



**Phosphomannose Isomerase (Entrez® Database Accession Number
AAA24109): Assessment of Amino Acid Sequence Similarity to Known or
Putative Allergens**

Data Requirement:	Not applicable
Author:	Brian Harper
Study Completion Date:	March 10, 2011
Performing Laboratory:	Syngenta Crop Protection, LLC Product Safety 3054 East Cornwallis Road PO Box 12257 Research Triangle Park, NC 27709-2257, USA
Syngenta Study No.:	Not applicable
Report No.:	SSB-102-11

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Company: *Syngenta Seeds, Inc.*

Company Representative:

Ann Tuttle

Ann Tuttle
Regulatory Affairs Manager

March 4, 2011

Date

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STATEMENT CONCERNING GOOD LABORATORY PRACTICES STANDARDS

This is not a study as defined by 40 CFR Part 160.3 and is therefore not subject to Federal Insecticide, Fungicide, and Rodenticide Act Good Laboratory Practices Standards (GLPS). However, all components of this analysis were performed according to accepted scientific practices, and relevant records have been retained.

Study Director:



Brian Harper
Technical Expert, Toxicology and Health Science
 Product Safety
 Syngenta Crop Protection, LLC

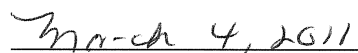


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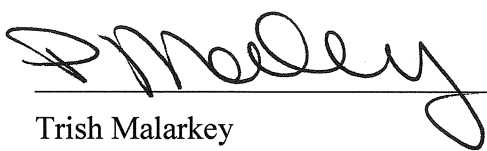


Ann Tuttle
Regulatory Affairs Manager
 Syngenta Seeds, Inc.
 3054 East Cornwallis Road
 PO Box 12257
 Research Triangle Park, NC 27709-2257, USA



Date

Sponsor:



Trish Malarkey
Head of NAFTA Product Safety
 Syngenta Crop Protection, LLC
 Product Safety
 410 Swing Road
 Post Office Box 18300
 Greensboro, NC 27419-8300 USA



Date

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LIST OF ACRONYMS AND ABBREVIATIONS

aa	amino acid
BLOSUM50	Blocks Substitution Matrix50
FARRP	Food Allergy Research and Resource Program
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
GLPS	Good Laboratory Practice Standards
<i>manA</i>	phosphomannose isomerase gene
NCBI	National Center for Biotechnology Information
<i>pmi</i>	phosphomannose isomerase gene
PMI	phosphomannose isomerase protein
POI1	(Protein of Interest 1) PMI test substance
POI2	(Protein of Interest 2) bovine serum albumin test substance
SBI	Syngenta Biotechnology, Inc.
US EPA	United States Environmental Protection Agency
®	registered trademark

SUMMARY

The gene *pmi*, also known as *manA*, is from *Escherichia coli* and encodes the enzyme phosphomannose isomerase (PMI). Maize cells expressing *pmi* can utilize mannose as a primary carbon source whereas cells lacking PMI expression will fail to proliferate in a mannose-based culture medium. Therefore, PMI has utility as a plant selectable marker. To determine whether or not the PMI amino acid sequence showed biologically relevant amino acid sequence similarity to known or putative allergens, two different searches were performed against the Food Allergy Research and Resource Program Protein (FARRP) AllergenOnline database, version 11.0, which contained 1,491 amino acid sequences of known and putative allergens. A full-length sequence search using FASTA and a search for exact matches of eight or more contiguous amino acids when compared to each of the known or putative allergen sequences were used in the assessment. In the first search, no sequence similarity greater than 35% shared identity over 80 amino acids or more was observed between the PMI amino acid sequence and any entry in the FARRP AllergenOnline database. In the second search, a single match of eight identical amino acids between PMI and α -parvalbumin from *Rana* species CH2001 was observed. This match has been previously reported in assessments of the sequence similarity of PMI to known and putative allergens (first reported in Rabe 2004). Further investigation using sensitive serum IgE antibody screening demonstrated no cross-reactivity between PMI and the α -parvalbumin protein using serum from the single individual known to have demonstrated IgE-mediated allergy to this specific α -parvalbumin from *Rana* species CH2001. The results indicated that the allergic patient's serum IgE does not recognize any portion of PMI as an allergenic epitope. The present study was undertaken to reassess the similarity of PMI to known allergens based on an updated FARRP AllergenOnline database. This study found no new significant amino acid sequence similarity to known or putative allergens other than what has previously been reported (Rabe 2004). These results support the conclusion that PMI shares no biologically relevant amino acid sequence similarity to known or putative protein allergens.

INTRODUCTION

The purpose of this analysis is to determine whether the phosphomannose isomerase protein (PMI) has biologically relevant amino acid sequence similarity to known or putative protein allergens.

The *pmi* gene, also known as *manA*, is from *Escherichia coli* and encodes the enzyme PMI. Maize cells expressing *pmi* can utilize mannose as a primary carbon source whereas cells lacking PMI expression will fail to proliferate in a mannose-based culture medium; therefore, PMI has utility as a plant selectable marker.

The PMI amino acid sequence was systematically compared against the protein sequences in the Food Allergy Research and Resource Program (FARRP) AllergenOnline database, version 11.0 (FARRP 2011), located online at www.allergenonline.org.

MATERIALS AND METHODS

Allergen Database Searches

The FARRP AllergenOnline database (2011) contains the amino acid sequences of known and putative protein allergens. It is a curated, peer-reviewed database containing proteins identified as food allergens, respiratory allergens, allergenic venom proteins, contact allergens, gliadins, and glutenins. Entries were compiled primarily from searches of publicly available protein databases using the National Center for Biotechnology Information (NCBI) Entrez® search and retrieval system, most recently searched in 2010 (NCBI 2010). The NCBI dataset was screened by searches for entries associated with allergy or celiac disease; duplicate entries were removed, and additional entries were identified from publications. The list of candidate entries was then reviewed by an international panel of allergy experts who reviewed published clinical and laboratory evidence to support the candidate sequences as allergens. Proteins are classified as known or putative allergens according to predetermined criteria set by the FARRP expert review panel. The latest version of the FARRP AllergenOnline database (2011) contains 1,491 nonredundant entries (Appendix A).

Similarity searches were performed using an exact copy of the entire list of sequences in the current version of the FARRP AllergenOnline database (2011) (maintained at Syngenta Crop Protection, LLC, Research Triangle Park, NC, USA). Two different sequence searches were performed in order to compare the amino acid sequence of PMI (391 amino acids, Entrez® Database Accession No. AAA24109, GenInfo Identifier 146722 [NCBI 2010] [Figure 1]) with sequences in the FARRP AllergenOnline database (2011).

Figure 1. Amino acid sequence of PMI

```

1   MQKLINSVQN YAWGSKTALT ELYGMENPSS QPMAELWMGA HPKSSSRVQN
51  AAGDIVSLRD VIESDKSTLL GEAVAKRFGE LPFLFKVLCA AQPLSIQVHP
101 NKHNSEIGFA KENAAGIPMD AAERNYKDPN HKPELVFALT PFLAMNAFRE
151 FSEIVSLLQP VAGAHPAIAH FLQQPDAERL SELFASLLNM QGEEKSRAIA
201 ILKSALDSQQ GEWPQTIRLI SEFYPEDSGL FSPLLLNVVK LNPGEAMFLF
251 AETPHAYLQG VALEVMANSN NVLRAGLTPK YIDIPELVAN VKFEAKPANQ
301 LLTQPVKQGA ELDFPIPVDD FAFSLHDLSD KETTISQQSA AILFCVEGDA
351 TLWKGSQQLO LKPGESAFIA ANESPVTVKG HGRLARVYNK L

```

In the first search, the FASTA search algorithm, version 3.45 (Pearson and Lipman 1988), was used to assess overall sequence similarity by conducting a search of the entire PMI amino acid sequence with the sequences in the FARRP AllergenOnline database (2011). The default FASTA settings used include an extension penalty of two and gap creation penalty of 12. The scoring matrix for FASTA was the Blocks Substitution Matrix50 (BLOSUM50). The BLOSUM50 matrix is weighted to favor identical amino acids likely to impact protein structure.

In the second search, the PMI amino acid sequence was screened for matches of eight or more contiguous amino acids (Hileman *et al.* 2002) using a program developed by Syngenta; this program compared every possible peptide of eight contiguous amino acids in the query sequence with the sequences in the FARRP AllergenOnline database (2011).

Assessment of Alignment Significance

The FASTA search produces localized alignments between the entire PMI amino acid sequence and the sequences in the allergen database. The evaluation of each resulting alignment utilizes the minimum criterion of at least 80 amino acids of alignment length with greater than 35% shared amino acid identity over the alignment length. Any alignments exceeding this criterion for shared sequence similarity indicate the potential for immunologically relevant sequence similarity (Codex Alimentarius Commission 2003).

Additionally, any match of eight (or more) identical contiguous amino acids between the PMI amino acid sequence and any sequence in the allergen database indicates the potential for immunologically relevant sequence similarity (Codex Alimentarius Commission 2003).

RESULTS AND DISCUSSION

No new findings, other than that from a previous assessment (Rabe 2004), were revealed in this analysis. No significant sequence similarity was observed between the PMI amino acid sequence and any entry in the FARRP AllergenOnline database (2011) in the FASTA search (Appendix D). As previously identified (Rabe 2004), there was one sequence identity match of eight contiguous identical amino acids between PMI and a known allergen, α -parvalbumin (110 amino acids, Entrez® Database Accession No. CAC83047, GenInfo Identifier 20796733 [NCBI 2011] [Figure 2] [Appendix A, Entry 1256]) from *Rana* species CH2001 (Hilger *et al.* 2002; see Appendix B for a copy of this

publication). The specific amino acid sequence in common was “DLSDKETT,” which occurs at positions 327 – 334 of PMI and positions 77 – 84 of the allergen sequence.

Figure 2. Amino acid sequence of α -parvalbumin protein from *Rana* species CH2001

