADAF 51
KAJ6785739.1 -----AQGHASAAATASGYDSPA YPA--PYGG-WV-----SEWRDSY 52
KAJ6782204.1 -----WGRYTQTTPDGHSPWPYPC--PRGG-TV-----SQWAEYS 128
KFG84234.1 -----PGHFHKL DARAELATSPPHYPS--PWMNPQA-----PGWEDAY 58
KAJ6788989.1 -----NN--TNSNSTTEQTGPLAHSPPFYPS--P WMDPKA-----PGWEDAY 60

KAJ6787877.1 STPPAQLVQLTKAGLVGGVILFGENVDAKTAAAMD--TLRQAYAASPAPA-LLKKT-TGV 99
KAJ6782998.1 PGPPDELYDLTRAGLVGGVLLYDVHVNKDTPAALA--KLQAAYKASPAHK-LLRKQ-SGR 100
KFG78085.1 VTP--QIKSLIEDHHLGSIILTAKNLKS--AQETA--KL VQEL-----Q-TIAKN-AGH 91
KAJ6788372.1 VTP--QIRTLIEDHHLGSIILTAKNLKS--AQQT A--RLVQEL-----Q-TIAQN-AGH 84
KAJ6789110.1 PTP--GIIDLIEHNHLGSIILFSRNIAT--PKQVQ--KLTHSL-----Q-QIARN-AGH 71
KAJ6785893.1 VNN--DIKSLIQDYGVAIVLFKRNVGS--AAELR--TLCDRL-----Q-QLAKD-AGH 68
KAJ6786934.1 DRAAAIVKVLTLDE-----KANNLASSAS-----GS 182
KAJ6780833.1 LNVEEV LKKLTITE-----KV ELLSGMSIA-----PAM 31
KAJ6787866.1 QSARALVGQMTLDE-----KVNITRGFK-ADN-----ICAGTTGSV 79
KAJ6786079.1 AKAQKLVSQMTLEE-----KVSLTG GADSIDN-----GCSGNVANI 94
KAJ6785739.1 AKAKAMVDQMSLEE-----KVSITGGVD-LKS-----GCSGTIAGI 86
KAJ6782204.1 SKAKKLVD SMTLAE-----KTNITAGTGIFMGKSRLSNQAKASDAAILRCNGNTGSA 104
KFG84234.1 EKAARMVRNMTLAE-----KVNITGTGWAMG-----LAVGNTGPA 164
KAJ6788989.1 KQARDFVSRMTLAE-----KVNLTGTGWMSD-----NCVGNSGAV 94
AKAKAFVSQTLAE-----KVNITGVGWMGE-----KCVGNVGSV 96
: :

KAJ6787877.1 ADA--KFFISTDQ---EGGQVRRMKGEE-----PKL--SPKQMGASADPAAAGKAGG 144
KAJ6782998.1 DTA--LLIMTNEE---GGTVFNGVHDGG-----PAL--SAKQVGASPDPAAGWQAG 145
KFG78085.1 PQ---PLLIADVQ---ENGGVNSLFDED-----YVCQFPSAMGIAATGRVELAYEI-Y 137
KAJ6788372.1 PQ---PLLIADVQ---ENGGVNSLFDED-----YVCQFPSAMGIAAAGSP ELAYEV-T 130
AGC24356.1 KR---PLFIADVQ---ENG VVRLGD-S-----GT YLPGNMALGALGSSSTAARNV-A 115
KAJ6789110.1 EQ---PLFIGIDQ---ENGLVTRISP-P-----VASQQPGPMALGAAGSLDIASQV-A 113
KAJ6785893.1 SKTGLPAYQWQNEALHGVAGSTGVQFQSPLGSNFS AATSFMPILLSAAFDDKMVKDV-A 241

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KAJ6786934.1 PKHGIPSIIRMSD-----GPNVGRGTKFF--NGVPAACFPCGTALGSTFNQELLEKA-G 81  
KAJ6780833.1 PRLNWPGMCLHD-----AGNGVRAAEV--N-----AWPSALHSGASWDRNLTHQR-G 124  
KAJ6787866.1 SRLGFGPMCLSD-----AGNGLRATDFV--S-----SFPSGIHV GASWNKD LAARR-G 139  
KAJ6786079.1 PRLKFGPMCLND-----AGNGVRATDYV--S-----GFASGIVGASWNKVLAKQR-G 131  
KAJ6785739.1 PRVGFPMCLCLED-----GASGIRQADHV--T-----AFPDGITAGATFDKELMYQR-G 149  
KAJ6782204.1 IYAGFPSLALQD-----GPLGIRFADNA--T-----AFPAGITVGASWNKELMFQR-G 209  
KFG84234.1 PRLGLRALCLQD-----GPLGIRLS DYN--S-----AFPAGITAGATWSEHLWRDR-G 139  
KAJ6788989.1 PRMGLKSLCMQD-----GPLGLRFS DYN--S-----AFPVGVTAGASWARHLWRDR-G 141  
: : .:

KAJ6787877.1 AGAAATLKKFNNNAN----LAPVLGV-YREAGDFLDYYGRSFGNSSAAVAAAVPFIKA 198  
KAJ6782998.1 VQAAAAALKRYNFNVD----LAPVLGV-YRDEGNFLDTGNRSYGKTADKVIAATLPFIRA 199  
KFG78085.1 KATASEISACGVNLM-----LGPVLDV-LNNAR-YQPLGVRSTGDDPQEASQYGLAALNG 190  
KAJ6788372.1 KATATEISACGVNLM-----LGPVLDV-LNNAR-YQPLGVRATSDDPQEVSYGLAAMAG 183  
AGC24356.1 MATSKELLTLGMNWN----LAPVLDV-NNNPL-NPVI GVRSYGQDPELVARMGLAQVEG 168  
KAJ6789110.1 GATAEMLGHFGINMN----YAPVVDI-NSEPL-NPVI GVRSPGDDPEKVAQFASACAKG 166  
KAJ6785893.1 TIISTEARAFANHGFAGLDFWTPNINP-FRDPR--WGRGMETPGEDSFRISNYVVS LVDG 298  
KAJ6786934.1 KTMGDEATAKSAHLI-----LGP TIN-MQRSPL--GGRGFESIGEDPFLSGLGAALVRG 133  
KAJ6780833.1 LYMGGEFPGKGINIA-----LGPNAGPLGRTP--GGRNWEFGSVDPYLSGQLNAETITG 177  
KAJ6787866.1 AAMAGEFKKKGVNVL-----LGPVVGPAWRVT--SGRNWEGFSADPYLSGSLAAQSVAG 192  
KAJ6786079.1 VALGGENRRKGVNIM-----LGPVVGPAWTVK--GGRNWEGSSADPYLSGALAAETVVG 184  
KAJ6785739.1 VALGKEARGKGVNIL-----LGP TVGP IGRKPK--GGRNWEFGVDP TLQATGARQT IKG 202  
KAJ6782204.1 QAHGQEAAREKGINVL-----LGPSVGPLGRMPA--GGRNWEYGPDPY LQGIAAAETIRG 262  
KFG84234.1 KALGAESRDKGIDIA-----LGPASGPLGRAPT--GGRNAEGFGSDPY LQKGKLANTVIG 192  
KAJ6788989.1 NAMGSEARDKGVDVI-----LGPASGPLGRLSK--GGRIGEAFGADPY LQGQALANTVTG 194  
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KAJ6787877.1 QQAAG-----VAATA--KHFPGLGAASHDANT-----DTGPVTLEQSLDEIRSIDE 242  
KAJ6782998.1 QRERG-----ILVSI--KHYPGLGAARKDQNT-----DAAPVTLDVSRADLESIDL 243  
KFG78085.1 IRDAG-----IAAAG--KHFP SYGNLDFQGSN-----S-AVPVITQTLEELSLSAL 233  
KAJ6788372.1 IRDAG-----IATCG--KHFP SYGNLDFLGSS-----L-DVP IITQTLEELSLSAL 226  
AGC24356.1 YQRGK-----VATSI--KHFP GHGDTA-TDSH-----L-DVP VINKTLEELDKTEL 210  
KAJ6789110.1 MRENK-----VVP CI--KHFP GHGDTA-VDSH-----Y-GLPSIDKSRAQLDAVEL 208  
KAJ6785893.1 LQGGINPEFHRTISTC--KHFAAYDVESGRTQN-----DIHPTRQDMADYYL 343  
KAJ6786934.1 IQSTG-----VVATI--KHFLCNDQEDKRMGV-----QSVITERALREIYA 172  
KAJ6780833.1 IQKAG-----VIANI--KHFIANEQET YRRPY-----FGVEAASSNVDDKT LHEYYL 222  
KAJ6787866.1 IQQGQ-----VITST--KHFIANEQETNRNP-----QDVQSLSSNIDDKTMH EYL 237  
KAJ6786079.1 VQSQN-----VMTSVKKQHYIGNEQEL YRSLE-----GDIQAISSNIDDKTMH EYL 231  
KAJ6785739.1 IQEQG-----VIATI--KHLVGNEQEMYRMYN-----PFQQA YSSNIDDR TLHEVYL 247  
KAJ6782204.1 IQEGG-----VMATI--KH FVANEQE HFRQP-----WAWGLPHAVSSNVDDRTMH ELYA 309  
KFG84234.1 IQESG-----VIACA--KHFIANEQE HFRQAGESVPRGFNISELSSNVDDKT LHEDYA 244  
KAJ6788989.1 IQGAG-----VVACA--KH YIANEQE HFRQVGESVDRGYDISETLSSNVNDKLMHEYY 246  
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KAJ6787877.1 APYVGAIA-AGVELVM----MSWA--VYPALDG-RPAGLSNKWVQDELGRGLGFTG---V 291  
KAJ6782998.1 RPFQAAIR-AGVDMVM----ASWA--VYPAVDGAWPAGLSSRMKDILRGLGFRG---V 293  
KFG78085.1 VPF RNAIA-TGKLDAM---FVGGCGISNPSMNVG-HACLS DQVVDLLRNELGFKG---V 285  
KAJ6788372.1 VPF RNAVA-SGKLDAM---FVGGCGLSNPSMNVS-HACLS DQVVDMLRNEMGFRG---V 278  
AGC24356.1 VPFKKALE-AGGIACPTSMVGHM--LLPHFNKDVSSIAPEIVRDLRRRFGYKG---V 264  
KAJ6789110.1 IPFKRAAQ-EGIE---MIMTAHI--AMPQLTGS DMPSTLSPQVLSILRDEFKFDG---V 258  
KAJ6785893.1 PMFERCVRDAKVG SVM-----C--AYNSVDGI-PACASSYLLQTVLRDGNWFKEPYNY 393  
KAJ6786934.1 MPQLAVRDANPGA FM-----T--AYNGINGT-FCSENPKYLDGMLRKEWGWGD---L 219  
KAJ6780833.1 WPFMDGVH-AGVGSVM-----C--SYNRINNT-YGCENSKLMNGLLKGE LAFDG---F 268  
KAJ6787866.1 WPFQDAVH-AGSGNIM-----C--SYQRINNS-YGCANSKTLNGLLKSELGFQG---F 283  
KAJ6786079.1 WPFVDLVK-AGTANVM-----C--SYNRLNQT-YACGNSKTLNGLLKTELGFQG---F 277  
KAJ6785739.1 WPF AEGIH-AGVGAVM-----T--AYNAVNGS-AC SQNPYLNGILKDELGFQG---F 293  
KAJ6782204.1 WPFANAVK-AGVASVM-----C--SYNMVNNS-YACGNSKLLNGLKDELGFQG---F 355  
KFG84234.1 WPFADAIR-AGVGSIM-----C--SYNQINNS-YACQNSKLLNGLKDEM GFQG---F 290  
KAJ6788989.1 WPFQDAVK-AGVGSIM-----C--SYNQVNNS-YACQNSKLLNGLKHE YGFQG---F 292  
: . : \* :

KAJ6787877.1 TITDAMEAGSLKG----FGGAEETAKLAAAAGMDLLASGRNVTOG--DTIRKAVVSGIQ 345  
KAJ6782998.1 TITEAMEAGSILP----FGDVEERTKIAVRAGNDLILASGLNVTEG--EVIRKALVEGLK 347  
KFG78085.1 AISECLEMEALSH----DLGVQNGVVMAVEAGCDLVLLCRAYDVQL--EAI-KGLKLGYE 338  
KAJ6788372.1 AISECLEMEALSH----DLGVQNGVVMAVEAGCDLVLLCRAYDIQL--EAI-KGLQLGLE 331  
AGC24356.1 IITDCELEMDAVKE----TVGT PKGALMALQAGNDMAMISHTLAFQK--DAF-KVLYSALQ 317  
KAJ6789110.1 IMTDCLEMDGIRA----TYGTVEGALLAFQAGVDNVMICHTYDVQT--AAV-DRICAALE 311  
KAJ6785893.1 VVSDCDVDNIFDPHHYAKDRVEASALGINAGTDLDCGD-----TY--TNLNQGV R 442  
KAJ6786934.1 IMSDWYGTYSTND-----AVKAGLDLEMPGPS-----RFRGEALQFNAS 258  
KAJ6780833.1 VMLDWN AQHNL-N-----SANAGLDM LMPMG-----GNWQNL TNAVR 305  
KAJ6787866.1 VVSDWGAQHTGHA-----GALAGMDMAMPNP-----GSFWGDEL VKSVK 322  
KAJ6786079.1 VVSDWGAQH AL-T-----DAPNGLDMGMPNS-----DPYWGAA LVNAV K 315  
KAJ6785739.1 VMSDWLGHMSGVE-----SALAGLDM DMPGDTQVPLLGYSYWMFELTRSA L 339  
KAJ6782204.1 VMSDWLAQQSGVA-----SALAGLDM SMPGDGLGWT DGESLWGFQLSRAVL 401  
KFG84234.1 VMSDWQAQHGGAA-----TAVAGLDM SMPGDTE-FNTGYSFWGGNLT LAVI 335  
KAJ6788989.1 VMSDWQAQHS GVS-----NAVAGMDMAMPGDTI-FNTGRSYWGGNLT LAVL 337  
: : \* \* :

KAJ6787877.1 SGRLSRAQFDEATKRIAAMRSKL-----WA----- 370  
KAJ6782998.1 RGLGRDEFQATERIALRKV----- 369  
KFG78085.1 NGIITKDRIFTSIRRVQHLKSTCT-----SWAKALN-----P 370  
KAJ6788372.1 NGIITKERIFTSIRRVLHLKASCT-----SWSKALN-----P 363  
AGC24356.1 EGQLDKDEIRQSLQ RVAQLKDQFL-----NWDDVLQ-----Q 349  
KAJ6789110.1 KDEISQTRIDESLARLSK LKAKFT-----NWDRALQ-----T 343  
KAJ6785893.1 SKLTTEATLDKSLGRLYSALIKVGYFNPP----AQYNR----- 476  
KAJ6786934.1 TGKPFIIHIDE---RVRAVLKLVKKVSSL--PIE-----EN----- 289  
KAJ6780833.1 NGTVAEARVSDMATRIVASWYLVGQD--N-FPVPGIGMK-----NLT 344  
KAJ6787866.1 NGSVPESRINDMATRILTTWYQFKQD-EH-FPNPGVGMP-----K DVT 363  
KAJ6786079.1 SSVVPESRVTDAMRIIASWYQLKQDDPS-FPAPGIGMP-----GNLT 357  
KAJ6785739.1 NGSVPMTRLNDMATRIVATWYHMGQDQGF---PATNFHYNTRDEKGPLYPAAWPESPTT 395  
KAJ6782204.1 NGSPLVSRLLDDMTARIVASWYQLGQDDKSRFDRKGPNFSSWTNDKMGYINDGTSSSRQEKV 461  
KFG84234.1 NGTVPAYRIDDMMAMRIMASFFKVGMPKPGK---QVPTSFSWTRDTFGYRQAAAKENWEQV 392  
KAJ6788989.1 NGTVPAYRVDDMMAMRIMASL FKVGNVET---AKDTNFFSWSRNTYD YRHAAAKESMEQV 394

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KAJ6787877.1 ----- 370  
KAJ6782998.1 ----- 369  
KFG78085.1 PGISLLSQLHPSHVSLSRRAYDESITVIRDKEKMLPLASSMHPGE----- 415  
KAJ6788372.1 PGISLLSQLHPSHLALSRRAFDESITVIRDKEQLLPLARSMHPGE----- 408  
AGC24356.1 ADLKTMGSE--AHATLSKELYDRVPTVVTNRKNTLPIRPAQTDK----- 391  
KAJ6789110.1 STDAALDDINARGAKLAHKAYADAATVVRIDDKILPLSTSASTV----- 387  
KAJ6785893.1 --LGWADVNTTEAQTLAYNAAVKGMTLLKN-DGTLPLSK----- 512  
KAJ6786934.1 --GPENTRDTPETAAALLRKIGNESIVLLKNDNDNLPFTKEKKTIVLGPNAKEATYHGGGS 347  
KAJ6780833.1 EPHLEVDARNPESKPILMGAI TGHVLLKNTNNTLPFKGKQK----- 386  
KAJ6787866.1 KPHKIVDGRDPAAPVLLDGA VEGHVLVKNKTSTLPLRQ-PK----- 404  
KAJ6786079.1 VPHRIIEGRDPADLPVILQGAIESHVLVKNKSTLPLQS-PK----- 398  
KAJ6785739.1 VINENIDVRADH-DIVARQAQDAITLLKNDAGLLPLSE-ER----- 435  
KAJ6782204.1 EVNQYVNAQHNH-SILAREVA VEGTVLLKN-SGILPLTR-SGPRTR-----TKHKEGK 511  
KFG84234.1 --NFQVDVVRGDH-AAHIRE SAAKGTVILKN-TGSLPLNK-PK----- 429  
KAJ6788989.1 --NFQVDVRANH-ANHIRE SGA KGTVILKN-NGALPLNK-PK----- 431

KAJ6787877.1 ----- 370  
KAJ6782998.1 ----- 369  
KFG78085.1 ELLLLTPLVKPLPAS-----AMTKS----- 435  
KAJ6788372.1 ELLLLTPLVKPLPAS-----SLTKS----- 428  
AGC24356.1 -ILFLAA-----HV-----PQTL----- 403  
KAJ6789110.1 -FVSPGP-----DF-----PVGGG----- 400  
KAJ6785893.1 -FLSNVAIIGPWANVTDKMQGNYAGTAPLL-----VNPLDVFQKRWQN 554  
KAJ6786934.1 AALRAYYAVTPYEGI-----GEKLGTPFTTVGAYTHRFLPILGNQLTDPNGKQGMWRV 402  
KAJ6780833.1 -ML-----SVF-----GYDAALPETKNTD-----ILFQL 409  
KAJ6787866.1 -MV-----SLF-----GYSAKSPDFPAGGNLQL-----LQWQL 432  
KAJ6786079.1 -KV-----SIF-----GYSASTPPKWT AQDDT-D-----GTWRF 425  
KAJ6785739.1 -SI-----KVF-----GTDAAKNP----- 448  
KAJ6782204.1 VNI-----GIF-----GDDAGP-G----- 524  
KFG84234.1 -FL-----AVI-----GEDAGQNS----- 442  
KAJ6788989.1 -FL-----AVI-----GEDAGPNP----- 444

KAJ6787877.1 ----- 370  
KAJ6782998.1 ----- 369  
KFG78085.1 -----LLESKKTWSQAPTQH-----D 451  
KAJ6788372.1 -----LLDAKNDQSAATGPH-----E 444  
AGC24356.1 -----AVDSE-----KEP----- 411  
KAJ6789110.1 -----AVNSG-----DAAHPTR-----V 413  
KAJ6785893.1 VKYVQG-----AD--IDSGNTG----- 569  
KAJ6786934.1 FNEVPGTADRKLIDELQFTKTEH LVDYSNPNVNDVWYADMEGSLVADEDCTYEIGVVVS 462  
KAJ6780833.1 GYYS-----SQEMAQAVLGTEAHFDQAARG--GTIIS 439  
KAJ6787866.1 GAES-----IDLNEVLAGALGNAANASSIGIN--GTLFG 464  
KAJ6786079.1 GLAP-----V-----FEEDPATSP TGGR--GTMFG 448  
KAJ6785739.1 -----DGNACADRNCNK--GTLGQ 466  
KAJ6782204.1 -----LGNHCADRGCNE--GTLGS 542  
KFG84234.1 -----RGPNGCDDRGCD--GTLAM 460  
KAJ6788989.1 -----KGPNGCADRGCDD--GTLAM 462

KAJ6787877.1 ----- 370  
KAJ6782998.1 ----- 369  
KFG78085.1 SWAHKDRE-----RSAIMSGEGVF----- 470  
KAJ6788372.1 RWAHRRLD-----RTAHMSGEGVFREFGKTLARYNEKLLHTSY----- 483  
AGC24356.1 -----FNSFHASLLK-RHTNLEYIIY----- 431  
KAJ6789110.1 SWV-----SSSFGDEIRK-HCAGAE EIRY----- 436  
KAJ6785893.1 FGAA----- 574  
KAJ6786934.1 GTAKAFVNDQLIVDNATNQVAGDAFFGSATREERG-RVEMKKGETYNFRIEFGSAPTYTL 521  
KAJ6780833.1 GGRAAATAPSYIIDPLNAT-----Q-QRAMEDDTWV----- 469

KAJ6787866.1 GCGSGATTPANAVSPLEAI-----K-ARTYRDGTAL----- 494  
KAJ6786079.1 AGGSGAITPQDSVSPQAF-----V-ARAAKDGFTL----- 478  
KAJ6785739.1 GWGSGTVDYTYLDDPIGAL-----Q-ARVKNVTL-Y----- 495  
KAJ6782204.1 GWGSGAVDFPYLVTPESSL-----S-ATFDLNAVNISSSL----- 576  
KFG84234.1 LWGSGTSQFPYLITPDSAL-----Q-RQAIQDGSRYESVL----- 494  
KAJ6788989.1 LWGSGTSNFPYLITPDSAL-----Q-QQAIKDGSRYESVL----- 496

KAJ6787877.1 ----- 370  
KAJ6782998.1 ----- 369  
KFG78085.1 -----LHENLIARASCIIVTADANRNMYQAGF- 498  
KAJ6788372.1 -----TANGV---RPVHENLINRASCIVIFTADANRNLYQAGF- 518  
AGC24356.1 -----NEET---PDLSQKIQEADWVIIGTANANLYPFQVRM- 464  
KAJ6789110.1 -----TEDPL---TDEQWSKIEGADVLIATRNAREAPYQQKL- 471  
KAJ6785893.1 -----LDAARSSDHIIYLGIDIDIVENEGH----- 599  
KAJ6786934.1 KGDAYVPGHGSRLRVGGCKVIDDQEEIKKSVQLAKEHDQVVICAGLNADWETEGA----- 575  
KAJ6780833.1 -----NWDTKSFDPPVNPA---SNACLVFINAISTEGWDRDGL- 504  
KAJ6787866.1 -----FHDLASPSPVVDPA---SDVCLVLGNAFACEAYDRPAL- 529  
KAJ6786079.1 -----VQDLTSPPQVDPDA---SDVCVVFVGNAREGNDPQL- 513  
KAJ6785739.1 -----NTDSVPSPSLPKPAD---DDIAIVFISSDAGENTYTVEGN 531  
KAJ6782204.1 -----SNKK---PSKDLLQA---MDVCIVFANADAGEGFIRWESV 610  
KFG84234.1 -----SNYQWAATQORVVAQP---NVTAVVFNADSGEGYIEVDGN 531  
KAJ6788989.1 -----SNYAWPATHDLVSQP---NVTAVFANSNAGEGYINVGGN 533