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1      MPMTDVLAAC DISKAMAAFP AAEPFNHKKF FELCGLKGKS QDDMKKVFHM
51     LDKDQSGFIE KDELALILKG FTPEGRDLSD KETTALLAAG DKDGDGKIGV
101    DEFVKLVSEC

```

Location of the eight amino acid identity with PMI is underlined

Hilger *et al.* (2002) described a severe case of food-induced anaphylaxis in an individual who consumed frog legs of Indonesian origin. Using the patient’s serum, Hilger *et al.* (2002) proceeded to identify the causative agent of this anaphylactic response as α -parvalbumin from an unidentified frog (*Rana*) described as *Rana* species CH2001. The response of this patient appeared to be quite specific to the frog leg sample of Indonesian origin; however, the patient’s serum showed no cross-reactivity to related parvalbumins from *Rana esculenta*,¹ the common edible frog. In order to determine if the IgE antibodies present in this patient’s serum recognized PMI, Syngenta Biotechnology, Inc. sent two protein samples to the Hilger group for analysis of cross-reactivity. The first protein, designated “POI1,” was PMI test substance PMI-0198, produced from an *Escherichia coli* overexpression system and used in previous safety testing as a surrogate for PMI expressed in transgenic plants. PMI was encoded in the *E. coli* expression vector. It has the same amino acid sequence as that encoded by the *E. coli* gene *mana* used in plant transformation, except for the addition of 16 amino acids at the N-terminus (13 in the T7 tag and three from the polylinker) of PMI in the test substance. The preparation and characterization of test substance PMI-0198 are fully described in a previous report (Privalle 1999); this test substance contains approximately 61% PMI by weight and retains PMI enzymatic activity. As an internal check, an unrelated protein designated “POI2” was also submitted to Dr. Hilger’s laboratory for cross-reactivity analysis. This protein was bovine serum albumin (BSA) from Sigma-Aldrich Corp and was included as a control protein with no significant sequence similarity to PMI.

The results of the serum screening analysis demonstrated no IgE-reactivity with PMI (POI1) as detailed in Dr. Hilger’s report titled “Evaluation of Syngenta Protein Samples POI1 and POI2 for Reactivity with Serum IgE from a Patient Allergic to Frog Alpha-Parvalbumin from *Rana* Species” (Appendix C). Serum reactivity was observed towards the α -parvalbumin, indicating an expected positive reaction with the patient’s serum IgE. There was some reactivity with BSA (POI2), although this is not relevant to the conclusions regarding PMI. The negative control serum screening analysis demonstrated no IgE reactivity with either PMI (POI1) or BSA (POI2). These results support the conclusion that the shared eight amino acid sequence was not evidence of potential cross-reactivity between α -parvalbumin and PMI.

¹ Entrez® Database Accession No. for α -parvalbumin from *Rana esculenta*: CAC83046, GenInfo Identifier 20796729. Entrez® Database Accession No. for β -parvalbumin from *Rana esculenta*: CAC95152, GenInfo Identifier 20797081.

CONCLUSIONS

No significant sequence similarity was observed between the PMI amino acid sequence and any entry in the FARRP AllergenOnline database (2011) in the FASTA search. A separate search for shared sequence identity of eight or more consecutive amino acids revealed an expected single match of eight identical amino acids between PMI and α -parvalbumin from *Rana* species CH2001. This was previously identified by Rabe (2004). Further investigation using IgE-specific serum screening demonstrated no cross-reactivity between PMI and the allergen, α -parvalbumin, using serum from the single individual known to have demonstrated IgE-mediated allergy to this specific α -parvalbumin. This indicates that the allergic patient's serum IgE does not recognize any portion of PMI as an allergenic epitope; therefore, the observed low degree of shared sequence identity between PMI and α -parvalbumin from *Rana* species CH2001 is not immunologically relevant.

The current analyses, based on the most recent update of the FARRP AllergenOnline database (2011), resulted in no additional similarity than what was reported by Rabe (2004). This study supports the conclusion that PMI shows no biologically relevant amino acid sequence similarity to any known or putative protein allergens.

RECORDS RETENTION

Raw data, the original copy of this report, and other relevant records are archived at Syngenta Biotechnology, Inc., 3054 East Cornwallis Road, Research Triangle Park, NC 27709-2257, USA.

CONTRIBUTING SCIENTISTS

The analytical work reported herein was conducted by Brian Harper, M.S. This work was conducted at Syngenta Crop Protection, LLC.

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Unpublished

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APPENDICES

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0

The GenInfo identifier is a number assigned to a nucleotide or protein sequence and used to differentiate reported sequence variations within an entry.

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
1	<i>Acarus siro</i>	Mite	Unassigned	allergen Aca s 13 [Acarus siro]	118638268
2	<i>Actinidia chinensis</i>	Kiwi	Unassigned	Thaumatococcus-like protein (Allergen Act c 2)	68064399
3	<i>Actinidia chinensis</i>	Kiwi	Unassigned	Kiwellin (Allergen Act c ?)	85701136
4	<i>Actinidia chinensis</i>	Kiwi	Unassigned	RecName: Full=Actinidin; Short=Actinidin; AltName: Allergen=Act c 1; Flags: Precursor	190358935
5	<i>Actinidia chinensis</i>	Kiwi	Unassigned	bet v 1 related allergen [Actinidia chinensis]	281552896
6	<i>Actinidia deliciosa</i>	Kiwi	Unassigned	unnamed protein product [Actinidia deliciosa]	15984
7	<i>Actinidia deliciosa</i>	Kiwi	Unassigned	actinidin	166317
8	<i>Actinidia deliciosa</i>	Kiwi	Unassigned	phytoalexin [Actinidia deliciosa]	40807635
9	<i>Actinidia deliciosa</i>	Kiwi	Act c 2	thaumatococcus-like protein [Actinidia deliciosa]	71057064
10	<i>Actinidia deliciosa</i>	Kiwi	Unassigned	thaumatococcus-like protein [Actinidia deliciosa]	146737976
11	<i>Actinidia deliciosa</i>	Kiwi	Unassigned	bet v 1 related allergen [Actinidia deliciosa]	281552898
12	<i>Aedes aegypti</i>	Yellow fever mosquito	Aed a 2	D7 protein precursor (Allergen Aed a 2)	118216
13	<i>Aedes aegypti</i>	Yellow fever mosquito	Aed a 1	apyrase	556272
14	<i>Aedes aegypti</i>	Yellow fever mosquito	Unassigned	30 kDa salivary gland allergen Aed a 3 [Aedes aegypti]	2114497
15	<i>Aedes aegypti</i>	Yellow fever mosquito	Unassigned	30 kDa salivary gland allergen variant 2 [Aedes aegypti]	94468546
16	<i>Aedes aegypti</i>	Yellow fever mosquito	Unassigned	30 kDa salivary gland allergen variant 3 [Aedes aegypti]	94468552
17	<i>Aedes aegypti</i>	Yellow fever mosquito	Unassigned	RecName: Full=Apyrase; Full=Adenosine diphosphatase; AltName: Full=ATP-diphosphohydrolase; AltName: Full=ATP-diphosphatase; Short=ADPase; AltName: Allergen=Aed a 1; Flags: Precursor	193806340

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
18	<i>Aedes aegypti</i>	Yellow fever mosquito	Aed a 2	RecName: Full=37 kDa salivary gland allergen Aed a 2; AltName: Full=Protein D7; AltName: Allergen=Aed a 2; Flags: Precursor	205525919
19	<i>Aedes albopictus</i>	Asian tiger mosquito	Unassigned	30 kDa salivary gland allergen 30k-3 [<i>Aedes albopictus</i>]	56417504
20	<i>Aedes albopictus</i>	Asian tiger mosquito	Unassigned	GE-rich salivary protein 30k-4 [<i>Aedes albopictus</i>]	56417506
21	<i>Agrostis alba</i>	Bent grass	Unassigned	pollen allergen Agr a I - bent grass (fragment)	320606
22	<i>Agrostis alba</i>	Bent grass	Unassigned	Group I allergen Agr a I (Form 2), pollen	75139987
23	<i>Agrostis alba</i>	Bent grass	Unassigned	Group I allergen Agr a I (Form 1), pollen	75139989
24	<i>Alnus glutinosa</i>	Alder	Aln g 1	Aln g I [<i>Alnus glutinosa</i>]	261407
25	<i>Alnus glutinosa</i>	Alder	Unassigned	pollen allergen Aln g 4 [<i>Alnus glutinosa</i>]	3319651
26	<i>Alternaria alternata</i>	Fungus	Unassigned	Minor allergen Alt a 7 (Alt a VII)	1168402
27	<i>Alternaria alternata</i>	Fungus	Unassigned	RecName: Full=60S acidic ribosomal protein P2; AltName: Full=Minor allergen Alt a 5; AltName: Full=Allergen Alt a 6; AltName: Full=Allergen Alt a VI; AltName: Allergen=Alt a 5	1173071
28	<i>Alternaria alternata</i>	Fungus	Alt a 12	60S acidic ribosomal protein P1 (Allergen Alt a 12) (Alt a XII)	1350779
29	<i>Alternaria alternata</i>	Fungus	Alt a 1	major allergen Alt a 1 subunit [<i>Alternaria alternata</i>]	1842045
30	<i>Alternaria alternata</i>	Fungus	Alt a 5	ribosomal P2 phosphoprotein [<i>Alternaria alternata</i>]	1850540
31	<i>Alternaria alternata</i>	Fungus	Alt a 6	Enolase (2-phosphoglycerate dehydratase) (2-phospho-D-glycerate hydro-lyase) (Major allergen Alt a 11) (Alt a XI)	14423684
32	<i>Alternaria alternata</i>	Fungus	Alt a 3	Heat shock 70 kDa protein (Allergen Alt a 3)	14423730
33	<i>Alternaria alternata</i>	Fungus	Unassigned	putative nuclear transport factor 2 [<i>Alternaria alternata</i>]	21748153
34	<i>Alternaria alternata</i>	Fungus	Alt a 1	major allergen alt a1 [<i>Alternaria alternata</i>]	21913174
35	<i>Alternaria alternata</i>	Fungus	Unassigned	glutathione-S-transferase [<i>Alternaria alternata</i>]	41057621

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
36	<i>Alternaria alternata</i>	Fungus	Unassigned	major allergen Alt a 1 subunit [Alternaria alternata]	45680856
37	<i>Alternaria alternata</i>	Fungus	Unassigned	RecName: Full=Glutathione-S-transferase; AltName: Allergen=Alt a 13	74611808
38	<i>Alternaria alternata</i>	Fungus	Unassigned	aldehyde dehydrogenase (NAD+) [Alternaria alternata]	76666767
39	<i>Alternaria alternata</i>	Fungus	Alt a 4	Protein disulfide-isomerase (PDI) (Allergen Alt a 4)	85701160
40	<i>Alternaria alternata</i>	Fungus	Unassigned	TCTP [Alternaria alternata]	112824341
41	<i>Ambrosia artemisiifolia</i>	Short ragweed	Amb a 1.1	Pollen allergen Amb a 1.1 precursor (Antigen E) (AgE) (Antigen Amb a I)	113475
42	<i>Ambrosia artemisiifolia</i>	Short ragweed	Amb a 1.2	Pollen allergen Amb a 1.2 precursor (Antigen E) (Antigen Amb a I) (AaBA protein)	113476
43	<i>Ambrosia artemisiifolia</i>	Short ragweed	Amb a 1.3	Pollen allergen Amb a 1.3 precursor (Antigen E) (Antigen Amb a I)	113477
44	<i>Ambrosia artemisiifolia</i>	Short ragweed	Amb a 1.4	Pollen allergen Amb a 1.4 precursor (Antigen E) (Antigen Amb a I)	113478
45	<i>Ambrosia artemisiifolia</i>	Short ragweed	Amb a 2	Pollen allergen Amb a 2 precursor (Antigen K) (Antigen Amb a II)	113479
46	<i>Ambrosia artemisiifolia</i>	Short ragweed	Amb a 1.3	antigen E	166443
47	<i>Ambrosia artemisiifolia</i>	Short ragweed	Amb a 6	Nonspecific lipid-transfer protein precursor (LTP) (Pollen allergen Amb a 6) (Amb a VI) (Allergen Ra6)	14285595
48	<i>Ambrosia artemisiifolia</i>	Short ragweed	Unassigned	profilin-like protein [Ambrosia artemisiifolia]	34851178
49	<i>Ambrosia artemisiifolia</i>	Short ragweed	Unassigned	profilin-like protein [Ambrosia artemisiifolia]	34851180
50	<i>Ambrosia artemisiifolia</i>	Short ragweed	Unassigned	profilin-like protein [Ambrosia artemisiifolia]	34851182
51	<i>Ambrosia artemisiifolia</i>	Short ragweed	Unassigned	profilin isoallergen 1 [Ambrosia artemisiifolia]	62249502
52	<i>Ambrosia artemisiifolia</i>	Short ragweed	Unassigned	profilin isoallergen 2 [Ambrosia artemisiifolia]	62249512
53	<i>Ambrosia artemisiifolia</i>	Short ragweed	Unassigned	ragweed homologue of Art v 1 precursor [Ambrosia artemisiifolia]	285005077
54	<i>Ambrosia artemisiifolia</i>	Short ragweed	Unassigned	ragweed homologue of Art v 1 precursor [Ambrosia artemisiifolia]	285005079

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
55	<i>Ambrosia artemisiifolia</i>	Short ragweed	Unassigned	ragweed homologue of Art v 1 precursor [Ambrosia artemisiifolia]	285005081
56	<i>Ambrosia artemisiifolia</i> (elator)	Short ragweed	Amb a 5	Pollen allergen Amb a 5 (Amb a V) (Allergen Ra5)	114090
57	<i>Ambrosia artemisiifolia</i> (elator)	Short ragweed	Amb a 3	Pollen allergen Amb a 3 (Amb a III) (Allergen Ra3)	416636
58	<i>Ambrosia psilostachya</i>	Western ragweed	Unassigned	Amb p V allergen	515953
59	<i>Ambrosia psilostachya</i>	Western ragweed	Unassigned	Amb p V allergen	515954
60	<i>Ambrosia psilostachya</i>	Western ragweed	Unassigned	Amb p V allergen	515955
61	<i>Ambrosia psilostachya</i>	Western ragweed	Unassigned	Amb p V allergen	515956
62	<i>Ambrosia psilostachya</i>	Western ragweed	Unassigned	Amb p V allergen	515957
63	<i>Ambrosia trifida</i>	Giant ragweed	Amb t 5	Pollen allergen Amb t 5 precursor (Amb t V) (Allergen Ra5G)	114091
64	<i>Anacardium occidentale</i>	Cashew	Ana o 1	vicilin-like protein [Anacardium occidentale]	21666498
65	<i>Anacardium occidentale</i>	Cashew	Ana o 1	vicilin-like protein [Anacardium occidentale]	21914823
66	<i>Anacardium occidentale</i>	Cashew	Ana o 3	2s albumin [Anacardium occidentale]	24473800
67	<i>Anacardium occidentale</i>	Cashew	Ana o 2	allergen Ana 0 2 [Anacardium occidentale]	25991543
68	<i>Ananas comosus</i>	Pineapple	Unassigned	Bromelain precursor (Allergen Ana c 2)	75277440
69	<i>Ananas comosus</i>	Pineapple	Unassigned	RecName: Full=Profilin; AltName: Full=Minor food allergen Ana c 1; AltName: Allergen=Ana c 1	75306610
70	<i>Anisakis simplex</i>	Parasitic fish worm	Unassigned	troponin-like protein [Anisakis simplex]	6065738
71	<i>Anisakis simplex</i>	Parasitic fish worm	Ani s 2	paramyosin isoform [Anisakis simplex]	8453086
72	<i>Anisakis simplex</i>	Parasitic fish worm	Unassigned	21k allergen [Anisakis simplex]	31339067
73	<i>Anisakis simplex</i>	Parasitic fish worm	Unassigned	Paramyosin (Allergen Ani s 2)	42559536
74	<i>Anisakis simplex</i>	Parasitic fish worm	Ani s 4	Allergen Ani s 4	47605398
75	<i>Anisakis simplex</i>	Parasitic fish worm	Ani s 1	Major allergen Ani s 1 precursor (Excretory gland allergen Ans1) (21 kDa allergen)	47605452
76	<i>Anisakis simplex</i>	Parasitic fish worm	Unassigned	ani s 4 allergen [Anisakis simplex]	110346534
77	<i>Anisakis simplex</i>	Parasitic fish worm	Unassigned	UA3-recognized allergen [Anisakis simplex]	119524036
78	<i>Anisakis simplex</i>	Parasitic fish worm	Unassigned	SXP/RAL-2 family protein [Anisakis simplex]	121308878

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
79	<i>Anisakis simplex</i>	Parasitic fish worm	Unassigned	protease inhibitor [Anisakis simplex]	121308880
80	<i>Anisakis simplex</i>	Parasitic fish worm	Unassigned	SXP/RAL-2 family protein 2 isoform 1 [Anisakis simplex]	155676636
81	<i>Anisakis simplex</i>	Parasitic fish worm	Unassigned	SXP/RAL-2 family protein 2 isoform 2 [Anisakis simplex]	155676682
82	<i>Anisakis simplex</i>	Parasitic fish worm	Unassigned	SXP/RAL-2 family protein 2 isoform 3 [Anisakis simplex]	155676684
83	<i>Anisakis simplex</i>	Parasitic fish worm	Unassigned	SXP/RAL-2 family protein 2 isoform 4 [Anisakis simplex]	155676686
84	<i>Anisakis simplex</i>	Parasitic fish worm	Unassigned	SXP/RAL-2 family protein 2 isoform 5 [Anisakis simplex]	155676688
85	<i>Anisakis simplex</i>	Parasitic fish worm	Unassigned	SXP/RAL-2 family protein 2 isoform 6 [Anisakis simplex]	155676690
86	<i>Anisakis simplex</i>	Parasitic fish worm	Unassigned	SXP/RAL-2 family protein 2 isoform 7 [Anisakis simplex]	155676692
87	<i>Anisakis simplex</i>	Parasitic fish worm	Unassigned	SXP/RAL-2 family protein 2 isoform 8 [Anisakis simplex]	155676694
88	<i>Anisakis simplex</i>	Parasitic fish worm	Unassigned	SXP/RAL-2 family protein 2 isoform 9 [Anisakis simplex]	155676696
89	<i>Anisakis simplex</i>	Parasitic fish worm	Unassigned	SXP/RAL-2 family protein 2 isoform 10 [Anisakis simplex]	155676698
90	<i>Anisakis simplex</i>	Parasitic fish worm	Unassigned	Ani s 9 allergen precursor [Anisakis simplex]	157418806
91	<i>Anthoxanthum odoratum</i>	Sweet vernal grass	Unassigned	pollen allergen Ant o l - sweet vernal grass (fragment)	320607
92	<i>Anthoxanthum odoratum</i>	Sweet vernal grass	Unassigned	Group I allergen Ant o l (Form 1), pollen	75139986
93	<i>Anthoxanthum odoratum</i>	Sweet vernal grass	Unassigned	Group I allergen Ant o l (Form 2), pollen	75139990
94	<i>Apis cerana</i>	Indian honeybee	Unassigned	phospholipase A2 (EC 3.1.1.4), venom - Indian honeybee	7435005
95	<i>Apis cerana cerana</i>	Indian honeybee	Unassigned	Phospholipase A2 (Phosphatidylcholine 2-acylhydrolase)	24638082
96	<i>Apis dorsata</i>	Giant honeybee	Unassigned	Melittin	126955
97	<i>Apis dorsata</i>	Giant honeybee	Unassigned	Phospholipase A2 (Phosphatidylcholine 2-acylhydrolase)	47117012
98	<i>Apis mellifera</i>	Honeybee	Unassigned	melittin, minor - honeybee	69552

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
99	<i>Apis mellifera</i>	Honeybee	Unassigned	Melittin precursor (Allergen Api m 3) (Api m III)	126949
100	<i>Apis mellifera</i>	Honeybee	Api m 2	Hyaluronoglucosaminidase precursor (Hyaluronidase) (Hya) (Allergen Api m 2) (Api m II)	585279
101	<i>Apis mellifera</i>	Honeybee	Api m 1	Phospholipase A2 precursor (Phosphatidylcholine 2-acylhydrolase) (Allergen Api m 1) (Api m I)	24418862
102	<i>Apis mellifera</i>	Honeybee	Unassigned	allergen Api m 6 variant 2 precursor [Apis mellifera]	88770352
103	<i>Apis mellifera</i>	Honeybee	Unassigned	allergen Api m 6 variant 1 [Apis mellifera]	94400907
104	<i>Apis mellifera</i>	Honeybee	Unassigned	icarapin variant 1 precursor [Apis mellifera]	94471622
105	<i>Apis mellifera</i>	Honeybee	Unassigned	icarapin variant 2 precursor [Apis mellifera]	94471624
106	<i>Apium graveolens</i>	Celery	Api g 1.0101	Major allergen Api g 1 (Api g 1.0101) (Api g I)	1346568
107	<i>Apium graveolens</i>	Celery	Api g 4	profilin [Apium graveolens]	4761578
108	<i>Apium graveolens</i>	Celery	Api g 1.0201	Major allergen Api g 2 (Api g 1.0201)	14423646
109	<i>Apium graveolens</i>	Celery	Unassigned	[Segment 2 of 4] Allergen Api g 5	32363124
110	<i>Apium graveolens</i>	Celery	Unassigned	[Segment 3 of 4] Allergen Api g 5	32363125
111	<i>Apium graveolens</i>	Celery	Unassigned	[Segment 4 of 4] Allergen Api g 5	32363126
112	<i>Apium graveolens</i>	Celery	Unassigned	[Segment 1 of 4] Allergen Api g 5	33300921
113	<i>Arachis hypogaea</i>	Peanut	Unassigned	peanut agglutinin precursor; prePNA [Arachis hypogaea]	253289
114	<i>Arachis hypogaea</i>	Peanut	Ara h 1	Allergen Ara h 1, clone P17 precursor (Ara h I)	1168390
115	<i>Arachis hypogaea</i>	Peanut	Ara h 1	Allergen Ara h 1, clone P41B precursor (Ara h I)	1168391
116	<i>Arachis hypogaea</i>	Peanut	Ara h 3	glycinin [Arachis hypogaea]	3703107
117	<i>Arachis hypogaea</i>	Peanut	Ara h 4	glycinin [Arachis hypogaea]	5712199
118	<i>Arachis hypogaea</i>	Peanut	Ara h 5	profilin [Arachis hypogaea]	5902968
119	<i>Arachis hypogaea</i>	Peanut	Ara h 6	allergen Ara h 6 [Arachis hypogaea]	5923742
120	<i>Arachis hypogaea</i>	Peanut	Ara h 7	allergen [Arachis hypogaea]	5931948
121	<i>Arachis hypogaea</i>	Peanut	Unassigned	allergen II [Arachis hypogaea]	15418705
122	<i>Arachis hypogaea</i>	Peanut	Unassigned	conglutin [Arachis hypogaea]	17225991
123	<i>Arachis hypogaea</i>	Peanut	Unassigned	allergen Ara h 3/Ara h 4 [Arachis hypogaea]	21314465

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
124	<i>Arachis hypogaea</i>	Peanut	Unassigned	trypsin inhibitor [Arachis hypogaea]	22135348
125	<i>Arachis hypogaea</i>	Peanut	Ara h 2.02	allergen Ara h 2.02 [Arachis hypogaea]	26245447
126	<i>Arachis hypogaea</i>	Peanut	Ara h 2	allergen Ara h 2 isoform [Arachis hypogaea]	31322017
127	<i>Arachis hypogaea</i>	Peanut	Ara h 8	Ara h 8 allergen [Arachis hypogaea]	37499626
128	<i>Arachis hypogaea</i>	Peanut	Unassigned	conarachin [Arachis hypogaea]	46560472
129	<i>Arachis hypogaea</i>	Peanut	Unassigned	conarachin [Arachis hypogaea]	46560474
130	<i>Arachis hypogaea</i>	Peanut	Unassigned	conarachin [Arachis hypogaea]	46560476
131	<i>Arachis hypogaea</i>	Peanut	Unassigned	RecName: Full=Conglutin; AltName: Allergen=Ara h 6; Flags: Precursor	75114094
132	<i>Arachis hypogaea</i>	Peanut	Unassigned	iso-Ara h3 [Arachis hypogaea]	112380623
133	<i>Arachis hypogaea</i>	Peanut	Unassigned	Ara h 8 allergen isoform [Arachis hypogaea]	145904610
134	<i>Arachis hypogaea</i>	Peanut	Unassigned	Ara h 7 allergen precursor [Arachis hypogaea]	158121995
135	<i>Arachis hypogaea</i>	Peanut	Unassigned	Chain A, Allergen Ara h6 From Peanut (Arachis Hypogaea)	159163254
136	<i>Arachis hypogaea</i>	Peanut	Unassigned	LTP isoallergen 1 precursor [Arachis hypogaea]	161087230
137	<i>Arachis hypogaea</i>	Peanut	Unassigned	LTP isoallergen 2 [Arachis hypogaea]	161610580
138	<i>Arachis hypogaea</i>	Peanut	Unassigned	Ara h 8 allergen isoform 3 [Arachis hypogaea]	169786740
139	<i>Arachis hypogaea</i>	Peanut	Unassigned	arachin Ara h3 isoform [Arachis hypogaea]	199732457
140	<i>Arachis hypogaea</i>	Peanut	Unassigned	Chain A, Crystal Structure Of Peanut Major Allergen Ara H 3	224036293
141	<i>Arachis hypogaea</i>	Peanut	Unassigned	Ara h 2.01 allergen [Arachis hypogaea]	224747150
142	<i>Arachis hypogaea</i>	Peanut	Unassigned	profilin [Arachis hypogaea]	284810529
143	<i>Argas reflexus</i>	European pigeon tick	Arg r 1	Arg r 1 precursor [Argas reflexus]	58371884
144	<i>Artemisia vulgaris</i>	Mugwort	Art v 1	major pollen allergen Art v 1 precursor [Artemisia vulgaris]	27818335
145	<i>Artemisia vulgaris</i>	Mugwort	Unassigned	Amb a 1-like protein [Artemisia vulgaris]	62530263
146	<i>Artemisia vulgaris</i>	Mugwort	Unassigned	Nonspecific lipid-transfer protein (LTP) (Pollen allergen Art v 3)	73621307
147	<i>Artemisia vulgaris</i>	Mugwort	Unassigned	Profilin-1 (Pollen allergen Art v 4.01)	73621415

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
148	<i>Artemisia vulgaris</i>	Mugwort	Unassigned	Profilin-2 (Pollen allergen Art v 4.02)	73621416
149	<i>Artemisia vulgaris</i>	Mugwort	Unassigned	art v 2 allergen [<i>Artemisia vulgaris</i>]	148887203
150	<i>Artemisia vulgaris</i>	Mugwort	Unassigned	Art v 3.0201 allergen precursor [<i>Artemisia vulgaris</i>]	189544578
151	<i>Artemisia vulgaris</i>	Mugwort	Unassigned	Art v 3 allergen precursor [<i>Artemisia vulgaris</i>]	189544584
152	<i>Artemisia vulgaris</i>	Mugwort	Unassigned	Art v 3.0301 allergen precursor [<i>Artemisia vulgaris</i>]	189544590
153	<i>Artemisia vulgaris</i>	Mugwort	Unassigned	Art v 3 allergen precursor [<i>Artemisia vulgaris</i>]	189544595
154	<i>Arthroderma benhamiae</i>	Fungus	Unassigned	tri m 4 allergen [<i>Arthroderma benhamiae</i>]	23894232
155	<i>Arthroderma benhamiae</i>	Fungus	Unassigned	tri m 2 allergen [<i>Arthroderma benhamiae</i>]	23894240
156	<i>Arthroderma benhamiae</i>	Fungus	Unassigned	tri m 2 allergen [<i>Arthroderma benhamiae</i>]	23894244
157	<i>Arthroderma vanbreuseghemii</i>	Fungus	Unassigned	allergen [<i>Arthroderma vanbreuseghemii</i>]	219687753
158	<i>Ascaris lumbricoides</i>	Parasitic roundworm	Unassigned	ABA-1 allergen [<i>Ascaris lumbricoides</i>]	2735096
159	<i>Ascaris lumbricoides</i>	Parasitic roundworm	Unassigned	ABA-1 allergen [<i>Ascaris lumbricoides</i>]	2735098
160	<i>Ascaris lumbricoides</i>	Parasitic roundworm	Unassigned	ABA-1 allergen [<i>Ascaris lumbricoides</i>]	2735100
161	<i>Ascaris lumbricoides</i>	Parasitic roundworm	Unassigned	ABA-1 allergen [<i>Ascaris lumbricoides</i>]	2735102
162	<i>Ascaris lumbricoides</i>	Parasitic roundworm	Unassigned	ABA-1 allergen [<i>Ascaris lumbricoides</i>]	2735104
163	<i>Ascaris lumbricoides</i>	Parasitic roundworm	Unassigned	ABA-1 allergen [<i>Ascaris lumbricoides</i>]	2735106
164	<i>Ascaris lumbricoides</i>	Parasitic roundworm	Unassigned	ABA-1 allergen [<i>Ascaris lumbricoides</i>]	2735108
165	<i>Ascaris lumbricoides</i>	Parasitic roundworm	Unassigned	ABA-1 allergen [<i>Ascaris lumbricoides</i>]	2735110
166	<i>Ascaris lumbricoides</i>	Parasitic roundworm	Unassigned	ABA-1 allergen [<i>Ascaris lumbricoides</i>]	2735112
167	<i>Ascaris lumbricoides</i>	Parasitic roundworm	Unassigned	ABA-1 allergen [<i>Ascaris lumbricoides</i>]	2735114
168	<i>Ascaris lumbricoides</i>	Parasitic roundworm	Unassigned	ABA-1 allergen [<i>Ascaris lumbricoides</i>]	2735118
169	<i>Ascaris lumbricoides</i>	Parasitic roundworm	Unassigned	tropomyosin [<i>Ascaris lumbricoides</i>]	224016002
170	<i>Ascaris suum</i>	Parasitic roundworm	Asc s 1	major allergen ABA-1=TBA-1 allergen homolog {N-terminal} [<i>Ascaris suum</i> , pseudocoelomic body fluid, Peptide Partial, 68 aa]	299550

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
171	<i>Ascaris suum</i>	Parasitic roundworm	Asc s 1	ABA-1 polypeptide precursor (Body fluid allergen 1) (Allergen Asc s 1) (Nematode polypeptide allergen ABA-1) (NPA ABA-1) [Contains: ABA-1B1 repeat unit; ABA-1A4 repeat unit; ABA-1A3 repeat unit; ABA-1A2 repeat unit; ABA-1A1 repeat unit; C-terminal extensi	77416849
172	<i>Aspergillus flavus</i>	Fungus	Unassigned	Allergen Asp fl 1	74665726
173	<i>Aspergillus fumigatus</i>	Fungus	Asp f 2	Asp FII [Aspergillus fumigatus]	664852
174	<i>Aspergillus fumigatus</i>	Fungus	Asp f 10	aspergillopepsin i [Aspergillus fumigatus]	963013
175	<i>Aspergillus fumigatus</i>	Fungus	Asp f 6	manganese superoxide dismutase [Aspergillus fumigatus]	1648970
176	<i>Aspergillus fumigatus</i>	Fungus	Unassigned	cellular serine proteinase [Aspergillus fumigatus]	2143220
177	<i>Aspergillus fumigatus</i>	Fungus	Asp f 3	peroxisomal-like protein [Aspergillus fumigatus]	2769700
178	<i>Aspergillus fumigatus</i>	Fungus	Asp f 9	rAsp f 9 [Aspergillus fumigatus]	2879890
179	<i>Aspergillus fumigatus</i>	Fungus	Asp f 4	rAsp f 4 [Aspergillus fumigatus]	3005839
180	<i>Aspergillus fumigatus</i>	Fungus	Asp f 1	Aspf1 allergen [Aspergillus fumigatus]	3021324
181	<i>Aspergillus fumigatus</i>	Fungus	Asp f 16	allergen [Aspergillus fumigatus]	3643813
182	<i>Aspergillus fumigatus</i>	Fungus	Asp f 11	PPIase [Aspergillus fumigatus]	5019414
183	<i>Aspergillus fumigatus</i>	Fungus	Asp f 8	rAsp f 8 [Aspergillus fumigatus]	6686524
184	<i>Aspergillus fumigatus</i>	Fungus	Asp f 1	major allergen I 18kDa antigen [Aspergillus fumigatus]	9280360
185	<i>Aspergillus fumigatus</i>	Fungus	Asp f 22	enolase [Aspergillus fumigatus]	13925873
186	<i>Aspergillus fumigatus</i>	Fungus	Unassigned	large subunit ribosomal protein L3 [Aspergillus fumigatus]	21215170
187	<i>Aspergillus fumigatus</i>	Fungus	Unassigned	Ribonuclease mitogillin precursor (Major allergen Asp f 1) (Asp f I) (Allergen I/a) (IgE-binding ribotoxin)	54039254
188	<i>Aspergillus fumigatus</i>	Fungus	Unassigned	Enolase (2-phosphoglycerate dehydratase) (2-phospho-D-glycerate hydro-lyase) (Allergen Asp f 22)	83288046

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
189	<i>Aspergillus fumigatus</i>	Fungus	Asp f 2	Major allergen Asp f 2 precursor (Asp f II)	83300352
190	<i>Aspergillus fumigatus</i>	Fungus	Unassigned	Allergen Asp f 4 precursor	83300369
191	<i>Aspergillus fumigatus</i>	Fungus	Asp f 7	Allergen Asp f 7 precursor	83300389
192	<i>Aspergillus fumigatus</i>	Fungus	Asp f 12	Heat shock protein 90 (Heat shock protein hsp1) (65 kDa IgE-binding protein) (Allergen Asp f 12)	83303658
193	<i>Aspergillus fumigatus</i>	Fungus	Unassigned	60S ribosomal protein L3 (Allergen Asp f 23)	83305621
194	<i>Aspergillus fumigatus</i>	Fungus	Unassigned	60S acidic ribosomal protein P2 (Allergen Asp f 8) (AfP2)	83305635
195	<i>Aspergillus fumigatus</i>	Fungus	Unassigned	Superoxide dismutase [Mn], mitochondrial precursor (Allergen Asp f 6)	83305645
196	<i>Aspergillus fumigatus</i>	Fungus	Unassigned	Probable glycosidase crf1 precursor (Crh-like protein) (Allergen Asp f 9)	85540942
197	<i>Aspergillus fumigatus</i> Af293	Fungus	Unassigned	allergen Asp F3 [Aspergillus fumigatus Af293]	66845476
198	<i>Aspergillus fumigatus</i> Af293	Fungus	Unassigned	allergen Asp F4 [Aspergillus fumigatus Af293]	66847146
199	<i>Aspergillus fumigatus</i> Af293	Fungus	Unassigned	major allergen Asp F2 [Aspergillus fumigatus Af293]	66849502
200	<i>Aspergillus fumigatus</i> Af293	Fungus	Unassigned	allergen Asp F7 [Aspergillus fumigatus Af293]	66849793
201	<i>Aspergillus niger</i>	Fungus	Unassigned	serine protease	289172
202	<i>Aspergillus niger</i>	Fungus	Asp n 14	xylosidase [Aspergillus niger]	2181180
203	<i>Aspergillus niger</i>	Fungus	Asp n 14	beta-xylosidase [Aspergillus niger]	4235093
204	<i>Aspergillus oryzae</i>	Fungus	Asp o 13	Oryzin precursor (Alkaline proteinase) (ALP) (Aspergillus proteinase B) (Aspergillopeptidase B)	129235
205	<i>Aspergillus oryzae</i>	Fungus	Asp o 21	Alpha-amylase A type-1/2 precursor (Taka-amylase A) (TAA) (1,4-alpha-D-glucan glucanohydrolase)	94706935
206	<i>Bacillus lentus</i>	Bacteria	Unassigned	RecName: Full=Subtilisin Savinase; AltName: Full=Alkaline protease	267048
207	<i>Bacillus licheniformis</i>	Bacteria	Unassigned	RecName: Full=Subtilisin Carlsberg; Flags: Precursor	135016

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
208	<i>Bacillus licheniformis</i>	Bacteria	Unassigned	subtilisin precursor [Bacillus licheniformis]	11127680
209	<i>Bacillus sp.</i>	Bacteria	Unassigned	prepro AprM [Bacillus sp.]	1225905
210	<i>Balanus rostratus</i>	Barnacle	Unassigned	tropomyosin [Balanus rostratus]	125659386
211	<i>Batillus cornutus</i>	Japanese turban shell	Unassigned	[Segment 1 of 6] Tropomyosin (Major allergen Tur c 1)	47117350
212	<i>Batillus cornutus</i>	Japanese turban shell	Unassigned	[Segment 2 of 6] Tropomyosin (Major allergen Tur c 1)	47117351
213	<i>Batillus cornutus</i>	Japanese turban shell	Unassigned	tropomyosin [Turbo cornutus]	219806588
214	<i>Bertholletia excelsa</i>	Brazil nut	Unassigned	2S albumin [Bertholletia excelsa]	17713
215	<i>Bertholletia excelsa</i>	Brazil nut	Ber e 1	2S sulfur-rich seed storage protein precursor (Allergen Ber e 1)	112754