KAJ6787877.1 ----- 370  
KAJ6782998.1 ----- 369  
KFG78085.1 -----TKHVDMMCSMHRSGNKKQLIVVAVSSPYD---FAMDKSIGTYICT 541  
KAJ6788372.1 -----TKHVEMMCSMLRSRGQKKHLIVVAVSSPYD---FAMDKSIGTYICT 561  
AGC24356.1 -----VQ-----QAQKLAKRLVVAVMNPYD---QMCFPQVDTYLVT 498  
KAJ6789110.1 -----GLD-----IAQRRSGKTVISIATCAPYD---FLEEPAIKNVIVV 507  
KAJ6785893.1 ---DRT---SISWPGNQDLISQLSNLKG---PLVIVKFGGGQVDDSSLSNSKVNIVWA 651  
KAJ6786934.1 ---DRA---SMKLPGVLDQLIAEVAAANP---NTVVVMQTGTPEEMP-WLS---QTKAVLQA 624  
KAJ6780833.1 -----HDDFSDGLVRNVASKCA---NTIVVVHAGSIRLVQDQWIEHPNVTAAIIA 550  
KAJ6787866.1 -----QDAYTDDLKVTVAASCA---RTVVVLHAGPRVVDADWIEHDNVTAVIFA 575  
KAJ6786079.1 -----EDAYTDTMINAVADRCA---KTVVVFHAGPRVLDGFFVNHNPNTAVIFG 559  
KAJ6785739.1 HGDRDASKLYAWHNGDQLVQDVAKKYR---NVIVVVHTVGPLVLEKWIELPTVKSVLIA 587  
KAJ6782204.1 AGDRN---DLFLQRRGGDYLVLAEECGGGKGTIVVVHAGVPVVMERWIDHPGIGAVLAA 668  
KFG84234.1 AGDRK---NLTLWKNGGDLIKNVSSICH---NTIVVIHSVGPVLVTDWYQNPNISAIVWA 585  
KAJ6788989.1 EGDRN---NLTLWKNGGDLIRNVSALCR---NTIVVIHSGGPVLLDEISKNEVNTAVIWA 587

KAJ6787877.1 ----- 370  
KAJ6782998.1 ----- 369  
KFG78085.1 FDFTEADAMSALVRVLVGEITPIGSMPTLRKSKKVLK-----SRQHHLV 585  
KAJ6788372.1 FDFTENAMASLVRVLIGEVPVGSPLPGLTLRKSKKVLK-----SRQLWL 605  
AGC24356.1 YEYTPPAHEAAVRILFGEIETRSRLPISIPNVDDAIA-----P-ATFIV 541  
KAJ6789110.1 YEPTLEAFRSAVDIIYGVDTPRGKLPVAEKKV----- 539  
KAJ6785893.1 GYPGQEGGNAVFVLTGAAPPAGRLPITQYPKSYVENNNILDMNLRPSN-----GIPG 704  
KAJ6786934.1 WYGGNETGNCIADTIFGDSNPSSKLSLSFPKR-LQDTPAFNLNR-----TEAGRTLYGE 677  
KAJ6780833.1 HVPQDQSGRAIVKLLYGEADFSGLPYTIAKN-ESDYAVYK-PCGLAHKGDTPQCDYTE 608  
KAJ6787866.1 HLPQDQSGAALVSLLYGDVPSGKLPYTLAKR-DTDYPVLK-PSRPEGRFVNFPQSNFTE 633  
KAJ6786079.1 HLPQQAAGDAIVQLLFGDANPSGKLPYTVAKQ-AADYGPLLDPQASPG--SQSPQAYFPQ 616  
KAJ6785739.1 HLPQQEAGRSLEVLYGDVSPNGHLPYSITHA-EEDMPKSVTDLINFELAGKQADDDYTE 646  
KAJ6782204.1 NLPQQESGNAISTIIIFGDASPSGKLPYTIGKS-LEDYGGGAKVMTYTPN--GLVPQQDFNE 725  
KFG84234.1 GLPGQESGNSITDILYGKTSP-GRSPFTWGP-RESYGTD--VLYKPNNGNGAPQDDFTE 641  
KAJ6788989.1 GQPGQESGNSLTDILYGKTSP-GRTPFTWGAS-EAAYGND--VLYKPNNGKAPQDDFTD 643

KAJ6787877.1 ----- 370  
KAJ6782998.1 ----- 369  
KFG78085.1 EEYDRARDYAGLEDLLKAVHRASAPDLHFLKSTRAASMEHLHPNIKETHFV----- 636  
KAJ6788372.1 EEYDRERDATGLDILLKAIHRSGGSDLDPLANTASAFELFNTNIKEAHYV----- 656  
AGC24356.1 DDYRNDDDLHVMTAMWDDIFG---KDWPLR---KDKINLGLQRAKLQKKH----- 585  
KAJ6789110.1 ----- 539  
KAJ6785893.1 RT---YMWY---T-----GKPILPFGYGLHYTNFSTSWTKPSASYSIQALA--- 745  
KAJ6786934.1 DVYIGYRYEFAD-----REVNFPGHGLSYTTFGFSDLNVNADGKI----- 720  
KAJ6780833.1 GQYLDYRAFDKAKN-----ITPRFEFGYGLSYTTFNYSYLSISAHG----- 648  
KAJ6787866.1 GVFTDYRHFQKQK-----ITPRFEFGYGLSYTTFGLANLQARR-FDNASDALA--- 680  
KAJ6786079.1 GVVTDYKYFEQAH-----IEPRYEFGLSYTRFDYSDIVLGARPNAPTTPPP--- 664  
KAJ6785739.1 GLYIDYRWLNKQK-----IKPRYAFGHGLSYTKFNLSASIKKVTSLTKT-PPARA 696  
KAJ6782204.1 GVVVDYRHFQKFN-----IQPRFEFGYGLSYTTFNYSNLQLTEVKAKSRLAGERPA 776  
KFG84234.1 GSFIDYRHFQKVPAG-KNS---TGAPIYEFHGLSWSTFEYSNLKVEKRDVRP--MSPPNG 696  
KAJ6788989.1 GAFFDYRHFQKESDG-KPGSDPKAPVYEFHGLSWSTFEYSNLQVVKNDPRP--YKPTTG 700

KAJ6787877.1 ----- 370  
KAJ6782998.1 ----- 369

KFG78085.1 -----VRNSSTGALYGVFATYFI----AGVG----- 658  
KAJ6788372.1 -----VRNSSTQALYGVFATYAT----GGVG----- 678  
AGC24356.1 -----VARDSQGKIVGVFATQIVVVDNKKHG----- 611  
KAJ6789110.1 ----- 539  
KAJ6785893.1 ----- 745  
KAJ6786934.1 ----- 720  
KAJ6780833.1 ----- 648  
KAJ6787866.1 ----- 680  
KAJ6786079.1 ----- 664  
KAJ6785739.1 AKSGILDYSQKIPDASEGVAPDGFKKLFRYIYSWVQPNEAADAVK----DAATKKYPYP 751  
KAJ6782204.1 DQANPPDFEDKIPDISEAIFPSEIRKLKKFIYPYITSASDIKPG--VYPY-----P 825  
KFG84234.1 KTIAAPTFGNFSTNLKDYAFPPSIRYIYQFTYPLWNTTASGKEASGDPHYGQTAEQFLPP 756  
KAJ6788989.1 NSIAAPTFGNFSKDIKDYGFPAHFHYVKQFIYPLWNTTSSGKEASGDSSYGKTADEFLPP 760

KAJ6787877.1 ----- 370  
KAJ6782998.1 ----- 369  
KFG78085.1 -----II-----GALLVDPSKRN 672  
KAJ6788372.1 -----IL-----GALFVDPTRKN 692  
AGC24356.1 -----QL-----MLLMVSPSYQ 625  
KAJ6789110.1 ----- 539  
KAJ6785893.1 -----SQAGNDPNNALFAN---LAISVKNTGGEANIASDYVGLLFLSSQNAG- 789  
KAJ6786934.1 -----IAIVTVTNTGS--R-AGSAVAQMYIEPKQAA- 748  
KAJ6780833.1 -----VRKCVSTTLNELWEVVATLEVSITNSG---AVAGHEVAQLYLGIPGA-- 692  
KAJ6787866.1 -----EYPTGAVIPGGHADLWDNLVSVTADVNTGR--NHTGAEVVQLYLGIPIGG- 729  
KAJ6786079.1 -----EYPSGEIVSGGQKDLWEVLATVKCRLVNGG---KVAGAEAVQLYVRFPGM-- 711  
KAJ6785739.1 DGYSTEQKPGPRAGGGEGGNPALWDVAYTSLVKVTNVGN--KYGGKASVQAYLQFPDDA- 808  
KAJ6782204.1 DG-YDVKQPPSAAGGGQGGHPELWETHVSVQADVGNEGA--V-GGKVVAQLYISFPNTK- 880  
KFG84234.1 GATDGSPQRLASSGEPGGRQLWDVVYTVSATITNTGK--R-VSDEIPQLYISLG---- 809  
KAJ6788989.1 NAIDANPQPKHPAGGEPGGRQLFDVIYEVTATITNTGK--T-MTDEVPLQLYLSHG---- 813

KAJ6787877.1 ----- 370  
KAJ6782998.1 ----- 369  
KFG78085.1 SIGRSLHRRALKSLSQQRGLKKVQVGMSPGVFLGIPLDPE-ANTVKEWFSNSGWDTPFP 731  
KAJ6788372.1 SIGRSLHKRALKTLSQQRGIKRVQLGACFPSVFPGIALGVE-AATVTRWFSNSGWDTPFP 751  
AGC24356.1 GVGTLHLDAALEHFR-EQGADCIKLGSTYPRFFPGVPDDDAQSRKAQAFFSKKGWRMD-- 682  
KAJ6789110.1 ----- 539  
KAJ6785893.1 --PS---PRPNKKLVSYGRAQSIQVGSTQQLNL-RI-----NIAELARSDEN-- 830  
KAJ6786934.1 --RI---NRPVKELRGFAKVE-LEAGASKTVTISEL-----EKYAAAYFDEE-- 789  
KAJ6780833.1 -----PPQQLRGFEKLG-LQPRETGKATF-EL-----TKRDLSQWDVV-- 728  
KAJ6787866.1 --GAAAAPPVRQLRGYEKVT-LQPGETKTASF-AL-----SRDLSVWNVE-- 772  
KAJ6786079.1 -----QAKQLRGFEKPT-LKPGESRSVSF-EL-----TRRELSVWNTE-- 747  
KAJ6785739.1 --GY---ETPIIQLRDFEKTKTIAPIGGSETVKL-QL-----TRKDLSVWDTV-- 849  
KAJ6782204.1 --GV---DFPVRALRGFEKVY-LEPGQTKSVQF-NL-----TRRDLSYWDTT-- 920  
KFG84234.1 --GK---NEPVRVLRGFNRIEGIAPGQNVTFRH-EI-----TRREISNWDTA-- 850  
KAJ6788989.1 --GE---GEPVRVLRGFDRIERIAPGASATFRV-EL-----TRRDISNWDN-- 854

KAJ6787877.1 ----- 370  
KAJ6782998.1 ----- 369  
KFG78085.1 RRLTNMIIHNLPNWVAPEGLLQSIQRANISFDLIHGLENAESVLHHVRANANPEVLELYT 791  
KAJ6788372.1 RRLTNMIIADLGNWTAPEGLLPTIQRANISFDLIHGLDNADTVLHHVRTESGPEVVELYR 811  
AGC24356.1 DNLVHDLIGDLQDYKVPDKIQARMLKEKIWFGRIPSETWELYAF--QQRNFPHWLSTYQ 740  
KAJ6789110.1 ----- 539  
KAJ6785893.1 -----GDKYIYP----- 837  
KAJ6786934.1 -----RDQWCVES----- 797  
KAJ6780833.1 -----QQKWLHA----- 736  
KAJ6787866.1 -----RQKWLHP----- 780  
KAJ6786079.1 -----KQMWQLQR----- 755  
KAJ6785739.1 -----KQDWVIPTVD----- 859  
KAJ6782204.1 -----LQNWVMPE----- 928  
KFG84234.1 -----SQNWVITK----- 858  
KAJ6788989.1 -----AQNWVVD----- 862