216	<i>Bertholletia excelsa</i>	Brazil nut	Ber e 2	11S globulin [Bertholletia excelsa]	30313867
217	<i>Betula pendula</i>	European white birch	Bet v 1	Major pollen allergen Bet v 1-A (Allergen Bet v I-A)	114922
218	<i>Betula pendula</i>	European white birch	Bet v 2	Profilin (Pollen allergen Bet v 2) (Bet v II)	130975
219	<i>Betula pendula</i>	European white birch	Unassigned	Bet v I=major allergen [Betula verrucosa=birch trees, pollen, Peptide Partial, 43 aa]	239734
220	<i>Betula pendula</i>	European white birch	Bet v 1	major pollen allergen Bet v I - European white birch (fragment)	320545
221	<i>Betula pendula</i>	European white birch	Unassigned	major pollen allergen Bet v II - European white birch (fragment)	320546
222	<i>Betula pendula</i>	European white birch	Bet v 1	1 Sc-3 [Betula pendula]	534898
223	<i>Betula pendula</i>	European white birch	Bet v 1	1 Sc2 [Betula pendula]	534900
224	<i>Betula pendula</i>	European white birch	Bet v 1	1-Sc1 [Betula pendula]	534910
225	<i>Betula pendula</i>	European white birch	Bet v 3	Calcium-binding allergen Bet v 3 (Bet v III)	1168696
226	<i>Betula pendula</i>	European white birch	Bet v 1.0201	Major pollen allergen Bet v 1-B (Bet v I-B)	1168701
227	<i>Betula pendula</i>	European white birch	Bet v 1.0301	Major pollen allergen Bet v 1-C (Bet v I-C)	1168702
228	<i>Betula pendula</i>	European white birch	Bet v 1	Major pollen allergen Bet v 1-D/H (Bet v I-D/H)	1168703
229	<i>Betula pendula</i>	European white birch	Bet v 1.0501	Major pollen allergen Bet v 1-E (Bet v I-E)	1168704
230	<i>Betula pendula</i>	European white birch	Bet v 1f/I	Major pollen allergen Bet v 1-F/I (Bet v I-F/I)	1168705
231	<i>Betula pendula</i>	European white birch	Bet v 1.0701	Major pollen allergen Bet v 1-G (Bet v I-G)	1168706

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
232	<i>Betula pendula</i>	European white birch	Bet v 1.0801	Major pollen allergen Bet v 1-J (Bet v I-J)	1168707
233	<i>Betula pendula</i>	European white birch	Bet v 1.0901	Major pollen allergen Bet v 1-K (Bet v I-K)	1168708
234	<i>Betula pendula</i>	European white birch	Bet v 1.1001	Major pollen allergen Bet v 1-L (Bet v I-L)	1168709
235	<i>Betula pendula</i>	European white birch	Bet v 1m/n	Major pollen allergen Bet v 1-M/N (Bet v I-M/N)	1168710
236	<i>Betula pendula</i>	European white birch	Bet v 1.1601	major allergen Bet v 1 [Betula pendula]	1321714
237	<i>Betula pendula</i>	European white birch	Bet v 1.1701	major allergen Bet v 1 [Betula pendula]	1321716
238	<i>Betula pendula</i>	European white birch	Bet v 1.1801	major allergen Bet v 1 [Betula pendula]	1321718
239	<i>Betula pendula</i>	European white birch	Bet v 1.1502	major allergen Bet v 1 [Betula pendula]	1321720
240	<i>Betula pendula</i>	European white birch	Bet v 1.1901	major allergen Bet v 1 [Betula pendula]	1321722
241	<i>Betula pendula</i>	European white birch	Bet v 1.2001	major allergen Bet v 1 [Betula pendula]	1321724
242	<i>Betula pendula</i>	European white birch	Bet v 1.2101	major allergen Bet v 1 [Betula pendula]	1321726
243	<i>Betula pendula</i>	European white birch	Bet v 1.2201	major allergen Bet v 1 [Betula pendula]	1321728
244	<i>Betula pendula</i>	European white birch	Bet v 1.2401	pollen allergen Bet v 1 [Betula pendula]	1542861
245	<i>Betula pendula</i>	European white birch	Bet v 1.2501	pollen allergen Bet v 1 [Betula pendula]	1542863
246	<i>Betula pendula</i>	European white birch	Bet v 1.2601	pollen allergen Bet v 1 [Betula pendula]	1542865
247	<i>Betula pendula</i>	European white birch	Bet v 1.2701	pollen allergen Bet v 1 [Betula pendula]	1542867
248	<i>Betula pendula</i>	European white birch	Bet v 1.2801	pollen allergen Bet v 1 [Betula pendula]	1542869
249	<i>Betula pendula</i>	European white birch	Bet v 1.2901	pollen allergen Bet v 1 [Betula pendula]	1542871
250	<i>Betula pendula</i>	European white birch	Bet v 1.3001	pollen allergen Bet v 1 [Betula pendula]	1542873
251	<i>Betula pendula</i>	European white birch	Bet v 1.2301	major allergen Bet v 1 [Betula pendula]	2414158
252	<i>Betula pendula</i>	European white birch	Bet v 1	pollen allergen Betv1 [Betula pendula]	2564220
253	<i>Betula pendula</i>	European white birch	Bet v 1	pollen allergen Betv1 [Betula pendula]	2564222
254	<i>Betula pendula</i>	European white birch	Bet v 1	pollen allergen Betv1 [Betula pendula]	2564224
255	<i>Betula pendula</i>	European white birch	Bet v 1	pollen allergen Betv1 [Betula pendula]	2564228
256	<i>Betula pendula</i>	European white birch	Bet v 1	pollen allergen Betv1, isoform at8 [Betula pendula]	4006928
257	<i>Betula pendula</i>	European white birch	Bet v 1	pollen allergen Betv1, isoform at10 [Betula pendula]	4006945

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
258	<i>Betula pendula</i>	European white birch	Unassigned	pollen allergen Betv1, isoform at14 [Betula pendula]	4006947
259	<i>Betula pendula</i>	European white birch	Bet v 1	pollen allergen Betv1, isoform at37 [Betula pendula]	4006953
260	<i>Betula pendula</i>	European white birch	Bet v 1	pollen allergen Betv1, isoform at42 [Betula pendula]	4006955
261	<i>Betula pendula</i>	European white birch	Bet v 1	pollen allergen Betv1, isoform at45 [Betula pendula]	4006957
262	<i>Betula pendula</i>	European white birch	Bet v 1	pollen allergen Betv1, isoform at50 [Betula pendula]	4006959
263	<i>Betula pendula</i>	European white birch	Bet v 1	pollen allergen Betv1, isoform at59 [Betula pendula]	4006961
264	<i>Betula pendula</i>	European white birch	Unassigned	pollen allergen Betv1, isoform at87 [Betula pendula]	4006963
265	<i>Betula pendula</i>	European white birch	Bet v 1	pollen allergen Betv1, isoform at5 [Betula pendula]	4006965
266	<i>Betula pendula</i>	European white birch	Bet v 1	pollen allergen Betv1, isoform at7 [Betula pendula]	4006967
267	<i>Betula pendula</i>	European white birch	Bet v 1	pollen allergen, Betv1 [Betula pendula]	4376216
268	<i>Betula pendula</i>	European white birch	Bet v 1	pollen allergen, Betv1 [Betula pendula]	4376219
269	<i>Betula pendula</i>	European white birch	Bet v 1	pollen allergen, Betv1 [Betula pendula]	4376220
270	<i>Betula pendula</i>	European white birch	Bet v 1	pollen allergen, Betv1 [Betula pendula]	4376221
271	<i>Betula pendula</i>	European white birch	Bet v 1	pollen allergen, Betv1 [Betula pendula]	4376222
272	<i>Betula pendula</i>	European white birch	Bet v 1 b1	isoallergen bet v 1 b1 [Betula pendula]	4590392
273	<i>Betula pendula</i>	European white birch	Bet v 1 b2	isoallergen Bet v 1 b2 [Betula pendula]	4590394
274	<i>Betula pendula</i>	European white birch	bet v 1 b3	isoallergen bet v 1 b3 [Betula pendula]	4590396
275	<i>Betula pendula</i>	European white birch	Bet v 6.0102	allergenic isoflavone reductase-like protein Bet v 6.0102 [Betula pendula]	10764491
276	<i>Betula pendula</i>	European white birch	Bet v 1	Chain A, Birch Pollen Allergen Bet V 1 Mutant N28t, K32q, E45s, P108g	11514622
277	<i>Betula pendula</i>	European white birch	Bet v 4	Polcalcin Bet v 4 (Calcium-binding pollen allergen Bet v 4)	14423850

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
278	<i>Betula pendula</i>	European white birch	Bet v 7	peptidylprolyl isomerase (cyclophilin) [Betula pendula]	21886603
279	<i>Betula pendula</i>	European white birch	Bet v 1x	allergen Bet v 1x [Betula pendula]	30908931
280	<i>Betula pendula</i>	European white birch	Bet v 1	Chain A, Birch Pollen Allergen Bet V 1 Mutant E45s	38492423
281	<i>Betula pendula</i>	European white birch	Unassigned	Chain A, Birch Pollen Profilin	157830684
282	<i>Betula pendula</i>	European white birch	Bet v 1	Chain A, Birch Pollen Allergen Bet V 1	159162097
283	<i>Betula platyphylla</i>	Japanese white birch	Unassigned	Bet vl jap1 [Betula platyphylla]	12583681
284	<i>Betula platyphylla</i>	Japanese white birch	Unassigned	Bet vl jap2 [Betula platyphylla]	12583683
285	<i>Betula platyphylla</i>	Japanese white birch	Unassigned	Bet vl jap3 [Betula platyphylla]	12583685
286	<i>Betula sp.</i>	Birch	Unassigned	isoallergen {N-terminal} [birch, pollen, Peptide Partial, 51 aa]	298736
287	<i>Betula sp.</i>	Birch	Unassigned	isoallergen {N-terminal} [birch, pollen, Peptide Partial, 51 aa]	298737
288	<i>Blattella germanica</i>	German cockroach	Unassigned	36 kda allergen {peptide 143-111} [Blattella germanica=German cockroaches, Peptide Partial, 20 aa]	544618
289	<i>Blattella germanica</i>	German cockroach	Unassigned	36 kda allergen {peptide 143-115} [Blattella germanica=German cockroaches, Peptide Partial, 25 aa]	544619
290	<i>Blattella germanica</i>	German cockroach	Bla g 4	allergen Bla g 4	1166573
291	<i>Blattella germanica</i>	German cockroach	Bla g 2	Aspartic protease Bla g 2 precursor (Allergen Bla g II)	1703445
292	<i>Blattella germanica</i>	German cockroach	Bla g 1.02	major allergen Bla g 1.02 [Blattella germanica]	4240395
293	<i>Blattella germanica</i>	German cockroach	Bla g 1.0101	major allergen Bla g 1.0101 [Blattella germanica]	4572592
294	<i>Blattella germanica</i>	German cockroach	Unassigned	Glutathione S-transferase (GST class-sigma) (Major allergen Bla g 5)	6225491
295	<i>Blattella germanica</i>	German cockroach	Unassigned	tropomyosin [Blattella germanica]	8101069
296	<i>Blattella germanica</i>	German cockroach	Unassigned	Chain A, The Structure Of Mutant (N93g) Of Bla G 2	62738637
297	<i>Blattella germanica</i>	German cockroach	Unassigned	Bla g 4 allergen [Blattella germanica]	144952778

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
298	<i>Blattella germanica</i>	German cockroach	Unassigned	Bla g 5 variant allergen [Blattella germanica]	144952780
299	<i>Blattella germanica</i>	German cockroach	Unassigned	Bla g 2 allergen variant [Blattella germanica]	145105726
300	<i>Blattella germanica</i>	German cockroach	Unassigned	delta class glutathione S-transferase [Blattella germanica]	161137518
301	<i>Blattella germanica</i>	German cockroach	Unassigned	Bla g 4 isoallergen 1 [Blattella germanica]	194350815
302	<i>Blattella germanica</i>	German cockroach	Unassigned	Bla g 4 isoallergen 2 [Blattella germanica]	194350817
303	<i>Blattella germanica</i>	German cockroach	Unassigned	Bla g 4 allergen [Blattella germanica]	212675308
304	<i>Blomia tropicalis</i>	Mite	Unassigned	Blo t 1.02 [Blomia tropicalis] Manual Entry	2
305	<i>Blomia tropicalis</i>	Mite	Blo t 5	major IgE-binding protein Blo t 5 [Blomia tropicalis]	4204917
306	<i>Blomia tropicalis</i>	Mite	Blo t 1	cysteine protease precursor [Blomia tropicalis]	14276828
307	<i>Blomia tropicalis</i>	Mite	Unassigned	Fatty acid-binding protein (Allergen Blo t 13) (Bt6)	14423698
308	<i>Blomia tropicalis</i>	Mite	Blo t 11	paramyosin allergen [Blomia tropicalis]	21954740
309	<i>Blomia tropicalis</i>	Mite	Unassigned	trypsin [Blomia tropicalis]	25989482
310	<i>Blomia tropicalis</i>	Mite	Unassigned	Blo t 1 allergen [Blomia tropicalis]	33667928
311	<i>Blomia tropicalis</i>	Mite	Unassigned	Blo t 3 allergen [Blomia tropicalis]	33667930
312	<i>Blomia tropicalis</i>	Mite	Unassigned	Blo t 13 allergen [Blomia tropicalis]	37958153
313	<i>Blomia tropicalis</i>	Mite	Unassigned	Blo t 21 allergen [Blomia tropicalis]	111120420
314	<i>Blomia tropicalis</i>	Mite	Unassigned	Blo t 21 allergen [Blomia tropicalis]	111120424
315	<i>Blomia tropicalis</i>	Mite	Unassigned	Blo t 21 allergen [Blomia tropicalis]	111120428
316	<i>Blomia tropicalis</i>	Mite	Unassigned	Blo t 21 allergen [Blomia tropicalis]	111120432
317	<i>Blomia tropicalis</i>	Mite	Unassigned	Blo t 5 allergen [Blomia tropicalis]	111120436
318	<i>Blomia tropicalis</i>	Mite	Unassigned	Blo t 5 allergen [Blomia tropicalis]	111120450
319	<i>Blomia tropicalis</i>	Mite	Unassigned	Blo t 21 allergen [Blomia tropicalis]	111494253
320	<i>Blomia tropicalis</i>	Mite	Unassigned	group 10 allergen Blo t 10 [Blomia tropicalis]	156938889
321	<i>Blomia tropicalis</i>	Mite	Unassigned	Chain A, Nmr Solution Structure Of Blo T 5, A Major Mite Allergen From Blomia Tropicalis	160285626

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
322	<i>Bombus terrestris</i>	Bumblebee	Unassigned	Phospholipase A2 (Phosphatidylcholine 2-acylhydrolase) (Allergen Bom t 1)	14423832
323	<i>Bombyx mori</i>	Moth	Unassigned	arginine kinase [Bombyx mori]	204324083
324	<i>Bos taurus</i>	Bovine	Bos d 5	beta-lactoglobulin [Bos taurus]	520
325	<i>Bos taurus</i>	Bovine	Unassigned	Beta-lactoglobulin precursor (Beta-LG) (Allergen Bos d 5)	125910
326	<i>Bos taurus</i>	Bovine	Unassigned	Alpha-lactalbumin precursor (Lactose synthase B protein) (Allergen Bos d 4)	125996
327	<i>Bos taurus</i>	Bovine	Unassigned	alpha-s1-casein	162650
328	<i>Bos taurus</i>	Bovine	Unassigned	beta-lactoglobulin	162750
329	<i>Bos taurus</i>	Bovine	Unassigned	alpha-s1-casein precursor	162792
330	<i>Bos taurus</i>	Bovine	Unassigned	alpha-S1-casein	162794
331	<i>Bos taurus</i>	Bovine	Unassigned	beta-casein precursor	162797
332	<i>Bos taurus</i>	Bovine	Unassigned	beta-casein	162805
333	<i>Bos taurus</i>	Bovine	Unassigned	kappa-casein precursor	162811
334	<i>Bos taurus</i>	Bovine	Unassigned	alpha-s1-casein	162927
335	<i>Bos taurus</i>	Bovine	Unassigned	alpha-s2-like casein precursor	162929
336	<i>Bos taurus</i>	Bovine	Unassigned	beta-casein precursor	162931
337	<i>Bos taurus</i>	Bovine	Bos d 4	alpha-lactalbumin [Bos taurus]	295774
338	<i>Bos taurus</i>	Bovine	Unassigned	beta-casein A3 [Bos taurus]	459292
339	<i>Bos taurus</i>	Bovine	Unassigned	RecName: Full=Serum albumin; AltName: Full=BSA; AltName: Allergen=Bos d 6; Flags: Precursor	1351907
340	<i>Bos taurus</i>	Bovine	Bos d 3	S100 calcium-binding protein A7 (Allergen Bos d 3) (Dander minor allergen BDA11) (Dermal allergen BDA11) (Calcium-binding protein in amniotic fluid 2) (CAAF2)	2493414
341	<i>Bos taurus</i>	Bovine	Unassigned	Allergen Bos d 2 precursor (Dander major allergen BDA20) (Dermal allergen BDA20)	2497701
342	<i>Bos taurus</i>	Bovine	Unassigned	bovine serum albumin [Bos taurus]	3336842
343	<i>Bos taurus</i>	Bovine	Unassigned	collagen alpha-2(I) chain precursor [Bos taurus]	27806257
344	<i>Bos taurus</i>	Bovine	Unassigned	lactotransferrin [Bos taurus]	30794292

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
345	<i>Bos taurus</i>	Bovine	Unassigned	alpha S1 casein [Bos taurus]	159793197
346	<i>Bos taurus</i>	Bovine	Unassigned	alpha S1 casein [Bos taurus]	159793201
347	<i>Bos taurus</i>	Bovine	Unassigned	alpha S1 casein [Bos taurus]	159793217
348	<i>Bos taurus</i>	Bovine	Unassigned	major allergen beta-lactoglobulin [Bos taurus]	195957138
349	<i>Brassica juncea</i>	Mustard	Bra j 1	Allergen Bra j 1-E (Bra j I) [Contains: Allergen Bra j 1-E small chain; Allergen Bra j 1-E large chain]	32363444
350	<i>Brassica napus</i>	Rape	Unassigned	pollen allergen group II (clone 42) - rape	2129801
351	<i>Brassica napus</i>	Rape	Unassigned	pollen allergen group II (clone 44) - rape	2129802