KAJ6787877.1 ----- 370  
KAJ6782998.1 ----- 369  
KFG78085.1 YA--LSEKTCGIVRAKDPGSGNLIGTVII----CRQGSPLVTYIPPLSD----GEDVG 840  
KAJ6788372.1 YA--LAETKSCGIVRAKDPAGAIMGTIII----CRQGSPLSTYIPALRSR----SENVA 860  
AGC24356.1 HHVELGDYQDLIVARQDDENGRVIASLIL---NTHVS-HEYRSDLIWTDDKLFGRSG 795  
KAJ6789110.1 ----- 539  
KAJ6785893.1 -----GDYTLTLDTTGATAA-----QFKLTGQPAKI--STLPRK----- 869  
KAJ6786934.1 -----GEYDVVISDSSAVTEKALRATINVSESYWWSGI----- 830  
KAJ6780833.1 -----GEYKIYVGASSRDIR--LTGKIVISG----- 760  
KAJ6787866.1 -----GTYTVWVGTSSRNLP--LKQTLKI----- 802  
KAJ6786079.1 -----GDYEIYIGRSSSKLP--LKTYLTI----- 777  
KAJ6785739.1 -----GGYKVVWGEASDNLG--TVCSIDSMK--CQSGAKGPV--Q----- 893

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KAJ6782204.1  -----GQFSIAVGASSRDLP--LTGTW----- 948
KFG84234.1    -----APKKVFVGSSSRNLP--LSADLN----- 879
KAJ6788989.1  -----APKTIWVGSSSRNLP--LSAKLQ----- 883

KAJ6787877.1  ----- 370
KAJ6782998.1  ----- 369
KFG78085.1    GIIAPIVPSTPQATLVLQGLALMGVRQSKGHRASKAVLSWIVDDAFEPLVAMGFDILQAF 900
KAJ6788372.1  GIVAPTVPFGPLSTLVLQGLALMGVRQCKSHKASKAVLSWVIDDTSEPLIGMGFEALQSF 920
AGC24356.1    GMACVGVAQEERGRGIGIGIVAHANWLLKQRGVTKSYYVDWVELDFYS--RVGYKTWRSY 853
KAJ6789110.1  ----- 539
KAJ6785893.1  -----S----- 870
KAJ6786934.1  ----- 830
KAJ6780833.1  ----- 760
KAJ6787866.1  ----- 802
KAJ6786079.1  ----- 777
KAJ6785739.1  ----- 893
KAJ6782204.1  ----- 948
KFG84234.1    ----- 879
KAJ6788989.1  ----- 883

KAJ6787877.1  ----- 370
KAJ6782998.1  ----- 369
KFG78085.1    EEITNSPEV--- 909
KAJ6788372.1  EEITNSPDIFQN 932
AGC24356.1    RLGH-----F-- 858
KAJ6789110.1  ----- 539
KAJ6785893.1  ----- 870
KAJ6786934.1  ----- 830
KAJ6780833.1  ----- 760
KAJ6787866.1  ----- 802
KAJ6786079.1  ----- 777
KAJ6785739.1  ----- 893
KAJ6782204.1  ----- 948
KFG84234.1    ----- 879
KAJ6788989.1  ----- 883

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**Figure S2. Clustal alignment of *A. album* GH3 enzymes.** The twelve sequences were aligned together with the GH3  $\beta$ -N-acetylhexosaminidases identified in *R. miehei* (AGC24356) and *M. anisopliae* (KFG78085) and with one *M. anisopliae* GH3  $\beta$ -glucosidases (KFG84234). Boxed sequences correspond to the conserved motif KHF(I)PGH(L)GXXXXDS(T)H, typical of GH3 sequences.

## Figure S3

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KAJ6780494.1 ----- 0
KAJ6784096.1 -----MAS---TQT---FGGKRAMTAGSVRPTANYEKPra 29
KAJ6785798.1 ----- 0
KAJ6785933.1 ----- 0
KFG80340.1 ----- 0
KAJ6783033.1 ----- 0
KAJ6780076.1 ----- 0
KAJ6789215.1 MYKFVQLFCLFWLFLLTVHALAAGLQDTTTTTTGGIVVARSHAVTVG-FLPVQRFHHLQA 59
KAJ6787434.1 ----- 0
KFG85702.1 ----- 0
KAJ6780083.1 ----- 0

KAJ6780494.1 ----- 0
KAJ6784096.1 RGAEPGARADKES-----ALHLGQQPGAD 53
KAJ6785798.1 ----- 0
KAJ6785933.1 ----- 0
KFG80340.1 ----- 0
KAJ6783033.1 ----- 0
KAJ6780076.1 ----- 0
KAJ6789215.1 RDQAAGSSCSSEGQWNCMTNSWQRCAAGRWS TTQCAKGTTCAPAGLTNEFRIQHDGSVN 119
KAJ6787434.1 ----- 0
KFG85702.1 ----- 0
KAJ6780083.1 ----- 0

KAJ6780494.1 -----MLHQQCATALWASI-----VALSLSAT 22
KAJ6784096.1 GARRPDSEEQEAADAAAANRDLTGPAAPTAHLWHRR---RLCRDRWEFAAQWNEAFF 109
KAJ6785798.1 -----MWSS--- 4
KAJ6785933.1 ----- 0
KFG80340.1 ----- 0
KAJ6783033.1 ----- 0
KAJ6780076.1 ----- 0
KAJ6789215.1 GNGGPPTTSVA-----ASLGTRTWVSKVGTGFLVLGWVFLRIKFAIHSK 163
KAJ6787434.1 ----- 0
KFG85702.1 ----- 0
KAJ6780083.1 ----- 0

KAJ6780494.1 ASPI-----V-----GS-----SADAAQIDLNGAADSK---SNLPAVWPPPQKISGS 61
KAJ6784096.1 ESDKMHAMVDKIKEIIQELTQDLNRNGLSQI--VLSTLACQGA---ASLIGIPTADYTT 164
KAJ6785798.1 -----FNL--LSGLLLLDVAL---AHLPGIPTVPFKG 31
KAJ6785933.1 ----- 0
KFG80340.1 -----MR-----FYTSALLAALATVELTSAVTVKVNPLPAPQDVTWG 37
KAJ6783033.1 -----MRS---QSLSSALLIWL-AAATGLGAAVKVNPLPAPQEITWG 38
KAJ6780076.1 -----MRL---IVF--STLLA--AA--TALWPVPKELQTG 26
KAJ6789215.1 ESSL---GLPSVDVVFYCFRK--ARSGMHLRIVFVVVASAQ--LA--AALWPVPKHLSTG 214
KAJ6787434.1 -----MLSKFLALLALAAIG--QV--NAIWPIPSSLSTG 30
KFG85702.1 -----MLNNAIIAVALAALR--PV--DAIWPVPQQISTG 31
KAJ6780083.1 -----MRLHSY--LAVALAAS--PV--AALWPIPIDISTG 29

KAJ6780494.1 GDCAV----R--L-----SSEVTIVTGNATDG----PTIKVIQ 89
KAJ6784096.1 TECK-----RF-----DLRQVSGIVVDAQHASARDTQGATLIP 197
KAJ6785798.1 DGKK-----TF-----KLDVAVQTVIDSKYTKTTDKSGLTLIP 64
KAJ6785933.1 -----MSLIP 5
KFG80340.1 DSGP-----KHVGW-----LNL--RTNSN-RKSESNTQLVSEAWNRAKAITSLRWVP 82
KAJ6783033.1 ESGA-----IPVGY-----LTL--RTVNADWSTNDNVRIVNDAWNRAFKAITTIRWVP 84
KAJ6780076.1 NETVWIGQDIQVSYRHGNNCYVDFGKNADDSHDEITVRAVVRGAIARALSTVFDEGLIP 86
KAJ6789215.1 QTILEIGTALKITYNGGSLAWNQAQVDSQ-----NLNDTNIVQGGIARAYNAIESGFVP 269
KAJ6787434.1 SDVLFISQDIQVTFNGGALSASS-----GGGRSTIPDAVARTLDTILKKGFTP 80
KFG85702.1 QDVLFDVKSQVITYNGEPVSYDGRTGETK---ESPSSSSQVVHDAVARSLTAIFEHGLVP 88
KAJ6780083.1 NKTLYIDKTINITYNGEPLQYTTGYNPPA---GSSFTSKSIVQGALARSLKAIFDDGYVP 86

KAJ6780494.1 AIVAAAGGKATVSPYASGAGAQIF-----VGTDSENRA-----AADAAKALT 131
KAJ6784096.1 PTLQEFAT--TFA-----SDLASSIGIKTNVEVAAAPRDQ---CIYI-TLDP-QGNY 242

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KAJ6785798.1 PTLHEFGA--TFA-----QDLQEVFNKTVTAKDGDKRESN---TIFL-TIDS-DHEF 109  
KAJ6785933.1 ----QPQS---VTPKEG-I-----VE-----LASLDQIV--- 26  
KFG80340.1 QAIEQPIP--KFEPFPT-AGSNDSSSS-----AKSKRNTGGSWLNEVNVQVSDW 128  
KAJ6783033.1 QAVEQPIP--KFDPFPG-KNSTSNSKRADAQADAQAGDASASNNWGSRWLNEITVKVDDW 141  
KAJ6780076.1 WKLVP RNELPNHEPSAD-AT-KTYIRKLSIV---QTAVA-----ND----- 122  
KAJ6789215.1 YMLNPPGS--DFEPSRA-QI-QGQIKVLVIS---NVRK----- 300  
KAJ6787434.1 WMLREANS--DYEPATG-SG-KGKVKSLALK---RAGKE-----AGGSSSS 119  
KFG85702.1 WMLNPPGS--DFEPALD-DG-AAKVTSLTIK---QTGED-----NATV--- 124  
KAJ6780083.1 WMLHKPGS--HFEPRCG-PNNKNHVRSLTIT---QTGTD-----DAST--- 123

KAJ6780494.1 GDSAKSLTAEGYVLGSGKYNGHPTIVLNGVDTRGTFYAAQTLRQLVGGK----- 180  
KAJ6784096.1 TDAAGRFTHEGYSLTNNSS---GVFIAGASPLGAWWATRTVLQQAIRSQ-----TKNV 293  
KAJ6785798.1 LDAAGRSTTEGYTIVAEED---GVTIRGASSLGAWWGTRTLLQQAILGD-----K 156  
KAJ6785933.1 SSLDPTLHPEGYTIDISAA--Q-GVQIKGGS DAGLFYAKQTLRQLIPPSALRSGARGPWR 83  
KFG80340.1 SADLKHGVDES YTLTVSAS--SSTVEIAAKTVWGALHAFTTFQQLVIFEG-----GSL 179  
KAJ6783033.1 SADLKHGVDES YTVDTISS--SSQVQVTAKTAWGALHAFTTLQQMVISDG-----RGGL 193  
KAJ6780076.1 -SSLIGPSNESYSLHIETD--G-TASITAVAPSGILRALQTFTQLFYLHS---TKQGSY 174  
KAJ6789215.1 -----NSESYSLVHDGS---NAVINAESTIAVLRALETFTQLFNQHS---SGSYWY 346  
KAJ6787434.1 SRLDFAEMDES YTLDLSSS--G-DATIAANSTVGLLRGLETFTQLFYKHS---SGAAVY 172  
KFG85702.1 FKPLAGQVDES YSLHLEAN--G-EASIEAVTSTGLVRGLESFTQLFFKHS---SGDAFY 177  
KAJ6780083.1 FKPLAGQRDES YALNVTFD--G-LASIRANSSIGVMRGLETFSQLFFKHS---SGGAWY 176  
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KAJ6780494.1 RGVPGVKVRDWPLMPVRGSIEGFYGI PWSHQARMDQYVFGQHKNMNTYVYTPKGD PY--- 237  
KAJ6784096.1 TALPYGHRDAPGWMRGMMMLDAGRHWY PKEFLVEMCGYMSYFKQNTFHVHLSDNLVTD 353  
KAJ6785798.1 SAVPVGGQDDAPGWSTRGMMMLDCGRHFY PKQFLIDMCYSISFFKQNTFHIHLSDNITVPT 216  
KAJ6785933.1 LPAQTISDAPSSGLRWGCM LDVARHFMPVSDVLHFIDVLA FHKLNTFHFH LTTDDQGWRI 143  
KFG80340.1 IVEQPVTIKDHPNYPYRGVMVD TGRNFTSANKIKEQIDGLALSKMNILHWHITDTQSWPI 239  
KAJ6783033.1 IVEQPVKIKDHPNYPYRGVMVDSGRNFTSVNKLREQIDGLALSKMNILHWHITDDQSWPI 253  
KAJ6780076.1 TRLAPIHITDAPQFSHRGINLDVARNFY PVKDVLRTIDALAWNKFNVLHLMTDSQSWPM 234  
KAJ6789215.1 TTLAPVAIEDSPTFPHRGLIFDVSRERYSVDDVKHTIDALAMAKLNKLHLSVNTQSWQV 406  
KAJ6787434.1 TDMAPVSIRDAPVMPYRALLIDVARHWYEVADIKRTIDGLAMNKLNVLHLHITDTQSWPL 232  
KFG85702.1 TQQAPVSIQDAPRFP HRGLVL DLSRHWFAVDDIKRTIDGLAMNKMNVILH LITNTQSWPL 237  
KAJ6780083.1 TTQAPVRIADAPKFPHRGMMMLDVSRHWF AVADIKRTIDGLSMAMNVLHLHITDTQSWPL 236  
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KAJ6780494.1 LRATWRELYGGEDLDK LKELIETANANHVDFTYALSPGLDICYTSGADFNATVAKFEQLR 297  
KAJ6784096.1 YYSYEQAMALEANFRLF---SESG---ALQ-----GLSSPRDV---AYTRADFDEVQ 396  
KAJ6785798.1 YTPD-NYNETYARFRLW---SDSS---EVS-----GLNKHANE---SYTKDDFEDIQ 258  
KAJ6785933.1 DVPQWPRLAEVASSRKR---SMQGTRHDCS-----FDARPHGG---FYTADDLREIV 189  
KFG80340.1 HLEAYPQVT-KD-----AYS GRE---SYSAKDVQDII 267  
KAJ6783033.1 HIDAFPEFT-KD-----AYSERE---IYSANDVADVI 281  
KAJ6780076.1 EIPSLPDLAGKG-----AYYAGM---SYTPTDIETIQ 263  
KAJ6789215.1 EIPSFPPELTEKG-----TFYSGQ---YYSVDDLHDLY 435  
KAJ6787434.1 EIPALPLLAEKH-----RYAKGL---TYS PADLEIDIQ 261  
KFG85702.1 EIPALPKLAEGK-----RYAPGL---TYS PQAIQEIQ 266  
KAJ6780083.1 EIPALPLLAERH-----AYSKGL---TYS PADIADLH 265  
: . :

KAJ6780494.1 KLGVS SFYIALDDIPELFHCDSDKQKYPNTGNY---HWL-----ADAHAFY 340  
KAJ6784096.1 QKCAARGVTVMPEIEAPGHALRIVQWK PQLG-----FHKDPSL 434  
KAJ6785798.1 TKCAQRGVTI IPEIEAPGHCLPIVQWRPQIG-----YQGDLSL 296  
KAJ6785933.1 AFAAERHVTVVPEVNM PGHMQAAIAAYPELGNTDVEGRSPDAGVWDSWGI---SPR--V 243  
KFG80340.1 SYARARGVRV IPEIDMPGHSASGWQQIDKDIVTCQNSWWS---NDNWPLHTAVQPNPGQ 323  
KAJ6783033.1 SYARARGVRV IPEIDMPGHSASGWQQIDKDII TCENSWWS---NDNWPLHTAVQPNPGQ 337  
KAJ6780076.1 KYALHRGVT VHIEFDMPGHTTAVSWGYPELVAAAE AQPR-----G-RYCAEPPCGT 313  
KAJ6789215.1 TYAVSRGVEIVMGIDMPGHSN-IQH IY PDLGVAYMAHPW-----N-TYCSEPPCGS 484  
KAJ6787434.1 EYGAARGVQVILEIDMPGHVG-IERAYPGLSNAFAAQPW-----G-TYCAEPPCGS 310  
KFG85702.1 EYGVARGVQV LLEIDMPGHVG-IDKAYPGLSVAYNEKPY-----D-KYCAQPPCGA 315  
KAJ6780083.1 EYGIHRGVQVILEIDMPGHVG-IERAYPGLSVAYNKR PY-----G-QYCAQPPCGS 314  
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KAJ6780494.1 LNRVQKEYIKAHEGLT-DL-ETVP--TNYAGSAPDPYKSEFGKQLDKNIRVQ----- 388  
KAJ6784096.1 LNISHPETIPTMKSIWQEFLPW FH---TKLVSIGADEYHGPV-ADYNR----- 478  
KAJ6785798.1 LNISHPD TIPTMKTIWKEFLPW FH---TSVVSIGADEYKGP E-EDYKR----- 340  
KAJ6785933.1 LNV-SDKTLD FCRSVLDLVC DIFP--SETV CIGGDECPYDE-WKASPSVQARMKELGIKT 299  
KFG80340.1 LDVMNPKTYQVVG NVYSEL SKKFS--DDFFHVG GDELQIGC-FNFSK GIRDWFAADPKRT 380  
KAJ6783033.1 LDVLNPKTYKTVEKVYAE LSHRFS--DDFFHVG GDELQIGC-FNFSKPIRDWFAEDSSRT 394

KAJ6780076.1 LQLNNPAVDDFLDTLFDVMPRVKSYAAFFHTGGDEVNAQA-YTLDPTMQT----NDRSK 368  
 KAJ6789215.1 YRLNNTGVDRFLEKLFEDLLPRIAPYASHFHTGGDEYNANN-CALDPDIRS----GEMSV 539  
 KAJ6787434.1 LKLNNTDVYKFLDTLFDLLPRTAPYSSYFHTGGDEYKASN-SLLDPALRT----DDTSV 365  
 KFG85702.1 LKLNNTDVENFISTLFDLLPRLSPYSAYFHTGGDEYKATN-SLLDPDLQT----DNMTL 370  
 KAJ6780083.1 LRLGNKKVEEFLDTLFDLLPRLSPYTAYFHTGGDEYKANN-SLLDSDLQT----NDPAI 369  
 : . \* .  
  
 KAJ6780494.1 -WTGEGVFSDKITVDSVVRADSTYVTDKLFIVDNFPVN-DNKPFR-----F 433  
 KAJ6784096.1 -----FVNTMND-FIR-----EQSNKTMISIWGTFPPK-YDGTYNINQNVAIQHWEFFE 525  
 KAJ6785798.1 -----FVNEMSA-FMN-----EEASKSIRIWGTFPAVKHAGSPTTIDSNITIQHWAYLF 388  
 KAJ6785933.1 ESALQGWFTDRMA-----AHLATRGKRAYGWDEVIEG-YTGP---TEKILVAAWRG-- 346  
 KFG80340.1 YFDLNLQYWDHAYPLFMSEENSGKKDRRLIMWEDVVLS-PDAHAHNVS KSVIMQSWNNG- 438  
 KAJ6783033.1 YFDLNLQHWIDTSMPIFTSEKNTGKKNRRLIMWEDVVLS-PDAAAHNVSKDVIMQSWNNG- 452  
 KAJ6780076.1 IRAQIQKMVDRNH-----AHVRKAGLTPIVWEEMLLE-WNLT--L-PLDVVVQTVRG-- 416  
 KAJ6789215.1 VQPLMQKFVQNVH-----KIIRKRGTPVWVEETINV-WNVT--L-PKDTLVQSWRG-- 587  
 KAJ6787434.1 LKPLLHAFLOHVVH-----GKIRQHGMTPFVWEEMVQG-WGAP--LPTNDTIIQTWFG-- 414  
 KFG85702.1 LQPLLQRFDLHAH-----NNIRGHGLVPIVWEEMVEE-WAAD--V-GNDTVVQAWLG-- 418  
 KAJ6780083.1 LQPLLQRFDLHAH-----GKIRELGLVPMVWEEMINE-WNAT--V-GKDVVVQSWFG-- 417  
 : \*  
  
 KAJ6780494.1 LNPLTERATDLYKHMIGFTSNPMVQSYASMIALGNYGD----- 471  
 KAJ6784096.1 DKPLTDYIQNNYSVINSDDTY-----YVVKYSESYPALPLDKTFSADPSVPGGGP--- 577  
 KAJ6785798.1 DNPYEDYIKNNYSVINSDEMY-----YIVMKDG-PYGRKINTDITFTGN--PDGHGP-- 437  
 KAJ6785933.1 PGPTAIAARRGFDVVTCPDVN-----AYLDYRQSD-----D-----PGEPTPVGI----- 386  
 KFG80340.1 VANIDKLTAKAGYDIVSSADF-----MYLDCGNGGYVTNDPRYNAPQSNPDATGATFSFN 493  
 KAJ6783033.1 ITNIGKLTQGYDIVSSADF-----LYLDCGFGGYVTNDPRYNV-QENPDPTGATPSFN 506  
 KAJ6780076.1 DAAIAETVKQGYKALVGNKAS-----WYLNCGMGSWYNAAN-----GAEFK 457  
 KAJ6789215.1 GAT-PSLAKAGYKVIDSSSY-----YYLNCGRGAFVDYQD-----GSSLQ 627  
 KAJ6787434.1 AESVQKYARAGYRVIDTSYDA-----YYLDCGRGSWVDYAD-----SAV-S 454  
 KFG85702.1 SASVAKLAAAGHKVIDSTFDI-----YYLDCGRGQWLDFKD-----GPSLD 459  
 KAJ6780083.1 QDKVKELAEAGHKVIVSSSDS-----YYLDCGRGEFIDYEN-----GPDFQ 458  
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 KAJ6780494.1 -----YSWNSPAYNPQDSWAAVI-----QELAGKDQGIHSALLA----FADINQ 511  
 KAJ6784096.1 -----WYPHVFNAKKA-----SDNPQRSEPRVLGSIVPLWNDFGQONATVASEAYY 622  
 KAJ6785798.1 -----WYPNIFNLNSNP-----NSNPSKNNKLIQGAISPLWNHDGANTSVYSEAYY 482  
 KAJ6785933.1 -----LLTLENVYSFEPVPAGLTPEE-ARHIVGAQVNVVVEHMESARRVQ--YM 432  
 KFG80340.1 YGGPGGSWCAPYKTWQRIYDYDFTA-NLTSQ-AKHIIIGAAAPLWSEQVDDA-VIS--SK 548  
 KAJ6783033.1 YGGIGGSWCAPYKTWQRIYDYDFTQ-GLSEAQ-AKHIIIGASAPLWSEQVDDT-IIS--GK 561  
 KAJ6780076.1 QQYPFNDYCSFVKNWRLVYAFDPLA-GVPANL-TDLVLGGEVHLWSEQADGV-NVD--GL 512  
 KAJ6789215.1 NAYPFTDWCAPAKNWRVVMHTPTD-GVDARH-AQNVVVGGEVAIFSETVDAA-SLD--VI 682  
 KAJ6787434.1 PGTTFNWSCDPFKNWHIVYNHDPFA-GLEGSAAAKKVVGGEVALWSETIDGA-TFD--QI 510  
 KFG85702.1 AAYPFADYCSPTKNWRLIYSHDPVE-NMTAEA-AANVIGGEVAVWTEMIDPV-SLD--TL 514  
 KAJ6780083.1 GAYPFTDWCAPTKNWRLIYAQDPRA-GVSEEA-AENVIGGELPLWTETIDTT-SLD--SI 513  
 . : \* :  
  