352	<i>Brassica napus</i>	Rape	Unassigned	recombinant Ib pronapin precursor [Brassica napus]	26985163
353	<i>Brassica napus</i>	Rape	Unassigned	Polcalcin Bra n 1 (Calcium-binding pollen allergen Bra n 1)	59800143
354	<i>Brassica napus</i>	Rape	Unassigned	Polcalcin Bra n 2 (Calcium-binding pollen allergen Bra n 2)	59800145
355	<i>Brassica napus</i>	Rape	Bra n 1	Napin-3 (Napin BnIII) (Napin nIII) (1.7S seed storage protein) [Contains: Napin-3 small chain; Napin-3 large chain]	75107016
356	<i>Brassica oleracea</i>	Cabbage	Unassigned	LTP Bra o 3 [Brassica oleracea] Manual Entry	1
357	<i>Brassica rapa</i>	Turnip	Unassigned	pollen allergen group II (clone 4) - turnip (fragment)	2129805
358	<i>Brassica rapa</i> subsp. <i>rapa</i>	Turnip	Unassigned	Chitin-binding allergen Bra r 2	32363456
359	<i>Brassica rapa</i> subsp. <i>rapa</i>	Turnip	Unassigned	Polcalcin Bra r 1 (Calcium-binding pollen allergen Bra r 1)	59800144
360	<i>Brassica rapa</i> subsp. <i>rapa</i>	Turnip	Unassigned	Polcalcin Bra r 2 (Calcium-binding pollen allergen Bra r 2)	59800146
361	<i>Candida albicans</i>	Yeast	Unassigned	Enolase 1 (2-phosphoglycerate dehydratase) (2-phospho-D-glycerate hydro-lyase)	232054
362	<i>Candida albicans</i>	Yeast	Cand a 3	29 kDa IgE-binding protein [Candida albicans]	37548637
363	<i>Canis familiaris</i>	Dog	Can f 3	albumin [Canis familiaris]	633938
364	<i>Canis familiaris</i>	Dog	Can f 1	Major allergen Can f 1 precursor (Allergen Dog 1)	3121745
365	<i>Canis familiaris</i>	Dog	Can f 2	Minor allergen Can f 2 precursor (Allergen Dog 2)	3121746
366	<i>Canis familiaris</i>	Dog	Can f 3	albumin [Canis familiaris]	3319897

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
367	<i>Canis familiaris</i>	Dog	Can f 3	albumin [Canis familiaris]	6687188
368	<i>Canis familiaris</i>	Dog	Can f 2	precursor Can f II [Canis familiaris]	29292272
369	<i>Canis familiaris</i>	Dog	Can f 2	precursor Can f II [Canis familiaris]	29292274
370	<i>Capsicum annuum</i>	Bell pepper	Cap a 2	profilin [Capsicum annuum]	16555785
371	<i>Carica papaya</i>	Papaya	Unassigned	Papain precursor (Papaya proteinase I) (PPI) (Allergen Car p 1)	129614
372	<i>Carpinus betulus</i>	Hornbeam	Unassigned	Car b I=major allergen [Carpinus betulus=hornbeam trees, pollen, Peptide Partial, 40 aa]	239735
373	<i>Carpinus betulus</i>	Hornbeam	Car b 1	Car b I [Carpinus betulus]	402745
374	<i>Carpinus betulus</i>	Hornbeam	Car b 1	Major pollen allergen Car b 1 isoforms 1A and 1B (Car B I)	730048
375	<i>Carpinus betulus</i>	Hornbeam	Car b 1	Major pollen allergen Car b 1 isoform 2 (Car b I)	730049
376	<i>Carpinus betulus</i>	Hornbeam	Car b 1.0103	pollen allergen Car b 1 [Carpinus betulus]	1545875
377	<i>Carpinus betulus</i>	Hornbeam	Car b 1.0104	pollen allergen Car b 1 [Carpinus betulus]	1545877
378	<i>Carpinus betulus</i>	Hornbeam	Car b 1.0104	pollen allergen Car b 1 [Carpinus betulus]	1545879
379	<i>Carpinus betulus</i>	Hornbeam	Car b 1.0105	pollen allergen Car b 1 [Carpinus betulus]	1545887
380	<i>Carpinus betulus</i>	Hornbeam	Car b 1	pollen allergen Car b 1 [Carpinus betulus]	1545891
381	<i>Carpinus betulus</i>	Hornbeam	Car b 1.0108	pollen allergen Car b 1 [Carpinus betulus]	1545893
382	<i>Carpinus betulus</i>	Hornbeam	Car b 1.0301	pollen allergen Car b 1 [Carpinus betulus]	1545895
383	<i>Carpinus betulus</i>	Hornbeam	Car b 1.0302	pollen allergen Car b 1 [Carpinus betulus]	1545897
384	<i>Carpinus betulus</i>	Hornbeam	Unassigned	pollen allergen Car b 1 isoform [Carpinus betulus]	167472837
385	<i>Carpinus betulus</i>	Hornbeam	Unassigned	pollen allergen Car b 1 isoform [Carpinus betulus]	167472839
386	<i>Carpinus betulus</i>	Hornbeam	Unassigned	pollen allergen Car b 1 isoform [Carpinus betulus]	167472841
387	<i>Carpinus betulus</i>	Hornbeam	Unassigned	pollen allergen Car b 1 isoform [Carpinus betulus]	167472843
388	<i>Carpinus betulus</i>	Hornbeam	Unassigned	pollen allergen Car b 1 isoform [Carpinus betulus]	167472845
389	<i>Castanea sativa</i>	European chestnut	Cas s 5	chitinase Ib [Castanea sativa]	1359600
390	<i>Castanea sativa</i>	European chestnut	Cas s 1	ypr10 [Castanea sativa]	16555781
391	<i>Castanea sativa</i>	European chestnut	Unassigned	Cas s 1 pollen allergen [Castanea sativa]	212291464

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
392	<i>Castanea sativa</i>	European chestnut	Unassigned	Cas s 1 pollen allergen [Castanea sativa]	212291466
393	<i>Castanea sativa</i>	European chestnut	Unassigned	Cas s 1 pollen allergen [Castanea sativa]	212291468
394	<i>Cavia porcellus</i>	Domestic guinea pig	Cav p 2	Major allergen Cav p 2	32363133
395	<i>Cavia porcellus</i>	Domestic guinea pig	Cav p 1	Major urinary protein (MUP) (Allergen Cav p 1)	32469617
396	<i>Chamaecyparis obtusa</i>	Japanese cypress	Unassigned	Major pollen allergen Cha o 1 precursor	9087163
397	<i>Chamaecyparis obtusa</i>	Japanese cypress	Unassigned	Polygalacturonase precursor (PG) (Pectinase) (Major pollen allergen Cha o 2)	47606004
398	<i>Chamaecyparis obtusa</i>	Japanese cypress	Unassigned	pollen allergen [Chamaecyparis obtusa]	114841683
399	<i>Charybdis feriatus</i>	Crab	Cha f 1	Tropomyosin (Allergen Cha f 1) (Cha f I)	14285800
400	<i>Chenopodium album</i>	Pigweed	Che a 2	pollen allergen Che a 2 [Chenopodium album]	29465666
401	<i>Chenopodium album</i>	Pigweed	Che a 3	pollen allergen Che a 3 [Chenopodium album]	29465668
402	<i>Chenopodium album</i>	Pigweed	Unassigned	Pollen allergen Che a 1 precursor	47605504
403	<i>Chenopodium album</i>	Pigweed	Unassigned	Che a 2 pollen allergen [Chenopodium album]	238886048
404	<i>Chionoecetes opilio</i>	Snow crab	Unassigned	tropomyosin slow-tonic isoform [Chionoecetes opilio]	125995167
405	<i>Chironomus kiiensis</i>	Midge	Unassigned	Tropomyosin (Allergen Chi k 10)	42559556
406	<i>Chironomus thummi thummi</i>	Midge	Chi t 1.01	Globin CTT-III precursor (Erythrocrutorin III)	121219
407	<i>Chironomus thummi thummi</i>	Midge	Chi t 1.02	Globin CTT-IV precursor	121227
408	<i>Chironomus thummi thummi</i>	Midge	Chi t 8	Globin CTT-VIII	121237
409	<i>Chironomus thummi thummi</i>	Midge	Chi t 7	Globin CTT-VIIB-3 precursor	121244
410	<i>Chironomus thummi thummi</i>	Midge	Chi t 7	Globin CTT-VIIB-6 precursor	121248
411	<i>Chironomus thummi thummi</i>	Midge	Chi t 7	Globin CTT-VIIB-7 precursor	121249
412	<i>Chironomus thummi thummi</i>	Midge	Chi t 4	Globin CTT-IIIA	121256
413	<i>Chironomus thummi thummi</i>	Midge	Chi t 9	Globin CTT-X	121259
414	<i>Chironomus thummi thummi</i>	Midge	Chi t 3	Globin CTT-II beta precursor	1707908
415	<i>Chironomus thummi thummi</i>	Midge	Chi t 2	Globin CTT-I/CTT-IA precursor (Erythrocrutorin)	2506460
416	<i>Chironomus thummi thummi</i>	Midge	Chi t 5	Globin CTT-VI precursor	2506461

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
417	<i>Chironomus thummi thummi</i>	Midge	Chi t 7	Globin CTT-VIIB-4 precursor (Erythrocrucorin)	56405052
418	<i>Chironomus thummi thummi</i>	Midge	Chi t 7	Globin CTT-VIIB-5/CTT-VIIB-9 precursor	56405054
419	<i>Citrus limon</i>	Lemon	Unassigned	Nonspecific lipid-transfer protein (LTP) (Allergen Cit l 3)	52783176
420	<i>Citrus sinensis</i>	Navel orange	Cit s 3	lipid transfer protein [Citrus sinensis]	50199132
421	<i>Citrus sinensis</i>	Navel orange	Unassigned	Germin-like protein (Allergen Cit s 1)	52782810
422	<i>Citrus sinensis</i>	Navel orange	Unassigned	Nonspecific lipid-transfer protein (LTP) (Allergen Cit s 3.0101)	52783177
423	<i>Citrus sinensis</i>	Navel orange	Unassigned	RecName: Full=Profilin; AltName: Allergen=Cit s 2	261260074
424	<i>Cladosporium cladosporioides</i>	Fungus	Unassigned	vacuolar serine protease [Cladosporium cladosporioides]	148361511
425	<i>Cochliobolus lunatus</i>	Fungus	Cur l 2.01	enolase [Curvularia lunata]	14585753
426	<i>Coprinus comatus</i>	Shaggy mane	Cop c 1	Cop c1 allergen [Coprinus comatus]	4538529
427	<i>Corylus avellana</i>	European hazelnut	Cor a 1.0103	major allergen [Corylus avellana]	22684
428	<i>Corylus avellana</i>	European hazelnut	Cor a 1.0104	major allergen [Corylus avellana]	22686
429	<i>Corylus avellana</i>	European hazelnut	Cor a 1.0102	major allergen [Corylus avellana]	22690
430	<i>Corylus avellana</i>	European hazelnut	Cor a l	Major pollen allergen Cor a 1 isoforms 5, 6, 11 and 16 (Cor a l)	584968
431	<i>Corylus avellana</i>	European hazelnut	Cor a 1.0201	major allergen Cor a 1 [Corylus avellana]	1321731
432	<i>Corylus avellana</i>	European hazelnut	Cor a 1.0301	major allergen Cor a 1 [Corylus avellana]	1321733
433	<i>Corylus avellana</i>	European hazelnut	Cor a 1.0401	major allergen Cor a 1.0401 [Corylus avellana]	5726304
434	<i>Corylus avellana</i>	European hazelnut	Cor a 10	putative luminal binding protein [Corylus avellana]	10944737
435	<i>Corylus avellana</i>	European hazelnut	Cor a 1.0402	major allergen variant Cor a 1.0402 [Corylus avellana]	11762102
436	<i>Corylus avellana</i>	European hazelnut	Cor a 1.0403	major allergen variant Cor a 1.0403 [Corylus avellana]	11762104
437	<i>Corylus avellana</i>	European hazelnut	Cor a 1.0404	major allergen variant Cor a 1.0404 [Corylus avellana]	11762106
438	<i>Corylus avellana</i>	European hazelnut	Cor a 2	minor allergen hazelnut profilin [Corylus avellana]	12659206
439	<i>Corylus avellana</i>	European hazelnut	Cor a 2	minor allergen hazelnut profilin [Corylus avellana]	12659208

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
440	<i>Corylus avellana</i>	European hazelnut	Cor a 8	lipid transfer protein precursor [Corylus avellana]	13507262
441	<i>Corylus avellana</i>	European hazelnut	Cor a 9	11S globulin-like protein [Corylus avellana]	18479082
442	<i>Corylus avellana</i>	European hazelnut	Cor a 11	48-kDa glycoprotein precursor [Corylus avellana]	19338630
443	<i>Corylus avellana</i>	European hazelnut	Unassigned	oleosin [Corylus avellana]	29170509
444	<i>Corylus avellana</i>	European hazelnut	Unassigned	2S albumin [Corylus avellana]	226437844
445	<i>Crassostrea gigas</i>	American oyster	Unassigned	tropomyosin [Crassostrea gigas]	15419048
446	<i>Crassostrea gigas</i>	American oyster	Unassigned	tropomyosin [Crassostrea gigas]	219806594
447	<i>Crassostrea virginica</i>	Eastern oyster	Unassigned	tropomyosin [Crassostrea virginica]	3668408
448	<i>Crocus sativus</i>	Saffron crocus	Unassigned	profilin [Crocus sativus]	58700651
449	<i>Cryptomeria japonica</i>	Japanese cedar	Unassigned	Cry j 1B precursor [Cryptomeria japonica]	493634
450	<i>Cryptomeria japonica</i>	Japanese cedar	Cry j 2	Polygalacturonase precursor (PG) (Pectinase) (Major pollen allergen Cry j 2) (Cry j II)	1171004
451	<i>Cryptomeria japonica</i>	Japanese cedar	Cry j 1	Sugi basic protein precursor (SBP) (Major allergen Cry j 1) (Cry j I)	1173367
452	<i>Cryptomeria japonica</i>	Japanese cedar	Cry j 1	Cry j 1 precursor [Cryptomeria japonica]	19570315
453	<i>Cryptomeria japonica</i>	Japanese cedar	Unassigned	isoflavone reductase-like protein CJP-6 [Cryptomeria japonica]	19847822
454	<i>Cryptomeria japonica</i>	Japanese cedar	Cry j 2	allergen Cry j 2 [Cryptomeria japonica]	24898904
455	<i>Cryptomeria japonica</i>	Japanese cedar	Cry j 2	allergen Cry j 2 [Cryptomeria japonica]	24898906
456	<i>Cryptomeria japonica</i>	Japanese cedar	Cry j 2	allergen Cry j 2 [Cryptomeria japonica]	24898908
457	<i>Cryptomeria japonica</i>	Japanese cedar	Unassigned	class IV chitinase [Cryptomeria japonica]	56550550
458	<i>Cryptomeria japonica</i>	Japanese cedar	Unassigned	pollen allergen [Cryptomeria japonica]	114841607
459	<i>Cryptomeria japonica</i>	Japanese cedar	Unassigned	pollen allergen [Cryptomeria japonica]	114841617
460	<i>Cryptomeria japonica</i>	Japanese cedar	Unassigned	pollen allergen [Cryptomeria japonica]	114841629
461	<i>Cryptomeria japonica</i>	Japanese cedar	Unassigned	pollen allergen [Cryptomeria japonica]	114841635
462	<i>Cryptomeria japonica</i>	Japanese cedar	Unassigned	pollen allergen [Cryptomeria japonica]	114841641
463	<i>Cryptomeria japonica</i>	Japanese cedar	Unassigned	pollen allergen [Cryptomeria japonica]	114841653

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
464	<i>Cryptomeria japonica</i>	Japanese cedar	Unassigned	pollen allergen [Cryptomeria japonica]	114841657
465	<i>Cryptomeria japonica</i>	Japanese cedar	Unassigned	pollen allergen [Cryptomeria japonica]	114841663
466	<i>Cryptomeria japonica</i>	Japanese cedar	Unassigned	pollen allergen [Cryptomeria japonica]	114841665
467	<i>Cryptomeria japonica</i>	Japanese cedar	Unassigned	pollen allergen [Cryptomeria japonica]	114841671
468	<i>Cryptomeria japonica</i>	Japanese cedar	Unassigned	allergen Cry j 2 [Cryptomeria japonica]	123299282
469	<i>Cryptomeria japonica</i>	Japanese cedar	Unassigned	thaumatin-like protein [Cryptomeria japonica]	139002766
470	<i>Cucumis melo</i>	Muskmelon	Cuc m 2	profilin [Cucumis melo]	31559374
471	<i>Cucumis melo</i>	Muskmelon	Cuc m 3	[Segment 1 of 3] Pathogenesis-related protein (PR-1) (Allergen Cuc m 3)	46396596
472	<i>Cucumis melo</i>	Muskmelon	Cuc m 3	[Segment 2 of 3] Pathogenesis-related protein (PR-1) (Allergen Cuc m 3)	46396597
473	<i>Cucumis melo</i>	Muskmelon	Cuc m 3	[Segment 3 of 3] Pathogenesis-related protein (PR-1) (Allergen Cuc m 3)	46396598
474	<i>Cucumis melo</i>	Muskmelon	Cuc m 2	profilin [Cucumis melo]	58263793
475	<i>Cucumis melo</i>	Muskmelon	Unassigned	Cucumisin precursor (Allergen Cuc m 1)	71153243
476	<i>Cucumis melo</i> var. <i>inodorus</i>	Muskmelon	Unassigned	pathogen-related protein 1 [Cucumis melo var. inodorus]	171464770
477	<i>Cucumis melo</i> var. <i>reticulatus</i>	Netted muskmelon	Cuc m 2	profilin [Cucumis melo var. reticulatus]	57021110
478	<i>Cupressus arizonica</i>	Arizona Cypress	Unassigned	Major pollen allergen Cup a 1	9087167
479	<i>Cupressus arizonica</i>	Arizona Cypress	Unassigned	Cup a 3 protein [Cupressus arizonica]	9929163
480	<i>Cupressus arizonica</i>	Arizona Cypress	Cup a 1	putative allergen Cup a 1 [Cupressus arizonica]	19069497
481	<i>Cupressus arizonica</i>	Arizona Cypress	Unassigned	major allergen Cup a 1 [Cupressus arizonica]	118197955
482	<i>Cupressus arizonica</i>	Arizona Cypress	Unassigned	putative Cup a 4 allergen [Hesperocyparis arizonica]	261865475
483	<i>Cupressus sempervirens</i>	Mediterranean Cypress	Cup s 1.0101	Cup s 1 pollen allergen precursor [Cupressus sempervirens]	8101711
484	<i>Cupressus sempervirens</i>	Mediterranean Cypress	Cup s 1.0102	Cup s 1 pollen allergen precursor [Cupressus sempervirens]	8101713
485	<i>Cupressus sempervirens</i>	Mediterranean Cypress	Cup s 1.0103	Cup s 1 pollen allergen precursor [Cupressus sempervirens]	8101715

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
486	<i>Cupressus sempervirens</i>	Mediterranean Cypress	Cup s 1.0104	Cup s 1 pollen allergen precursor [Cupressus sempervirens]	8101717
487	<i>Cupressus sempervirens</i>	Mediterranean Cypress	Cup s 1.0105	Cup s 1 pollen allergen precursor [Cupressus sempervirens]	8101719