 KAJ6780494.1 NWPYRNNTESAPQLSKDIDAFWAARKSSQKQSDSALASRLTLIA-SIPDLLPG----- 563  
 KAJ6784096.1 AWREG-----LPAVADKQWGGTLNRAQFDVFPQVQPYAPGQNLDRAPSPAGETIL 674  
 KAJ6785798.1 AWRDG-----IPALADKHGNGNLTDQDQYSNWFSKLLAKIPAQTLERRIPSNQ-NTIF 533  
 KAJ6785933.1 VYPR-----ACAFAEVAWGKTKEHGSF---EDFRKRLEDKHLARLD-----AL 472  
 KFG80340.1 MWPR-----AAALAEVLWSGNKDPKTGLKRTTYLTQRILN----- 583  
 KAJ6783033.1 MWPR-----AAALGELTWSGNKDPKTGKKRTTFTQRIILN----- 596  
 KAJ6780076.1 LWPR-----AAAAAEVLWSGRHDAGGQNRSQVDAAPRLAE----- 547  
 KAJ6789215.1 LWPR-----AAAAGEIWWSGRKDENGTDRSVWHARPRLSE----- 717  
 KAJ6787434.1 AWPR-----ASAGGEIWWSGRKDASGNLRSQYHARPRLAE----- 545  
 KFG85702.1 AWPR-----AAAAGEAWWSGRKDEGNLRSVFTARPRLEE----- 549  
 KAJ6780083.1 VWPR-----AAAAGESWWSGRYDADGKNRSMYDARPRLSE----- 548  
 : : \*  
  
 KAJ6780494.1 -MAMKPF----AADVAPWSTVAMQWAKASQHMISMIAAIDAGDKST-ADSEY----- 609  
 KAJ6784096.1 QYNFASIPGHVVKDASGNHDAKTTCTMDRTALAIRPGCDVTLFPGAKGRDYTLSTLVKL 734  
 KAJ6785798.1 SYDLRKVKGDSVADKSGNKYDAKTTCKGADDGIAMSTDCDITPWSKGRNYKLSLTLNM 593  
 KAJ6785933.1 HVNYRP---QTGPRPWDGRPDAGPYQPSREHR-----LAEIEKM-----TAELRL 514  
 KFG80340.1 ---FRE---YLVANGIGAAPLVPKYCLQHPH-----ACDLYYN-----QTAVQ- 620  
 KAJ6783033.1 ---FRE---YLVANGIGATPLVPKYCFQHPH-----ACDLYYD-----QEAVK- 633  
 KAJ6780076.1 ---MRE---RMVLGGVQAGPVQMFCTQKDAR-----ECIF----- 577  
 KAJ6789215.1 ---MRH---RMLARGVKGATVTHTWCEQHAE-----ECTSGYS-----G----- 751  
 KAJ6787434.1 ---MRE---RMLARGIVGGTIAPGFCLQSELG-----ACV----- 574  
 KFG85702.1 ---MRE---RMLARGVRGAVISQLFCGQSPLE-----DCAA----- 579

KAJ6780083.1	---MRE---RMLARGVRGAPITQLWCDQADTI-----DCSSE-----	579
KAJ6780494.1	-----NAAQEWVEKTKAKTVSSLRDD	630
KAJ6784096.1	DQDMRGQNATILTGTDSALLLTPTLTLYASNYYPLNLTIPVNRWVDI-----	TIRGK 787
KAJ6785798.1	DKLTDETNTTLVAGSDSTLMLTPNVTLFASGIYYRLNKTIPLQSWVRL-----	EINGD 646
KAJ6785933.1	-----	514
KFG80340.1	-----	620
KAJ6783033.1	-----	633
KAJ6780076.1	-----	577
KAJ6789215.1	-----	751
KAJ6787434.1	-----	574
KFG85702.1	-----	579
KAJ6780083.1	-----	579
KAJ6780494.1	GKVVPNSITPTTGDGVFDAFIANATALYNDQ-----	661
KAJ6784096.1	GNQTFGAMKPA--GGFFEEEFQTMGI VGKRLHWDTI AVEAPLGKLG GFTGMLRNLT LT	845
KAJ6785798.1	GPKTFASAFNEKGDII FSKEEFLEMSY YGQPLRWHEMAIEAPIHQITGWQGKVRDFTLT	706
KAJ6785933.1	-----	514
KFG80340.1	-----	620
KAJ6783033.1	-----	633
KAJ6780076.1	-----	577
KAJ6789215.1	-----	751
KAJ6787434.1	-----	574
KFG85702.1	-----	579
KAJ6780083.1	-----	579
KAJ6780494.1	-----	661
KAJ6784096.1	NRG-----	848
KAJ6785798.1	TDGMGDKPGDSFATRGLPSAPILIAALVALCLGL	741
KAJ6785933.1	-----	514
KFG80340.1	-----	620
KAJ6783033.1	-----	633
KAJ6780076.1	-----	577
KAJ6789215.1	-----	751
KAJ6787434.1	-----	574
KFG85702.1	-----	579
KAJ6780083.1	-----	579

**Figure S3. Clustal alignment of *A. album* GH20 enzymes.** The nine sequences were aligned together with the GH20  $\beta$ -N-acetylhexosaminidases identified in *M. anisopliae* (KFG803409 and KFG85702). Boxed sequences correspond to the conserved motif H(N)XGA(C/G/M)DEA(I/L/V/Y), typical of GH20 sequences.

## Figure S4

KAJ6781485.1	-----	0
BAD08218.2	-----	0
ADG96019.1	-----	0
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ABZ88800.1	-----	0
EAL84291.1	-----	0
AAO41660.1	-----	0
CAE54966.1	-----	0
AJG44374.1	-----	0
KAJ6787168.1	-----	0
ABY77913.1	-----	0
KAJ6783315.1	-----	0
AFG33049.1	-----	0
KAJ6786595.1	-----	0
KAJ6788818.1	-----	0
ABX57824.1	-----	0
BAA12799.1	-----	0
KAJ6781651.1	-----	0
KAJ6785337.1	MLSEFEGDDADSDVDSAAAMATILWGRAVEQEDDILLWSLSSILNLHELGLASSHELZIA	60
KAJ6783761.1	-----	0
KAJ6781485.1	-----	0
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ADG96019.1	-----	0
BAA92250.1	-----	0
ABZ88800.1	-----	0
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AAO41660.1	-----	0
CAE54966.1	-----	0
AJG44374.1	-----	0
KAJ6787168.1	-----	0
ABY77913.1	-----	0
KAJ6783315.1	-----	0
AFG33049.1	-----	0
KAJ6786595.1	-----	0
KAJ6788818.1	-----	0
ABX57824.1	-----	0
BAA12799.1	-----	0
KAJ6781651.1	-----	0
KAJ6785337.1	GPPASMAETAPIFAPSSFDAIQVKINSIGHLHSYLSQLLAHDPSYHSNFEQGLVESALS	120
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KAJ6781485.1	-----	0
BAD08218.2	-----	0
ADG96019.1	-----	0
BAA92250.1	-----	0
ABZ88800.1	-----	0
EAL84291.1	-----	0
AAO41660.1	-----	0
CAE54966.1	-----	0
AJG44374.1	-----	0
KAJ6787168.1	-----	0
ABY77913.1	-----	0
KAJ6783315.1	-----	0
AFG33049.1	-----	0
KAJ6786595.1	-----	0
KAJ6788818.1	-----	0
ABX57824.1	-----	0
BAA12799.1	-----	0
KAJ6781651.1	-----	0
KAJ6785337.1	ARTAIMFSVTYFQQSHRYISLVHRPFSQDSTALLLAVAFAGSTRSPKDDVLCVRS	180
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KAJ6781485.1	-----	0

BAD08218.2	-----	0
ADG96019.1	-----	0
BAA92250.1	-----	0
ABZ88800.1	-----	0
EAL84291.1	-----	0
AAO41660.1	-----	0
CAE54966.1	-----	0
AJG44374.1	-----	0
KAJ6787168.1	-----	0
ABY77913.1	-----	0
KAJ6783315.1	-----	0
AFG33049.1	-----	0
KAJ6786595.1	-----	0
KAJ6788818.1	-----	0
ABX57824.1	-----	0
BAA12799.1	-----	0
KAJ6781651.1	-----	0
KAJ6785337.1	ARLLEEFVFOHLERLIVNANSMNRSRELLETLAAAILVYQIQFMSMAAAALQRMRTSRLP	240
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ABZ88800.1	-----	0
EAL84291.1	-----	0
AAO41660.1	-----	0
CAE54966.1	-----	0
AJG44374.1	-----	0
KAJ6787168.1	-----	0
ABY77913.1	-----	0
KAJ6783315.1	-----	0
AFG33049.1	-----	0
KAJ6786595.1	-----	0
KAJ6788818.1	-----	0
ABX57824.1	-----	0
BAA12799.1	-----	0
KAJ6781651.1	-----	0
KAJ6785337.1	ALISAARKMGLFTTKHKAGLGSVVISADLSLTPHMATALFTAVARWQKLWQENLRALSG	300
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AAO41660.1	-----	0
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KAJ6788818.1	-----	0
ABX57824.1	-----	0
BAA12799.1	-----	0
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BAA92250.1	-----	0

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EAL84291.1	-----0
AAO41660.1	-----0
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KAJ6783315.1	-----0
AFG33049.1	-----0
KAJ6786595.1	-----0
KAJ6788818.1	-----0
ABX57824.1	-----0
BAA12799.1	-----0
KAJ6781651.1	-----0
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KAJ6781485.1	-----0
BAD08218.2	-----0
ADG96019.1	-----0
BAA92250.1	-----0
ABZ88800.1	-----0
EAL84291.1	-----0
AAO41660.1	-----0
CAE54966.1	-----0
AJG44374.1	-----0
KAJ6787168.1	-----0
ABY77913.1	-----0
KAJ6783315.1	-----0
AFG33049.1	-----0
KAJ6786595.1	-----0
KAJ6788818.1	-----0
ABX57824.1	-----0
BAA12799.1	-----0
KAJ6781651.1	-----0
KAJ6785337.1	MLKDALLSSATAASPSRLINVSSTRHKRGPITDFGIINVKKEDYDAFDSYCQSKTAAVYL 480
KAJ6783761.1	-----0

KAJ6781485.1	-----0
BAD08218.2	-----0
ADG96019.1	-----0
BAA92250.1	-----0
ABZ88800.1	-----0
EAL84291.1	-----0
AAO41660.1	-----0
CAE54966.1	-----0
AJG44374.1	-----0
KAJ6787168.1	-----0
ABY77913.1	-----0
KAJ6783315.1	-----0
AFG33049.1	-----0
KAJ6786595.1	-----0
KAJ6788818.1	-----0
ABX57824.1	-----0
BAA12799.1	-----0
KAJ6781651.1	-----0
KAJ6785337.1	ASEMERRYGAPRIFTDVAEAAISSDVLHKDMRGRYLEDFVFSIPAAETKYPDILGYAHT 540
KAJ6783761.1	-----0

KAJ6781485.1	-----MLVKSI-----ASLA 10
BAD08218.2	-----MPIKSF-----ASRL 10
ADG96019.1	-----MMTY-----SRLI 8
BAA92250.1	-----M---H-----FAGI 6
ABZ88800.1	-----M---R-----LSEI 6
EAL84291.1	-----M---R-----LSEI 6
AAO41660.1	-----M---R-----LSEI 6

CAE54966.1	-----M---R-----LSEI 6
AJG44374.1	-----MR---Y-----LATA 7
KAJ6787168.1	-----M---L-----FSL 6
ABY77913.1	-----0
KAJ6783315.1	-----MR---S-----ATVI 7
AFG33049.1	-----MKTAA-----ITSL 9
KAJ6786595.1	-----0
KAJ6788818.1	-----MASL-----RSTL 8
ABX57824.1	-----MPSL-----RNTL 8
BAA12799.1	-----MPSL-----RNTL 8
KAJ6781651.1	-----MKTT-----ASIL 8
KAJ6785337.1	YDEQRAKDLWKFTKELLGHD TGLFPYAFTSFNTVAAQYRDIPDMMRVTT-----KIAL 593
KAJ6783761.1	-----MK-----ASLA 6