488	<i>Cupressus sempervirens</i>	Mediterranean Cypress	Unassigned	PR5 allergen Cup s 3.2 precursor [Cupressus sempervirens]	38456228
489	<i>Cupressus sempervirens</i>	Mediterranean Cypress	Unassigned	PR5 allergen Cup s 3.3 precursor [Cupressus sempervirens]	38456230
490	<i>Cynodon dactylon</i>	Bermuda grass	Cyn d 1	major allergen Cyn d l=34 kda polypeptide {N-terminal} [Cynodon dactylon=Bermuda grass, pollen, Peptide Partial, 25 aa]	451274
491	<i>Cynodon dactylon</i>	Bermuda grass	Cyn d 1	major allergen Cyn d l=29 kda polypeptide {N-terminal} [Cynodon dactylon=Bermuda grass, pollen, Peptide Partial, 38 aa]	451275
492	<i>Cynodon dactylon</i>	Bermuda grass	Cyn d 1	Cyn d lb isoallergen {N-terminal} [Cynodon dactylon=Bermuda grass, pollen, Peptide Partial, 34 aa]	691726
493	<i>Cynodon dactylon</i>	Bermuda grass	Unassigned	B1 protein allergen [Cynodon dactylon]	1247373
494	<i>Cynodon dactylon</i>	Bermuda grass	Unassigned	B4 protein allergen [Cynodon dactylon]	1247375
495	<i>Cynodon dactylon</i>	Bermuda grass	Cyn d 7	calcium-binding pollen allergen [Cynodon dactylon]	1871507
496	<i>Cynodon dactylon</i>	Bermuda grass	Cyn d 12	profilin 1 [Cynodon dactylon]	2154730
497	<i>Cynodon dactylon</i>	Bermuda grass	Cyn d 1.0204	acidic Cyn d 1 isoallergen isoform 1 precursor [Cynodon dactylon]	10314021
498	<i>Cynodon dactylon</i>	Bermuda grass	Cyn d 1	Major pollen allergen Cyn d 1	14423757
499	<i>Cynodon dactylon</i>	Bermuda grass	Cyn d 1.0201	acidic allergen Cyn d 1 precursor [Cynodon dactylon]	15384338
500	<i>Cynodon dactylon</i>	Bermuda grass	Cyn d 1.0202	acidic Cyn d 1 isoallergen isoform 2 precursor [Cynodon dactylon]	16076693
501	<i>Cynodon dactylon</i>	Bermuda grass	Cyn d 1	acidic Cyn d 1 isoallergen isoform 3 precursor [Cynodon dactylon]	16076695
502	<i>Cynodon dactylon</i>	Bermuda grass	Cyn d 1.0203	acidic Cyn d 1 isoallergen isoform 4 precursor [Cynodon dactylon]	16076697

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
503	<i>Cyprinus carpio</i>	Carp	Unassigned	parvalbumin [Cyprinus carpio]	17977825
504	<i>Cyprinus carpio</i>	Carp	Unassigned	parvalbumin [Cyprinus carpio]	17977827
505	<i>Dactylis glomerata</i>	Orchard grass	Dac g 2	allergen Dac g II	1093120
506	<i>Dactylis glomerata</i>	Orchard grass	Dac g 2	pollen allergen (group II) [Dactylis glomerata]	4007040
507	<i>Dactylis glomerata</i>	Orchard grass	Dac g 5	group 5 allergen precursor [Dactylis glomerata]	14423124
508	<i>Dactylis glomerata</i>	Orchard grass	Unassigned	Pollen allergen Dac g 3 (Dac g III)	14423759
509	<i>Dactylis glomerata</i>	Orchard grass	Dac g 5	unnamed protein product [Dactylis glomerata]	18093971
510	<i>Dactylis glomerata</i>	Orchard grass	Dac g 1	unnamed protein product [Dactylis glomerata]	18093991
511	<i>Dactylis glomerata</i>	Orchard grass	Unassigned	[Segment 1 of 4] Major pollen allergen Dac g 4	32363464
512	<i>Dactylis glomerata</i>	Orchard grass	Unassigned	[Segment 2 of 4] Major pollen allergen Dac g 4	32363465
513	<i>Dactylis glomerata</i>	Orchard grass	Unassigned	[Segment 3 of 4] Major pollen allergen Dac g 4	32363466
514	<i>Dactylis glomerata</i>	Orchard grass	Unassigned	[Segment 4 of 4] Major pollen allergen Dac g 4	32363467
515	<i>Dactylis glomerata</i>	Orchard grass	Unassigned	group 1 allergen Dac g 1.01 precursor [Dactylis glomerata]	33149333
516	<i>Daucus carota</i>	Carrot	Dau c 1.0101	pathogenesis-related protein	1335877
517	<i>Daucus carota</i>	Carrot	Dau c 1.0102	cr16 [Daucus carota]	1663522
518	<i>Daucus carota</i>	Carrot	Dau c 1.0103	major allergen [Daucus carota]	2154732
519	<i>Daucus carota</i>	Carrot	Dau c 1.0104	major allergen [Daucus carota]	2154734
520	<i>Daucus carota</i>	Carrot	Unassigned	Major allergen Dau c 1 (CR16) (Pathogenesis-related protein Gea20)	8928058
521	<i>Daucus carota</i>	Carrot	Dau c 1.0201	major allergen isoform Dau c 1.0201 [Daucus carota]	18652047
522	<i>Daucus carota</i>	Carrot	Unassigned	pathogenesis-related protein-like protein 1 [Daucus carota]	19912791
523	<i>Daucus carota</i>	Carrot	Unassigned	RecName: Full=Profilin; AltName: Full=Minor pollen allergen Dau c 4; AltName: Allergen=Dau c 4	47606043
524	<i>Davidiella tassiana</i>	Fungus	Cla h 6	enolase; phosphopyruvate hydratase [Davidiella tassiana]	467660
525	<i>Davidiella tassiana</i>	Fungus	Unassigned	Heat shock 70 kDa protein (Allergen Cla h 4) (Cla h IV)	729764

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
526	<i>Davidiella tassiana</i>	Fungus	Cla h 7	Minor allergen Cla h 5 (Cla h V)	1168970
527	<i>Davidiella tassiana</i>	Fungus	Cla h 5	60S acidic ribosomal protein P2 (Allergen Cla h 3) (Cla h III)	1173074
528	<i>Davidiella tassiana</i>	Fungus	Cla h 6	Enolase (2-phosphoglycerate dehydratase) (2-phospho-D-glycerate hydro-lyase) (Allergen Cla h 6) (Cla h VI)	6015094
529	<i>Davidiella tassiana</i>	Fungus	Cla h 5	60S acidic ribosomal protein P2 (Minor allergen Cla h 4) (Cla h IV)	21542440
530	<i>Davidiella tassiana</i>	Fungus	Unassigned	putative nuclear transport factor 2 [Davidiella tassiana]	21748151
531	<i>Davidiella tassiana</i>	Fungus	Unassigned	hydrophobin [Davidiella tassiana]	22796153
532	<i>Davidiella tassiana</i>	Fungus	Unassigned	vacuolar serine protease [Davidiella tassiana]	60116876
533	<i>Davidiella tassiana</i>	Fungus	Unassigned	Probable NADP-dependent mannitol dehydrogenase (MtDH) (Mannitol 2-dehydrogenase [NADP+]) (Allergen Cla h 8)	85701146
534	<i>Davidiella tassiana</i>	Fungus	Unassigned	Aldehyde dehydrogenase (ALDDH) (Allergen Cla h 10) (Cla h 3) (Cla h III)	108935817
535	<i>Dermatophagoides farinae</i>	House dust mite	Der f 2	mite allergen Der f II precursor [Dermatophagoides farinae]	217308
536	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	DF5=allergen {N-terminal} [Dermatophagoides farinae=mites, Peptide Partial, 20 aa]	404371
537	<i>Dermatophagoides farinae</i>	House dust mite	Der f 2	Der f II [Dermatophagoides farinae]	546852
538	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	Allergen Mag	729979
539	<i>Dermatophagoides farinae</i>	House dust mite	Der f 1	Major mite fecal allergen Der f 1 precursor (Der f I)	730035
540	<i>Dermatophagoides farinae</i>	House dust mite	Der f 3	Der f 3 mite allergen	1314736
541	<i>Dermatophagoides farinae</i>	House dust mite	Der f 14	Mag3 [Dermatophagoides farinae]	1545803
542	<i>Dermatophagoides farinae</i>	House dust mite	Der f 7	Mite allergen Der f 7 precursor (Der f VII)	2498299
543	<i>Dermatophagoides farinae</i>	House dust mite	Der f 3	Mite allergen Der f 3 precursor (Der f III)	2507248
544	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	Mite allergen Der f 6 precursor (Der f VI) (DF5)	14424450

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
545	<i>Dermatophagoides farinae</i>	House dust mite	Der f 2	major Der f 2 isoform [Dermatophagoides farinae]	17978844
546	<i>Dermatophagoides farinae</i>	House dust mite	Der f 16	gelsolin-like allergen Der f 16 [Dermatophagoides farinae]	21591547
547	<i>Dermatophagoides farinae</i>	House dust mite	Der f 1	Der f 1 allergen preproenzyme [Dermatophagoides farinae]	27530349
548	<i>Dermatophagoides farinae</i>	House dust mite	Der f 18	60 kDa allergen Der f 18p [Dermatophagoides farinae]	27550039
549	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	Der f 7 allergen [Dermatophagoides farinae]	37958165
550	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	Paramyosin (Allergen Der f 11) (Antigen Df642)	42559514
551	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	Tropomyosin (Allergen Der f 10) (Mag44)	42559584
552	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	mite allergen Der f 2 [Dermatophagoides farinae]	55859466
553	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	Der f 2 [Dermatophagoides farinae]	55859468
554	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	mite allergen Der f 2 [Dermatophagoides farinae]	55859470
555	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	Der f 5.02 allergen [Dermatophagoides farinae]	60679572
556	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	Der f 1 allergen precursor [Dermatophagoides farinae]	76097507
557	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	Der f 2 allergen precursor [Dermatophagoides farinae]	76097511
558	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	Chain A, Solution Structure Of Der F 13, Group 13 Allergen From House Dust Mites	99031759
559	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	group 21 allergen [Dermatophagoides farinae]	140089314
560	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	group 21 allergen [Dermatophagoides farinae]	140089316
561	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	group 21 allergen [Dermatophagoides farinae]	140089320
562	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	group 21 allergen [Dermatophagoides farinae]	140089322

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
563	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	group 21 allergen [Dermatophagoides farinae]	140089324
564	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	group 21 allergen [Dermatophagoides farinae]	140089326
565	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	Der f 1 allergen [Dermatophagoides farinae]	156106765
566	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	Der f 2 allergen [Dermatophagoides farinae]	156480837
567	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	Der f 3 allergen precursor [Dermatophagoides farinae]	163638970
568	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	Der f 3 allergen [Dermatophagoides farinae]	218203816
569	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	Der f 3 allergen [Dermatophagoides farinae]	218203818
570	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	Der f 6 allergen [Dermatophagoides farinae]	218203826
571	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	Der f 6 allergen [Dermatophagoides farinae]	218203828
572	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	Der f 7 allergen [Dermatophagoides farinae]	218203832
573	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	Der f 2 allergen [Dermatophagoides farinae]	218203834
574	<i>Dermatophagoides farinae</i>	House dust mite	Unassigned	group 2 allergen [Dermatophagoides farinae]	256631558
575	<i>Dermatophagoides microceras</i>	House dust mite	Der m 1	Major mite fecal allergen Der m 1 (Der m I)	127205
576	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Unassigned	major house dust allergen [Dermatophagoides pteronyssinus]	387592
577	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 3	Der p 3 allergen	511476
578	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 1	Major mite fecal allergen Der p 1 precursor (Der p I)	730036
579	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 5	Der p V allergen [Dermatophagoides pteronyssinus]	913285
580	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Unassigned	Glutathione S-transferase (GST class-mu) (Major allergen Der p 8) (P dp 15)	1170095
581	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Unassigned	Alpha-amylase (Allergen Der p 4) (Der p IV)	1351935

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
582	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 2	Mite group 2 allergen Der p 2 precursor (Der p II) (DPX)	1352237
583	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 5	Mite allergen Der p 5 (Der P V) (IgE-binding allergen)	1352238
584	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 6	Mite allergen Der p 6 (Der p VI) (DP5)	1352239
585	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Unassigned	Mite allergen Der p 7 precursor (Der p VII)	1352240
586	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Unassigned	cysteine protease [Dermatophagoides pteronyssinus]	1460058
587	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 10	tropomyosin [Dermatophagoides pteronyssinus]	2353266
588	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 10	tropomyosin [Dermatophagoides pteronyssinus]	2440053
589	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 4	alpha-amylase [Dermatophagoides pteronyssinus]	5059162
590	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 7	unnamed protein product [Dermatophagoides pteronyssinus]	10189811
591	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 14	group 14 allergen protein [Dermatophagoides pteronyssinus]	20385544
592	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 2	Chain A, X-Ray Structure Of Der P 2, The Major House Dust Mite Allergen	21465915
593	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 1	unnamed protein product [Dermatophagoides pteronyssinus]	21725560
594	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 1	unnamed protein product [Dermatophagoides pteronyssinus]	21725562
595	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 1	unnamed protein product [Dermatophagoides pteronyssinus]	21725564
596	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 1	unnamed protein product [Dermatophagoides pteronyssinus]	21725566
597	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 1	unnamed protein product [Dermatophagoides pteronyssinus]	21725568
598	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 1	unnamed protein product [Dermatophagoides pteronyssinus]	21725570
599	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 1	unnamed protein product [Dermatophagoides pteronyssinus]	21725572
600	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 1	unnamed protein product [Dermatophagoides pteronyssinus]	21725574

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
601	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 1	unnamed protein product [Dermatophagoides pteronyssinus]	21725576
602	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 1	unnamed protein product [Dermatophagoides pteronyssinus]	21725578
603	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 1	unnamed protein product [Dermatophagoides pteronyssinus]	21725580
604	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 2	unnamed protein product [Dermatophagoides pteronyssinus]	21725582
605	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 2	unnamed protein product [Dermatophagoides pteronyssinus]	21725584
606	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 2	unnamed protein product [Dermatophagoides pteronyssinus]	21725586
607	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 2	unnamed protein product [Dermatophagoides pteronyssinus]	21725588
608	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 2	unnamed protein product [Dermatophagoides pteronyssinus]	21725590
609	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 2	unnamed protein product [Dermatophagoides pteronyssinus]	21725592
610	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 2	unnamed protein product [Dermatophagoides pteronyssinus]	21725594