KAJ6781485.1	ALSGIAAAAGPIRASVPTNVDGSKYN---KPNAGPPGDWFSGDSSLPISKIASA---V-S 63
BAD08218.2	A-LSLA----ICGTAMGQKVNGADYN---KPDGGPPAKFFQASSSIPVAAIQAA---A-A 58
ADG96019.1	PFALFA---LFGTGLAQTVDGSKFN---KPDGGPPGSYFAAGSSIPVAALQSA---A-A 57
BAA92250.1	VAIALA--TGATAYDLPENLKQ-IYE---KH-K-GKCSK-----ELQGG---YDN 46
ABZ88800.1	LTVALV--TGATAYNLPNNLEQ-IYD---KH-K-GKCSK-----VLAKG---FTN 45
EAL84291.1	LTVALV--TGATAYNLPNNLKQ-IYD---KH-K-GKCSK-----VLAKG---FTN 45
AAO41660.1	LTVALV--TGATAYNLPNNLKQ-IYD---KH-K-GKCSK-----VLAKG---FTN 45
CAE54966.1	LTVALV--TGATAYNLPNNLKQ-IYD---KH-K-GKCSK-----ILAKG---FTN 45
AJG44374.1	AVLAGA--GLASAYSVPANLQQ-IYN---KH-KTGTQCN-----KLQDG---FSD 47
KAJ6787168.1	TVAALG--AVASAYDLPDNLRS-LYQ---AH-INGECRS-----ALSDP---FNT 46
ABY77913.1	-----YQLPANLKK-IYD---SH-KSGTCSK-----KLSSA---FSG 29
KAJ6783315.1	TLAALG--SLASGYQLPAKLKS-LYD---QH-KSGSCSK-----KLAGP---FNG 47
AFG33049.1	AVAALA--APALAYDIPDNVQA-FYD---KVKKGDDCTG-----SDLLKGG---FYA 52
KAJ6786595.1	-----MRA-LVN---I-----TW-----HIVGAQLARNA 20
KAJ6788818.1	LLSL-A--AVAAARDVPSNVRD-FYN---SVRGKQCSN-----KLKSG---FHS 48
ABX57824.1	LASLLA--ASVSARDVPANVKS-FKD---SIKQGSCKS-----TLATG---FYS 49
BAA12799.1	LASLLA--ASVSGRDVPANVKT-FKD---SIKQGSCKS-----TLATG---FYS 49
KAJ6781651.1	FASLLA--SPVLGRQVPQNVVD-LYN---SIRAQKSCHN-----ELKGG---FYS 49
KAJ6785337.1	TASLLA--LNSYARDVPSNIRD-LYN---SIRARGQCSN-----VLKGG---FYS 634
KAJ6783761.1	IISLLA--TGALSREV PANVKS-LYK---SIRSKGQCSK-----VLKTG---FFS 47

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ADG96019.1	KARTPVPDATYPINGDNGAKKVTIHSDWAKFDKGA-AYVWIAADMDVDCDGI	IDYK-----110
BAA92250.1	GHS HDGKSFSY--CGDIP-----NAIYLHSSKNGGQYADMDIDCDG	ANRH---AGK 92
ABZ88800.1	GDASQGKSFSY--CGDIP-----GAIFISSK--GYTNMDIDCDG	ANNS---AGK 88
EAL84291.1	GDASQGKSFSY--CGDIP-----GAIFISSK--GYTNMDIDCDG	ANNS---AGK 88
AAO41660.1	GDASQGKSFSY--CGDIP-----GAIFISSK--GYTNMDIDCDG	ANNS---AGK 88
CAE54966.1	GDASQGKSFSY--CGDIP-----GAIFISSK--GYTNMDIDCDG	ANNS---AGK 88
AJG44374.1	GISGPGT-SAY--CGDIQ-----GAIFLHSSANGGQYDNMDIDCDG	ANNS---GGD 92
KAJ6787168.1	G-----AVY--CGDIP-----NAIFLKG--PNGEYDNMDIDCDG	ANNS---AGD 83
ABY77913.1	G-----AVY--CGDLP-----NAIFLKG--KAGNYDNLDIDCDG	ANNS---AGE 66
KAJ6783315.1	G-----ASY--CGDIN-----GAIFLKG--N-GNYDNMDIDCDG	ANRT---GGA 83
AFG33049.1	-EEGGSKNFGY--CQKYF-----TNKG-FY LKG--SGSKLADMDIDCDG	QDQG--IDSR 98
KAJ6786595.1	-DQITRADMSY--CGDHL-----DDLGVVYLQG--P-GKFS	DMDVDCDGAQGGPQDDGR 68
KAJ6788818.1	-IEGDDGSFSY--CGDHL-----NDYRVLYLQG--KGGQLVNMDIDCDG	IQHGPADDGR 97
ABX57824.1	-SDGDSGTYSY--CGDHV-----KDY NVIYLQG--KNGKLVNMDIDCDG	IQGSPADDGR 98
BAA12799.1	-SDGDSGTYSY--CGDHV-----KDY NVIYLQG--KNGKLVNMDIDCDG	VQGSPADDGR 98
KAJ6781651.1	-QEGDSKNFGY--CGDHL-----SDYGIMYLQG--KNGQLVNMDIDCDG	ALGD--GDGS 96
KAJ6785337.1	-QEKDSKDFCY--CGDHL-----ASDGIVYLQG--THGNLVNMDIDCDG	ALGE--GDGS 681
KAJ6783761.1	-SEDDSKDFSY--CGDHL-----ESDGILYIQG--KGGKLTNMDIDCDG	ILSK--KHGE 94

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KAJ6781485.1	CKGNDD--GETHTDFG-----ALAA YEVPFVVIPNKFASEHEK-----ELAG 155
BAD08218.2	CKGNPD--GQKETNWG-----ALSAYEVPFIVIPQEF LDANKG-----TLKG 149
ADG96019.1	CKGNPD--GQHQTNGF-----ALAA YEVPFVVIPDRFGTKYAK-----QLPG 150
BAA92250.1	CSNDHS--GQGETRWKDEVQKL--GIDDL DANIHPYVVFNGNDDGD DPEFDPRKHGM EP 148
ABZ88800.1	CANDPS--GQGETAFKSDVKKF--GISDL DANIHPYVVFNGNED---HSPKFKPQSHGMQ P 141
EAL84291.1	CANDPS--GQGETAFKSDVKKF--GISDL DANIHPYVVFNGNED---HSPKFKPQSHGMQ P 141
AAO41660.1	CANDPS--GQGETAFKSDVKKF--GISDL DANIHPYVVFNGNED---HSPKFKPQSHGMQ P 141
CAE54966.1	CANDPS--GQGETAFKSDVKKF--GISDL DANIHPYVVFNGNED---HSPKFKPQSHGMQ P 141

AJG44374.1 CANDPS--GQSMATFMDTVKQY--GISDLNANIHPYVVFNGSG---SSPTFDPQQYGMQP 145  
 KAJ6787168.1 CANDPS--GQGQTSFVDTVSTF--GIQDLNANLHSYVVFNGEG---DSPSFSPQNHGVQP 136  
 ABY77913.1 CANDPS--GQGQTAFKDDVKKY--GIPDLNANLHPYVVFNGEE---HSPSFDPEAHGMR 119  
 KAJ6783315.1 CANDPS--GQGETSFKDTVKTY--GIPDLNANVHPYIVFGNEG---ASPSFNPQAHGIKP 136  
 AFG33049.1 CDSSGD--TQPDATAFKDQVKS--DYGIPDLRADIHPYVVLGNYG DY--SPTFDPPEHVGIKP 153  
 KAJ6786595.1 CDASTD--TQDTT AIRWVIEGYDVGISDLNPHEHSFVVFNGSGTRPGWKTFSRDPVGVPEP 126  
 KAJ6788818.1 CGSSGD--TQSITSFQGT VQGYGTGQKDLDAFIHPYVVFNGEGSKSGYPNFPQDYGVEP 155  
 ABX57824.1 CGSSGD--TQSITSFQWVLESYGT SQKDLNANIHPYIVFGNEGTKSGWKTDFDPEKHGIKP 156  
 BAA12799.1 CGSSGD--TQSITSFQWVLESYGT SQKDLNANIHPYIVFGNEGTKKGWKTDFDPEKHGIKP 156  
 KAJ6781651.1 CDSSTD--TQGQTT FQGDVEGYGKGIKDLNAYIHSFVVLGNDSKNGYVTFKPEQYGVPEP 154  
 KAJ6785337.1 CDSSTD--TQGQTT FGDIVKGYKKGIKDLNAYIHSFVVLGNEGKKGYVEFDPQSVGIEP 739  
 KAJ6783761.1 CDSSGD--IQYETRF RKEVQGYKGLKDLDAYVHSYVVLGNEGKKNYIEFNPPQSVGIEP 152  
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 BAD08218.2 NAVAAVICNGKM-----F YGIFGD SNGDS PQ--VTGEASWLMARTCFPKEDLNGN---- 197  
 ADG96019.1 NNVGAVICNGKM-----F YGIYGD SDGDT PQ--VIGEASWLMARTCFPNDDLNGN---- 198  
 BAA92250.1 LSVMAVVCNKKL-----F YGIWGD TNGHT----ATGEASLSMAELCFPEEDPSGD---- 194  
 ABZ88800.1 LSVMAVVCNGQL-----H YGIWGD TNGGV----STGEASISLADLCFNEHLDGN---- 187  
 EAL84291.1 LSVMAVVCNGQL-----H YGIWGD TNGGV----STGEASISLADLCFNEHLDGN---- 187  
 AAO41660.1 LSVMAVVCNGQL-----H YGIWGD TNGGV----STGEASISLADLCFNEHLDGN---- 187  
 CAE54966.1 LSVMAVVCNGQL-----H YGIWGD TNGGV----STGEASISLADLCFNEHLDGN---- 187  
 AJG44374.1 LSVMAVVCNNQL-----F YGVWGD TNGDI----ATGEASISLAKLCFNDGITGD---- 191  
 KAJ6787168.1 LSVMAVVCNNQV-----F YGVWGD TNGFT----STGEASLALAKLCFNDGLNGD---- 182  
 ABY77913.1 LSVMAIVCNNQV-----F YGIWGD TNGGT----STGEASLALGKLRFPNDGLNGD---- 165  
 KAJ6783315.1 LSVMAVVCNGQL-----H YGIWGD TNGFT----STGEASLSMGKLCFNEHLTGN---- 182  
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 KAJ6788818.1 LSVMAVVCNKL-----I YGIWGD TNGDDGPQAMVGEASISLATA CYGN-GINGN---- 204  
 ABX57824.1 LSVMAVVCNKM-----F YGIWGD ENGDDGDYPMVGEASISLATA CYGK-SMNGN---- 205  
 BAA12799.1 LSVMAVVCNKM-----F YGIWGD ENGDDGDQPMVGEASISLATA CYGK-SMNGN---- 205  
 KAJ6781651.1 LSLVAVVCGDKM-----F YGVWGD TNGDDGP-PLVGEVSDSLGRACYGN-AVNGN---- 202  
 KAJ6785337.1 LSI VAVVCGDRL-----L YGVWGD TNGDDGP-PLIGEVS DSLGRACYGD-EVNGN---- 787  
 KAJ6783761.1 LSVVAVVCGDKM-----F YGVWGD TNGDDGP-PLVGEASLTIGQACYGK-SINGN---- 200  
 : \*: . : : \*\* : : : \* \* \* : . : :  
  