611	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 2	unnamed protein product [Dermatophagoides pteronyssinus]	21725596
612	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 2	unnamed protein product [Dermatophagoides pteronyssinus]	21725600
613	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 2	unnamed protein product [Dermatophagoides pteronyssinus]	21725602
614	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 2	unnamed protein product [Dermatophagoides pteronyssinus]	21725604
615	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 9	serine protease [Dermatophagoides pteronyssinus]	22595342
616	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 5	unnamed protein product [Dermatophagoides pteronyssinus]	28798085
617	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Der p 11	HDM allergen [Dermatophagoides pteronyssinus]	37778944
618	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Unassigned	glutathione transferase mu class Dp7019C10 [Dermatophagoides pteronyssinus]	60920878

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
619	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Unassigned	Der p 1 allergen [Dermatophagoides pteronyssinus]	61608445
620	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Unassigned	group 18 allergen protein [Dermatophagoides pteronyssinus]	67975085
621	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Unassigned	Der p 2 allergen precursor [Dermatophagoides pteronyssinus]	76097509
622	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Unassigned	tropomyosin [Dermatophagoides pteronyssinus]	80553470
623	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Unassigned	Chain B, Crystal Structure Of Mature And Fully Active Der P 1 Allergen	83754033
624	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Unassigned	allergen precursor [Dermatophagoides pteronyssinus]	85687540
625	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Unassigned	Der p 2 allergen precursor [Dermatophagoides pteronyssinus]	99644635
626	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Unassigned	group 2 allergen Der p 2 [Dermatophagoides pteronyssinus]	110560872
627	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Unassigned	Der p 1 allergen [Dermatophagoides pteronyssinus]	157696052
628	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Unassigned	Chain A, Tertiary Structure Of The Major House Dust Mite Allergen Der P 2, Nmr, 10 Structures	157829757
629	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Unassigned	Der p 2 allergen [Dermatophagoides pteronyssinus]	164415595
630	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Unassigned	Der p 1 allergen precursor [Dermatophagoides pteronyssinus]	195933901
631	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Unassigned	tropomyosin [Dermatophagoides pteronyssinus]	208970286
632	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Unassigned	Chain B, C2 Crystal Form Of Mite Allergen Der P 1	223365887
633	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Unassigned	Der p 2 allergen precursor [Dermatophagoides pteronyssinus]	256095984
634	<i>Dermatophagoides pteronyssinus</i>	House dust mite	Unassigned	Der p 1 allergen precursor [Dermatophagoides pteronyssinus]	256095986
635	<i>Dermatophagoides siboney</i>	House dust mite	Unassigned	Der s 2 a allergen [Dermatophagoides siboney]	86450747
636	<i>Dolichovespula arenaria</i>	Yellow jacket	Dol a 5	Venom allergen 5 (Antigen 5) (Ag5) (Allergen Dol a 5) (Dol a V)	465052

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
637	<i>Dolichovespula maculata</i>	Whiteface hornet	Dol m 5	Venom allergen 5.01 precursor (Antigen 5 form 2) (Ag5-2) (Allergen Dol m 5.01) (Dol m V-A)	137395
638	<i>Dolichovespula maculata</i>	Whiteface hornet	Dol m 1	Phospholipase A1 1 precursor (Allergen Dol m 1.01) (Dol m I)	548449
639	<i>Dolichovespula maculata</i>	Whiteface hornet	Dol m 5	Venom allergen 5.02 precursor (Antigen 5 form 3) (Ag5-3) (Allergen Dol m 5.02) (Dol m V-B)	549186
640	<i>Dolichovespula maculata</i>	Whiteface hornet	Dol m 2	Hyaluronoglucosaminidase (Hyaluronidase) (Allergen Dol m 2) (Dol m II)	1346322
641	<i>Dolichovespula maculata</i>	Whiteface hornet	Dol m 1	Phospholipase A1 2 (Allergen Dol m 1.02) (Dol m I)	1709542
642	<i>Epicoccum nigrum</i>	Fungus	Unassigned	Major allergen Epi p 1 (Epi n I4625*)	24636820
643	<i>Equus caballus</i>	Horse	Unassigned	Serum albumin precursor (Allergen Equ c 3)	543794
644	<i>Equus caballus</i>	Horse	Equ c 2.0101	Dander allergen Equ c 2.0101	3121755
645	<i>Equus caballus</i>	Horse	Equ c 2.0102	Dander allergen Equ c 2.0102	3121756
646	<i>Equus caballus</i>	Horse	Equ c 1	Major allergen Equ c 1 precursor	3121758
647	<i>Equus caballus</i>	Horse	Unassigned	Latherin precursor (Dander allergen Equ c 4/Equ c 5)	38258932
648	<i>Equus caballus</i>	Horse	Unassigned	Latherin precursor (Dander allergen Equ c 4/Equ c 5)	152031631
649	<i>Erimacrus isenbeckii</i>	Crab	Unassigned	tropomyosin slow-twitch isoform [Erimacrus isenbeckii]	125995169
650	<i>Erimacrus isenbeckii</i>	Crab	Unassigned	tropomyosin slow-tonic isoform [Erimacrus isenbeckii]	125995171
651	<i>Euphausia pacifica</i>	Krill	Unassigned	tropomyosin [Euphausia pacifica]	156712754
652	<i>Euphausia superba</i>	Krill	Unassigned	tropomyosin [Euphausia superba]	156712752
653	<i>Euroglyphus maynei</i>	House dust mite	Eur m 2.0102	group 2 allergen Eur m 2 0102 [Euroglyphus maynei]	3941386
654	<i>Euroglyphus maynei</i>	House dust mite	Eur m 2	Mite group 2 allergen Eur m 2 precursor	14423649
655	<i>Fagopyrum esculentum</i>	Buckwheat	Unassigned	BW8KD allergen protein [Fagopyrum esculentum]	17907758

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
656	<i>Fagopyrum esculentum</i>	Buckwheat	Unassigned	13S globulin seed storage protein 1 precursor (Legumin-like protein 1) [Contains: 13S globulin seed storage protein 1 acidic chain; 13S globulin seed storage protein 1 basic chain]	29839254
657	<i>Fagopyrum esculentum</i>	Buckwheat	Unassigned	13S globulin seed storage protein 2 precursor (Legumin-like protein 2) [Contains: 13S globulin seed storage protein 2 acidic chain; 13S globulin seed storage protein 2 basic chain]	29839255
658	<i>Fagopyrum esculentum</i>	Buckwheat	Unassigned	13S globulin seed storage protein 3 precursor (Legumin-like protein 3) (Allergen Fag e 1) [Contains: 13S globulin seed storage protein 3 acidic chain; 13S globulin seed storage protein 3 basic chain]	29839419
659	<i>Fagopyrum esculentum</i>	Buckwheat	Unassigned	BW 16kDa allergen [Fagopyrum esculentum]	61970231
660	<i>Fagopyrum esculentum</i>	Buckwheat	Unassigned	16 kDa allergen [Fagopyrum esculentum]	83416591
661	<i>Fagopyrum esculentum</i>	Buckwheat	Unassigned	vicilin-like protein [Fagopyrum esculentum]	146217148
662	<i>Fagopyrum gracilipes</i>	Buckwheat	Unassigned	22kDa storage protein [Fagopyrum gracilipes]	6979766
663	<i>Fagopyrum tataricum</i>	Buckwheat	Unassigned	allergenic protein [Fagopyrum tataricum]	113200131
664	<i>Fagopyrum tataricum</i>	Buckwheat	Unassigned	BW10KD allergen protein [Fagopyrum tataricum]	144228127
665	<i>Farfantepenaeus aztecus</i>	Brown shrimp	Pen a 1	Pen a 1 allergen [Farfantepenaeus aztecus]	73532979
666	<i>Felis catus</i>	Cat	Fel d 1	major allergen I	163825
667	<i>Felis catus</i>	Cat	Fel d 1	Major allergen I polypeptide chain 2 precursor (Allergen Fel d 1-B) (Fel d I-B) (Allergen Cat-1) (AG4) (Fdl)	232086
668	<i>Felis catus</i>	Cat	Unassigned	fel d I chain 2 precursor [Felis catus]	395407
669	<i>Felis catus</i>	Cat	Fel d 1	Major allergen I polypeptide chain 1 major form precursor (Allergen Fel d 1-A) (Fel d I-A) (Allergen Cat-1) (Fel dl) (AG4)	1169665
670	<i>Felis catus</i>	Cat	Unassigned	Serum albumin precursor (Allergen Fel d 2)	1351908

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
671	<i>Felis catus</i>	Cat	Fel d 1	fel d I chain 1 precursor with leader B [Felis catus]	1364212
672	<i>Felis catus</i>	Cat	Fel d 1	fel d I chain 1 precursor with leader A [Felis catus]	1364213
673	<i>Felis catus</i>	Cat	Unassigned	Cystatin-A (Allergen Fel d 3)	47605720
674	<i>Felis catus</i>	Cat	Unassigned	Allergen Fel d 4 precursor	75062228
675	<i>Felis catus</i>	Cat	Unassigned	major allergen I, polypeptide chain 1 [Felis catus]	114326420
676	<i>Forcipomyia taiwana</i>	Midge	Unassigned	serine/threonine protein kinase [Forcipomyia taiwana]	188572341
677	<i>Forcipomyia taiwana</i>	Midge	Unassigned	eukaryotic translation initiation factor [Forcipomyia taiwana]	188572343
678	<i>Fragaria x ananassa</i>	Strawberry	Fra a 1	[Segment 2 of 3] Allergen Fra a 18 kDa	60389904
679	<i>Fragaria x ananassa</i>	Strawberry	Fra a 1	[Segment 3 of 3] Allergen Fra a 18 kDa	60389905
680	<i>Fragaria x ananassa</i>	Strawberry	Fra a 1	Fra a 1-A allergen [Fragaria x ananassa]	88082485
681	<i>Fragaria x ananassa</i>	Strawberry	Fra a 1	Major strawberry allergen Fra a 1-B [Fragaria x ananassa]	90185682
682	<i>Fragaria x ananassa</i>	Strawberry	Fra a 1	Major strawberry allergen Fra a 1-D [Fragaria x ananassa]	90185684
683	<i>Fragaria x ananassa</i>	Strawberry	Fra a 1	Major strawberry allergen Fra a 1-C [Fragaria x ananassa]	90185688
684	<i>Fragaria x ananassa</i>	Strawberry	Fra a 1	Major strawberry allergen Fra a 1-E [Fragaria x ananassa]	90185692
685	<i>Fraxinus excelsior</i>	European ash	Fra e 1	allergen Fra e 1.0101 [Fraxinus excelsior]	33327133
686	<i>Fraxinus excelsior</i>	European ash	Fra e 1	allergen Fra e 1 [Fraxinus excelsior]	34978692
687	<i>Fraxinus excelsior</i>	European ash	Fra e 1	Fra e 1.0102 major allergen [Fraxinus excelsior]	56122438
688	<i>Fulvia mutica</i>	Clam	Unassigned	tropomyosin [Fulvia mutica]	219806596
689	<i>Fusarium culmorum</i>	Fungus	Unassigned	helix-loop-helix protein [Fusarium culmorum]	25361513
690	<i>Fusarium culmorum</i>	Fungus	Unassigned	RecName: Full=60S acidic ribosomal protein P2; AltName: Allergen=Fus c 1	41688715
691	<i>Fusarium culmorum</i>	Fungus	Unassigned	Thioredoxin-like protein (Allergen Fus c 2)	52783462
692	<i>Gadus callarias</i>	Baltic cod	Gad c 1	Parvalbumin beta (Allergen Gad c 1) (Gad c I) (Allergen M)	131112

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
693	<i>Gadus morhua</i>	Atlantic cod	Unassigned	parvalbumin beta [Gadus morhua]	14531014
694	<i>Gadus morhua</i>	Atlantic cod	Unassigned	parvalbumin beta [Gadus morhua]	14531016
695	<i>Gadus morhua</i>	Atlantic cod	Unassigned	parvalbumin beta [Gadus morhua]	148356691
696	<i>Gadus morhua</i>	Atlantic cod	Unassigned	parvalbumin beta [Gadus morhua]	148356693
697	<i>Gallus gallus</i>	Chicken	Gal d 2	unnamed protein product [Gallus gallus]	63052
698	<i>Gallus gallus</i>	Chicken	Unassigned	Serum albumin precursor (Alpha-livetin) (Allergen Gal d 5)	113575
699	<i>Gallus gallus</i>	Chicken	Gal d 1	Ovomucoid precursor (Allergen Gal d 1) (Gal d I)	124757
700	<i>Gallus gallus</i>	Chicken	Gal d 4	Lysozyme C precursor (1,4-beta-N-acetylmuramidase C) (Allergen Gal d 4) (Gal d IV)	126608
701	<i>Gallus gallus</i>	Chicken	Gal d 2	Ovalbumin (Plakalbumin) (Allergen Gal d 2) (Gal d II)	129293
702	<i>Gallus gallus</i>	Chicken	Gal d 4	lysozyme protein	212279
703	<i>Gallus gallus</i>	Chicken	Gal d 3	ovotransferrin [Gallus gallus]	757851
704	<i>Gallus gallus</i>	Chicken	Gal d 2	unnamed protein product [Gallus gallus]	808969
705	<i>Gallus gallus</i>	Chicken	Gal d 3	Ovotransferrin precursor (Conalbumin) (Allergen Gal d 3) (Gal d III) (Serum transferrin)	1351295
706	<i>Gallus gallus</i>	Chicken	Gal d 2	Chain A, Loop-Inserted Structure Of P1-P1' Cleaved Ovalbumin Mutant R339t	15826578
707	<i>Gallus gallus</i>	Chicken	Unassigned	Chain D, Crystal Structure Of S-Ovalbumin At 1.9 Angstrom Resolution	34811333
708	<i>Gallus gallus</i>	Chicken	Unassigned	ovomucoid [Gallus gallus]	162952006
709	<i>Gallus gallus</i>	Chicken	Unassigned	ovomucoid [Gallus gallus]	209979542
710	<i>Gallus gallus</i>	Chicken	Unassigned	parvalbumin [Gallus gallus]	225877920
711	<i>Gibberella zeae</i> PH-1	Fungus	Unassigned	RLA2_ALTAL 60S acidic ribosomal protein P2 (Minor allergen Alt a 6) (Alt a VI) [Gibberella zeae PH-1]	46122455
712	<i>Glossina morsitans morsitans</i>	Tsetse fly	Unassigned	antigen 5 precursor [Glossina morsitans morsitans]	8927462
713	<i>Glossina morsitans morsitans</i>	Tsetse fly	Unassigned	salivary antigen 5 precursor [Glossina morsitans morsitans]	289740263

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
714	<i>Glossina morsitans morsitans</i>	Tsetse fly	Unassigned	antigen 5 precursor [Glossina morsitans morsitans]	289742475
715	<i>Glossina morsitans morsitans</i>	Tsetse fly	Unassigned	salivary antigen 5 precursor variant [Glossina morsitans morsitans]	289742483
716	<i>Glycine max</i>	Soybean	Unassigned	unnamed protein product [Glycine max]	18536
717	<i>Glycine max</i>	Soybean	Unassigned	unnamed protein product [Glycine max]	18609
718	<i>Glycine max</i>	Soybean	Unassigned	unnamed protein product [Glycine max]	18615
719	<i>Glycine max</i>	Soybean	Unassigned	glycinin subunit G1 [Glycine max]	18635
720	<i>Glycine max</i>	Soybean	Unassigned	glycinin subunit G2 [Glycine max]	18637
721	<i>Glycine max</i>	Soybean	Unassigned	glycinin subunit G3 [Glycine max]	18639
722	<i>Glycine max</i>	Soybean	Unassigned	glycinin [Glycine max]	18641
723	<i>Glycine max</i>	Soybean	Unassigned	trypsin inhibitor subtype A [Glycine max]	18770
724	<i>Glycine max</i>	Soybean	Unassigned	trypsin inhibitor subtype B [Glycine max]	18772
725	<i>Glycine max</i>	Soybean	Unassigned	P34 probable thiol protease precursor	129353
726	<i>Glycine max</i>	Soybean	Unassigned	Stress-induced protein SAM22 (Starvation-associated message 22) (Allergen Gly m 4)	134194
727	<i>Glycine max</i>	Soybean	Unassigned	beta-conglycinin-alpha subunit	169927
728	<i>Glycine max</i>	Soybean	Unassigned	beta-conglycinin storage protein [Glycine max]	169929
729	<i>Glycine max</i>	Soybean	Unassigned	glycinin	169969
730	<i>Glycine max</i>	Soybean	Unassigned	glycinin precursor	169971
731	<i>Glycine max</i>	Soybean	Unassigned	CG4 beta-conglycinin [Glycine max]	256427
732	<i>Glycine max</i>	Soybean	Unassigned	Kunitz trypsin inhibitor; KTi [Glycine max]	256429
733	<i>Glycine max</i>	Soybean	Unassigned	Kunitz trypsin inhibitor KTi1 [Glycine max]	256635
734	<i>Glycine max</i>	Soybean	Unassigned	Kunitz trypsin inhibitor KTi2 [Glycine max]	256636
735	<i>Glycine max</i>	Soybean	Unassigned	Kunitz trypsin inhibitor [Glycine max]	510515
736	<i>Glycine max</i>	Soybean	Unassigned	unnamed protein product [Glycine max]	732706
737	<i>Glycine max</i>	Soybean	Gly m 1.0101	Gly m 1A allergen, HPS=hydrophobic seed protein {N-terminal} [Glycine max=soybeans, hulls, Peptide Partial, 42 aa]	999355

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
738	<i>Glycine max</i>	Soybean	Unassigned	34 kDa maturing seed vacuolar thiol protease precursor [Glycine max]	1199563