 KAJ6781485.1 QGHSDADVITYIFFTGDDSVLPD NAI---GKNYLTNFQALKNLGDKLMRDLVSSLHL---- 256  
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 ADG96019.1 SGHGDVDVITYILFTGDDSVLPSSAL---NKNYVTNFTTLRSMGDKLMTALAKNLKLV DGG 255  
 BAA92250.1 SGHEPNVDVLYIGFTGKEAVPGKS-ADWKADSTESFEESIKELGDKLVAGLK-----A- 245  
 ABZ88800.1 HGHDPNVDVLYIGFTSKDAVP GAT-AKWKAKNAKEFEDSIKSI GDKLVAGLK-----A- 238  
 EAL84291.1 HGHDPNVDVLYIGFTSKDAVP GAT-AKWKAKNAKEFEDSIKSI GDKLVAGLK-----A- 238  
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 CAE54966.1 HGHDPNVDVLYIGFTSKDAVP GAT-AKWKAKNAKEFEDSIKSI GDKLVAGLK-----A- 238  
 AJG44374.1 NGHDQDDVLYIGFTGQDTPV GAS-AAWTASDTSTFEESIKGLGDR LVAKLS-----A- 242  
 KAJ6787168.1 AGHDQKDVMYIAFTGDEAVPGRDGAKWSAGSP EEFEDSIKALGDR LVASLP-----S- 234  
 ABY77913.1 NGHDPKDVLYIGFTGSGAVPGKSGANWKAKKTADFEASIKALGDKLVASLP-----A- 217  
 KAJ6783315.1 NGHDPKDVLYIAFTGADTPV GKNGANWKAKNTDDFAKSIKSLGDKLVGRL----- 232  
 AFG33049.1 NGHEGTDVLYIAFKGDDAVPGT-SADWSASSYEDFAASIKDFGDNLVAS----- 249  
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 KAJ6788818.1 SGHDDNDVLYIAFPGHDAVP GKNGAKW HASSYNEFANSITSLGDKLIQRIG-----GG 257  
 ABX57824.1 FGHGEDDVLYIAFPGSDAVPGAKGAKWTAKNFDEFQSSITTLGDKLIKRIG-----SS 258  
 BAA12799.1 FGHSDDDVLYIAFPGDAVP GAKGAKWNAKNFDEFQTSITSLGDKLIKRIG-----GT 258  
 KAJ6781651.1 QAHDNDILYIAFTGSDAVPGANGAKWNANSFSSFESSLGLGDR LVQRIG-----GG 255  
 KAJ6785337.1 EAHDDNDVLYIAFTGKGAVPGANGAKWNAESFDEFEASLQAQGD KLVAKIG-----GG 840  
 KAJ6783761.1 NGHDENDVLYIAFRGNQAVPGANGA AWNAKTTFTEFENSLAKIGDKLVKGIK-----G- 252  
 . \* \* : : \* \* . : \* : : \* \* \* : :  
  
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 ADG96019.1 DGGSPTTTTA---GSNPTSGSCEWEGHCAGASCKDENDCSDQLVCKSGKCPSD----- 304  
 BAA92250.1 ----- 245  
 ABZ88800.1 ----- 238  
 EAL84291.1 ----- 238  
 AAO41660.1 ----- 238  
 CAE54966.1 ----- 238  
 AJG44374.1 ----- 242



KAJ6787168.1	-----	234
ABY77913.1	-----	217
KAJ6783315.1	-----	232
AFG33049.1	-----	249
KAJ6786595.1	NGG-----DGCSWDGHCAGASCTRAQDCADQLTCVKGKCA-----	273
KAJ6788818.1	GGGNP-----PPSGGNC5WAGHCEGASCKNENDCSDSLVCKSGKCSR-----	300
ABX57824.1	SGGGT-----TPPPTCSWPGHCGATCKTGDDCSDDLICTNGKCSPP-----	300
BAA12799.1	NNGGGD-----TGGGSGNTCSWPGHCGAACKTGDDCSDDLICTKGKCSPP-----	304
KAJ6781651.1	GG5-NP-----GNPGNPPSCSWQGHCLGAKCSSDDDCDGNLQC-----KS--	294
KAJ6785337.1	DTGSNPTSTTASPGRPTNSPPPN--NENLNPKCAPGGNFDLGYFNLQLPVGGPDIKSKQ	898
KAJ6783761.1	-----	252

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BAA92250.1	-----	245
ABZ88800.1	-----	238
EAL84291.1	-----	238
AAO41660.1	-----	238
CAE54966.1	-----	238
AJG44374.1	-----	242
KAJ6787168.1	-----	234
ABY77913.1	-----	217
KAJ6783315.1	-----	232
AFG33049.1	-----	249
KAJ6786595.1	-----	273
KAJ6788818.1	-----	300
ABX57824.1	-----	300
BAA12799.1	-----	304
KAJ6781651.1	-HK-CSQ-----	299
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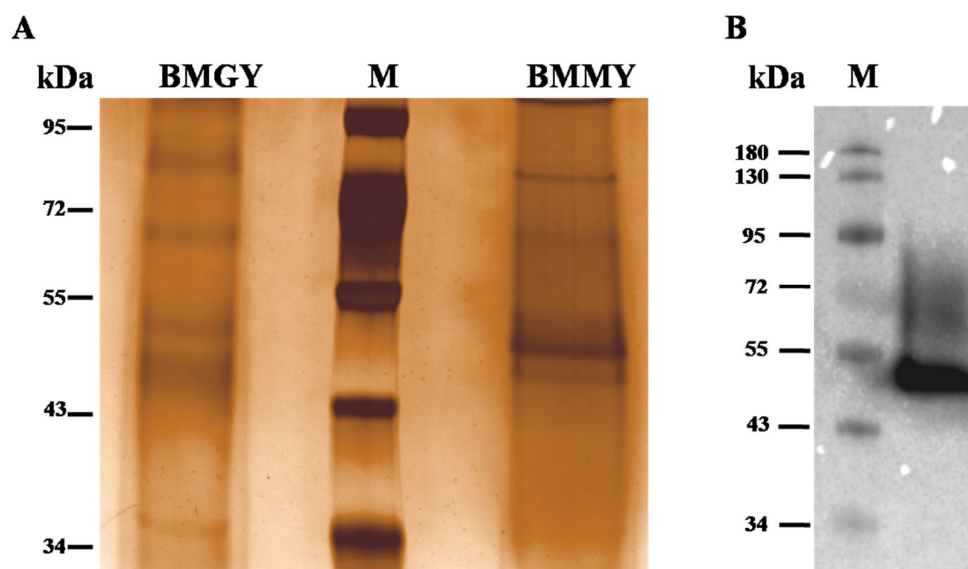
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AAO41660.1	-----	238
CAE54966.1	-----	238
AJG44374.1	-----	242
KAJ6787168.1	-----	234
ABY77913.1	-----	217
KAJ6783315.1	-----	232
AFG33049.1	-----	249
KAJ6786595.1	-----	273
KAJ6788818.1	-----	300
ABX57824.1	-----	300
BAA12799.1	-----	304
KAJ6781651.1	-----	299
KAJ6785337.1	WSPKGTNTLTVTMKVVKSDDGTHGTAIGQVFASEASKPLAEMYSPSGDIVVGVPDEDS	1017
KAJ6783761.1	-----	252

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ABZ88800.1	-----	238
EAL84291.1	-----	238
AAO41660.1	-----	238
CAE54966.1	-----	238
AJG44374.1	-----	242
KAJ6787168.1	-----	234
ABY77913.1	-----	217
KAJ6783315.1	-----	232

AFG33049.1	-----	249
KAJ6786595.1	-----	273
KAJ6788818.1	-----	300
ABX57824.1	-----	300
BAA12799.1	-----	304
KAJ6781651.1	-----	299
KAJ6785337.1	NQVVTKLGNVSVGTRKFTYVLNYSDDKLSISINGKTTALDTFNWDSPACYFKSGNYNQGKS	1077
KAJ6783761.1	-----	252
KAJ6781485.1	-----	256
BAD08218.2	-----	380
ADG96019.1	-----	304
BAA92250.1	-----	245
ABZ88800.1	-----	238
EAL84291.1	-----	238
AAO41660.1	-----	238
CAE54966.1	-----	238
AJG44374.1	-----	242
KAJ6787168.1	-----	234
ABY77913.1	-----	217
KAJ6783315.1	-----	232
AFG33049.1	-----	249
KAJ6786595.1	-----	273
KAJ6788818.1	-----	300
ABX57824.1	-----	300
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KAJ6783761.1	-----	252

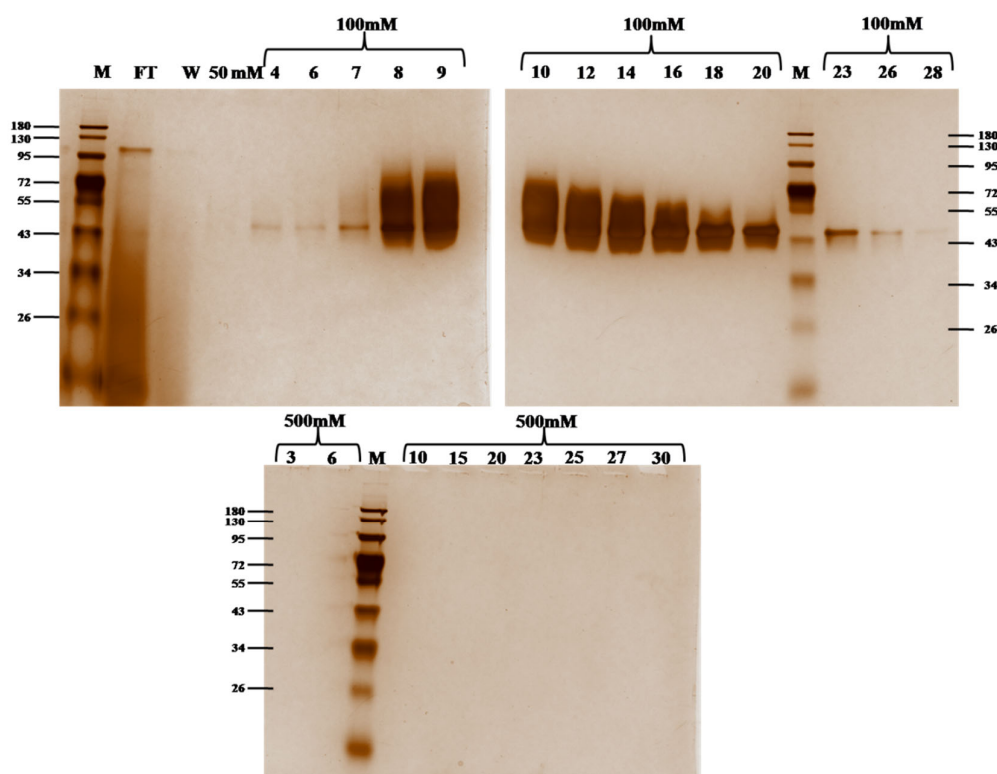
**Figure S4. Clustal alignment of *A. album* GH75 enzymes.** The eight sequences were aligned together with the GH75 chitosanases characterized in fungi ([http://www.cazy.org/GH75\\_characterized.html](http://www.cazy.org/GH75_characterized.html)) with the exception of the sequence EAQ87617 which is not complete. Boxed sequences correspond to the conserved motifs N(D)M(L)DIDCD and YGIWGD, typical of GH75 sequences.

**Figure S5**



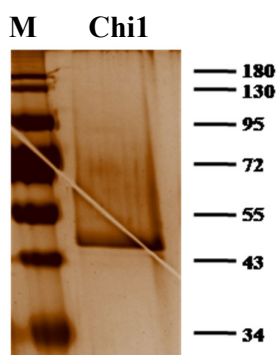
**Figure S5. Expression of recombinant Chi1 mature protein.** (A) SDS-PAGE on 15% biphasic polyacrylamide gel, M: Marker Protein (Thermo Scientific); BMGY (Buffered Glycerol-complex Medium): clone growth not induced with methanol; BMMY (Buffered Methanol-complex Medium): clone growth induced with methanol. Gel stained with silver staining. (B) Western blot of culture medium after expression in *Pichia pastoris* cells.

**Figure S6**



**Figure S6. SDS-PAGE (15% polyacrylamide gel) analysis of chromatographic fractions.** M: Marker PageRuler Prestained Protein Ladder (Thermo Scientific); FT: flow-through; W: washing fraction; 50 mM: fraction eluted with 50 mM imidazole EB; 100mM: fractions eluted with 100 mM imidazole EB; 500 mM: fractions eluted with 500 mM imidazole EB. Gels stained with silver staining.

**Figure S7**



**Figure S7. SDS-PAGE (15% polyacrylamide gel) of the purified Chi1 recombinant protein.** M: Marker PageRuler Prestained Protein Ladder (Thermo Scientific). Chi1: purified recombinant Chi1 protein after dialysis. Gel stained with silver staining.