739	<i>Glycine max</i>	Soybean	Gly m 2	hull allergen Gly m 2 - soybean (fragment)	1362049
740	<i>Glycine max</i>	Soybean	Gly m 3	profilin [Glycine max]	3021373
741	<i>Glycine max</i>	Soybean	Unassigned	Bd 30K [Glycine max]	3097321
742	<i>Glycine max</i>	Soybean	Gly m 3	Profilin-1 (GmPRO1) (Allergen Gly m 3)	3914435
743	<i>Glycine max</i>	Soybean	Unassigned	allergen Gly m Bd 28K [Glycine max]	12697782
744	<i>Glycine max</i>	Soybean	Unassigned	hydrophobic seed protein precursor-like [Glycine max]	76782247
745	<i>Glycine max</i>	Soybean	Unassigned	hydrophobic seed protein precursor [Glycine max]	76782249
746	<i>Glycine max</i>	Soybean	Unassigned	Major Gly 50 kDa allergen	85681057
747	<i>Glycine max</i>	Soybean	Unassigned	profilin [Glycine max]	156938901
748	<i>Glycine max</i>	Soybean	Unassigned	Gly m Bd 28K allergen [Glycine max]	187766747
749	<i>Glycine max</i>	Soybean	Unassigned	Gly m Bd 28K allergen [Glycine max]	187766749
750	<i>Glycine max</i>	Soybean	Unassigned	Gly m Bd 28K allergen [Glycine max]	187766751
751	<i>Glycine max</i>	Soybean	Unassigned	Gly m Bd 28K allergen [Glycine max]	187766755
752	<i>Glycine soja</i>	Soybean	Unassigned	Gy5 [Glycine soja]	736002
753	<i>Glycine soja</i>	Soybean	Unassigned	A5A4B3 subunit [Glycine soja]	806556
754	<i>Glycyphagus domesticus</i>	Storage mite	Unassigned	Gly d 2.03 [Glycyphagus domesticus]	33772588
755	<i>Glycyphagus domesticus</i>	Storage mite	Unassigned	Mite group 2 allergen Gly d 2.02	48428170
756	<i>Glycyphagus domesticus</i>	Storage mite	Unassigned	Mite group 2 allergen Gly d 2.01	48428178
757	<i>Haliotis discus discus</i>	Disk abalone	Unassigned	tropomyosin [Haliotis discus discus]	219806586
758	<i>Haliotis diversicolor</i>	Abalone	Unassigned	tropomyosin [Haliotis diversicolor]	9954249
759	<i>Helianthus annuus</i>	Sunflower	Unassigned	Albumin-8 precursor (Methionine-rich 2S protein) (SFA8)	112745
760	<i>Helianthus annuus</i>	Sunflower	Hel a 2	profilin [Helianthus annuus]	3581965
761	<i>Helix aspersa</i>	Brown garden snail	Unassigned	Tropomyosin (Allergen Hel as 1)	42559558
762	<i>Hevea brasiliensis</i>	Para rubber tree	Hev b 6	Pro-hevein precursor (Major hevein) [Contains: Hevein (Allergen Hev b 6); Win-like protein]	123062
763	<i>Hevea brasiliensis</i>	Para rubber tree	Hev b 1	Rubber elongation factor protein (REF) (Allergen Hev b 1)	132270

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
764	<i>Hevea brasiliensis</i>	Para rubber tree	Hev b 10.0101	superoxide dismutase (manganese)	348137
765	<i>Hevea brasiliensis</i>	Para rubber tree	Hev b 2	beta-1,3-glucanase	1184668
766	<i>Hevea brasiliensis</i>	Para rubber tree	Hev b 7.01	latex patatin homolog [Hevea brasiliensis]	1916805
767	<i>Hevea brasiliensis</i>	Para rubber tree	Hev b 6	prohevein [Hevea brasiliensis]	2832430
768	<i>Hevea brasiliensis</i>	Para rubber tree	Hev b 7.02	latex allergen [Hevea brasiliensis]	3087805
769	<i>Hevea brasiliensis</i>	Para rubber tree	Hev b 8	profilin [Hevea brasiliensis]	3183706
770	<i>Hevea brasiliensis</i>	Para rubber tree	Unassigned	latex allergen [Hevea brasiliensis]	3288200
771	<i>Hevea brasiliensis</i>	Para rubber tree	Hev b 10.0102	MnSOD [Hevea brasiliensis]	5777414
772	<i>Hevea brasiliensis</i>	Para rubber tree	Hev b 7	latex protein allergen Hev b 7 [Hevea brasiliensis]	6707018
773	<i>Hevea brasiliensis</i>	Para rubber tree	Unassigned	Major latex allergen Hev b 5	7387766
774	<i>Hevea brasiliensis</i>	Para rubber tree	Hev b 10.0103	IgE-binding protein MnSOD [Hevea brasiliensis]	10862818
775	<i>Hevea brasiliensis</i>	Para rubber tree	Hev b 8	Chain A, Latex Profilin Hevb8	11513601
776	<i>Hevea brasiliensis</i>	Para rubber tree	Unassigned	Enolase 2 (2-phosphoglycerate dehydratase 2) (2-phospho-D-glycerate hydro-lyase 2) (Allergen Hev b 9)	14423687
777	<i>Hevea brasiliensis</i>	Para rubber tree	Unassigned	Enolase 1 (2-phosphoglycerate dehydratase 1) (2-phospho-D-glycerate hydro-lyase 1) (Allergen Hev b 9)	14423688
778	<i>Hevea brasiliensis</i>	Para rubber tree	Hev b 8.0204	Profilin-6 (Pollen allergen Hev b 8.0204)	14423856
779	<i>Hevea brasiliensis</i>	Para rubber tree	Hev b 8.0203	Profilin-5 (Pollen allergen Hev b 8.0203)	14423858
780	<i>Hevea brasiliensis</i>	Para rubber tree	Hev b 8.0202	Profilin-4 (Pollen allergen Hev b 8.0202)	14423859
781	<i>Hevea brasiliensis</i>	Para rubber tree	Hev b 8.0201	Profilin-3 (Pollen allergen Hev b 8.0201)	14423860
782	<i>Hevea brasiliensis</i>	Para rubber tree	Hev b 8.0102	Profilin-2 (Pollen allergen Hev b 8.0102)	14423868
783	<i>Hevea brasiliensis</i>	Para rubber tree	Hev b 3	Small rubber particle protein (SRPP) (22 kDa rubber particle protein) (22 kDa RPP) (Latex allergen Hev b 3) (27 kDa natural rubber allergen)	14423933

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
784	<i>Hevea brasiliensis</i>	Para rubber tree	Hev b 11	putative class I chitinase [Hevea brasiliensis]	14575525
785	<i>Hevea brasiliensis</i>	Para rubber tree	Hev b 12	lipid transfer precursor protein [Hevea brasiliensis]	20135538
786	<i>Hevea brasiliensis</i>	Para rubber tree	Hev b 2	beta-1,3-glucanase [Hevea brasiliensis]	32765543
787	<i>Hevea brasiliensis</i>	Para rubber tree	Unassigned	putative latex allergen hev b 7.02 [Hevea brasiliensis]	41581137
788	<i>Hevea brasiliensis</i>	Para rubber tree	Unassigned	major latex allergen Hev b 4 [Hevea brasiliensis]	46410859
789	<i>Hevea brasiliensis</i>	Para rubber tree	Unassigned	Esterase precursor (Early nodule-specific protein homolog) (Latex allergen Hev b 13)	51315784
790	<i>Hevea brasiliensis</i>	Para rubber tree	Unassigned	Chain A, Crystal Structure Of A Hev B 6.02 Isoallergen	73535415
791	<i>Hevea brasiliensis</i>	Para rubber tree	Unassigned	beta-1,3-glucanase [Hevea brasiliensis]	124294783
792	<i>Hevea brasiliensis</i>	Para rubber tree	Unassigned	beta-1,3-glucanase [Hevea brasiliensis]	124294785
793	<i>Hevea brasiliensis</i>	Para rubber tree	Unassigned	beta-1,3-glucanase [Hevea brasiliensis]	124365249
794	<i>Hevea brasiliensis</i>	Para rubber tree	Unassigned	beta-1,3-glucanase [Hevea brasiliensis]	124365251
795	<i>Hevea brasiliensis</i>	Para rubber tree	Unassigned	beta-1,3-glucanase [Hevea brasiliensis]	124365253
796	<i>Hevea brasiliensis</i>	Para rubber tree	Unassigned	hevein [Hevea brasiliensis]	158342650
797	<i>Hevea brasiliensis</i>	Para rubber tree	Unassigned	Chain D, Crystal Structure Of The Native Endo Beta-1,3-Glucanase (Hev B 2), A Major Allergen From Hevea Brasiliensis (Space Group P41)	261824817
798	<i>Hevea brasiliensis</i>	Para rubber tree	Unassigned	beta-1,3-glucanase form 'RRII Gln 2' [Hevea brasiliensis]	268037674
799	<i>Hevea brasiliensis</i>	Para rubber tree	Unassigned	beta-1,3-glucanase [Hevea brasiliensis]	270315180
800	<i>Hevea brasiliensis</i> subsp. <i>brasiliensis</i>	Para rubber tree	Hev b 11	class I chitinase [Hevea brasiliensis subsp. <i>brasiliensis</i>]	27526732
801	<i>Holcus lanatus</i>	Velvet grass	Hol I 1.0102	protein with incomplete signal sequence [Holcus lanatus]	1167836
802	<i>Holcus lanatus</i>	Velvet grass	Unassigned	Major pollen allergen Hol I 1 precursor (Hol I 1) (Hol I 1.0101 and 1.0102)	1171005
803	<i>Holcus lanatus</i>	Velvet grass	Unassigned	group V grass pollen allergen [Holcus lanatus]	2266623
804	<i>Holcus lanatus</i>	Velvet grass	Unassigned	group V allergen [Holcus lanatus]	2266625

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
805	<i>Holcus lanatus</i>	Velvet grass	Unassigned	major group I allergen Hol I 1 [Holcus lanatus]	3860384
806	<i>Holcus lanatus</i>	Velvet grass	Unassigned	pollen allergen Hol I 5b [Holcus lanatus]	11991229
807	<i>Homarus americanus</i>	American lobster	Unassigned	fast tropomyosin isoform [Homarus americanus]	2660868
808	<i>Homarus americanus</i>	American lobster	Unassigned	Tropomyosin (Allergen Hom a 1)	14285796
809	<i>Hordeum vulgare</i>	Barley	Unassigned	LTP 1 [Hordeum vulgare]	19039
810	<i>Hordeum vulgare</i>	Barley	Unassigned	amylase/protease inhibitor	167077
811	<i>Hordeum vulgare</i>	Barley	Unassigned	Alpha-amylase/trypsin inhibitor CMb precursor (Chloroform/methanol-soluble protein CMb)	585290
812	<i>Hordeum vulgare</i>	Barley	Unassigned	trypsin inhibitor cme precursor [Hordeum vulgare]	1405736
813	<i>Hordeum vulgare</i>	Barley	Hor v 15	Alpha-amylase inhibitor BMAI-1 precursor (Allergen Hor v 1) (Alpha-amylase flour inhibitor)	2506771
814	<i>Hordeum vulgare</i> subsp. <i>vulgare</i>	Barley	Unassigned	alpha-amylase inhibitor [Hordeum vulgare subsp. vulgare]	18955
815	<i>Hordeum vulgare</i> subsp. <i>vulgare</i>	Barley	Unassigned	CMe [Hordeum vulgare subsp. vulgare]	19009
816	<i>Hordeum vulgare</i> subsp. <i>vulgare</i>	Barley	Unassigned	CMA, component of tetrameric alpha-amylase inhibitor [Hordeum vulgare subsp. vulgare]	439275
817	<i>Hordeum vulgare</i> subsp. <i>vulgare</i>	Barley	Unassigned	BDAI-1; Barley dimeric alpha-amylase inhibitor [Hordeum vulgare subsp. vulgare]	3367714
818	<i>Humulus japonicus</i>	Japanese hop	Hum j 1	Humj1 [Humulus japonicus]	33113263
819	<i>Humulus scandens</i>	Japanese hop	Unassigned	profilin-like protein [Humulus scandens]	34851174
820	<i>Humulus scandens</i>	Japanese hop	Unassigned	profilin-like protein [Humulus scandens]	34851176
821	<i>Juglans nigra</i>	Black walnut	Jug n 1	2S albumin seed storage protein [Juglans nigra]	31321942
822	<i>Juglans nigra</i>	Black walnut	Jug n 2	vicilin seed storage protein [Juglans nigra]	31321944
823	<i>Juglans regia</i>	English walnut	Jug r 1	albumin seed storage protein precursor [Juglans regia]	1794252
824	<i>Juglans regia</i>	English walnut	Jug r 2	vicilin-like protein precursor [Juglans regia]	6580762
825	<i>Juglans regia</i>	English walnut	Unassigned	seed storage protein [Juglans regia]	56788031
826	<i>Juglans regia</i>	English walnut	Unassigned	nonspecific lipid transfer protein [Juglans regia]	209484145

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
827	<i>Juniperus ashei</i>	Mountain cedar	Unassigned	Major pollen allergen Jun a 1 precursor	9087152
828	<i>Juniperus ashei</i>	Mountain cedar	Unassigned	Pathogenesis-related protein precursor (Pollen allergen Jun a 3)	9087177
829	<i>Juniperus ashei</i>	Mountain cedar	Unassigned	Polygalacturonase precursor (PG) (Pectinase) (Major pollen allergen Jun a 2)	47606048
830	<i>Juniperus oxycedrus</i>	Juniper	Unassigned	Polcalcin Jun o 2 (Calcium-binding pollen allergen Jun o 2)	14423843
831	<i>Juniperus oxycedrus</i>	Juniper	Unassigned	putative allergen jun o 1 [Juniperus oxycedrus]	15139849
832	<i>Juniperus rigida</i>	Cedar	Unassigned	PR5 allergen Jun r 3.1 precursor [Juniperus rigida]	38456222
833	<i>Juniperus rigida</i>	Cedar	Unassigned	PR5 allergen Jun r 3.2 precursor [Juniperus rigida]	38456224
834	<i>Juniperus virginiana</i>	Red cedar	Jun v 1	pollen major allergen 1-2 [Juniperus virginiana]	8843917
835	<i>Juniperus virginiana</i>	Red cedar	Jun v 1	pollen major allergen 1-1 [Juniperus virginiana]	8843921
836	<i>Juniperus virginiana</i>	Red cedar	Unassigned	Pathogenesis-related protein precursor (Potential major pollen allergen Jun v 3)	51316532
837	<i>Lens culinaris</i>	Lentil	Len c 1.0101	allergen Len c 1.0101 [Lens culinaris]	29539109
838	<i>Lens culinaris</i>	Lentil	Len c 1.0102	allergen Len c 1.0102 [Lens culinaris]	29539111
839	<i>Lepidoglyphus destructor</i>	Storage mite	Lep d 2	allergen Lep d 1.01	1582222
840	<i>Lepidoglyphus destructor</i>	Storage mite	Lep d 2	allergen Lep d 1.02	1582223
841	<i>Lepidoglyphus destructor</i>	Storage mite	Unassigned	Mite group 2 allergen Lep d 2 precursor (Lep d 1) (Lep d I)	1708793
842	<i>Lepidoglyphus destructor</i>	Storage mite	Lep d 2	allergen Lep d 1.02 precursor - Lepidoglyphus destructor	2147108
843	<i>Lepidoglyphus destructor</i>	Storage mite	Lep d 7	Mite allergen Lep d 7 precursor	14423650
844	<i>Lepidoglyphus destructor</i>	Storage mite	Lep d 5	Mite allergen Lep d 5	14423651
845	<i>Lepidoglyphus destructor</i>	Storage mite	Lep d 13	Fatty acid-binding protein (Allergen Lep d 13)	14423714
846	<i>Lepidoglyphus destructor</i>	Storage mite	Lep d 10	Tropomyosin (Allergen Lep d 10)	14423956
847	<i>Lepidoglyphus destructor</i>	Storage mite	Lep d 2	Lep D 2 precursor [Lepidoglyphus destructor]	21213898
848	<i>Lepidoglyphus destructor</i>	Storage mite	Lep d 2	Lep D 2 precursor [Lepidoglyphus destructor]	21213900

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
849	<i>Lepidoglyphus destructor</i>	Storage mite	Unassigned	type 2 allergen Lep d 2.013 [Lepidoglyphus destructor]	34495274
850	<i>Lepidoglyphus destructor</i>	Storage mite	Unassigned	type 2 allergen Lep d 2.023 [Lepidoglyphus destructor]	34495278
851	<i>Lepidoglyphus destructor</i>	Storage mite	Unassigned	type 2 allergen Lep d 2.024 [Lepidoglyphus destructor]	34495280
852	<i>Lepidoglyphus destructor</i>	Storage mite	Unassigned	type 2 allergen Lep d 2.025 [Lepidoglyphus destructor]	34495282
853	<i>Lepidoglyphus destructor</i>	Storage mite	Unassigned	type 2 allergen Lep d 2.031 [Lepidoglyphus destructor]	34495284
854	<i>Lepidoglyphus destructor</i>	Storage mite	Unassigned	type 2 allergen Lep d 2.035 [Lepidoglyphus destructor]	34495286
855	<i>Lepidoglyphus destructor</i>	Storage mite	Unassigned	type 2 allergen Lep d 2.039 [Lepidoglyphus destructor]	34495288
856	<i>Lepidoglyphus destructor</i>	Storage mite	Unassigned	type 2 allergen Lep d 2.042 [Lepidoglyphus destructor]	34495290
857	<i>Lepidoglyphus destructor</i>	Storage mite	Unassigned	type 2 allergen Lep d 5.02 [Lepidoglyphus destructor]	34495292
858	<i>Lepidoglyphus destructor</i>	Storage mite	Unassigned	type 2 allergen Lep d 5.04 [Lepidoglyphus destructor]	34495294
859	<i>Lepidiorhombus whiffiagonis</i>	Mite	Unassigned	parvalbumin [Lepidiorhombus whiffiagonis]	208608078
860	<i>Lepisma saccharina</i>	Silverfish	Lep s 1	tropomyosin [Lepisma saccharina]	20387027
861	<i>Lepisma saccharina</i>	Silverfish	Unassigned	tropomyosin [Lepisma saccharina]	20387029
862	<i>Ligustrum vulgare</i>	Privet	Lig v 1.0102	major allergen [Ligustrum vulgare]	3256212
863	<i>Ligustrum vulgare</i>	Privet	Unassigned	Major pollen allergen Lig v 1	14423737
864	<i>Lilium longiflorum</i>	Trumpet lily	Unassigned	polygalacturonase [Lilium longiflorum]	73913442
865	<i>Litchi chinensis</i>	Lychee nut	Lit c 1	profilin [Litchi chinensis]	15809696
866	<i>Litchi chinensis</i>	Lychee nut	Unassigned	profilin [Litchi chinensis]	83317152
867	<i>Litopenaeus vannamei</i>	Pacific white shrimp	Unassigned	arginine kinase [Litopenaeus vannamei]	115492980
868	<i>Litopenaeus vannamei</i>	Pacific white shrimp	Unassigned	Lit v 3 allergen myosin light chain [Litopenaeus vannamei]	184198734
869	<i>Litopenaeus vannamei</i>	Pacific white shrimp	Unassigned	sarcoplasmic calcium-binding protein [Litopenaeus vannamei]	223403273
870	<i>Lolium italicum</i>	Italian rye grass	Unassigned	pollen allergen (group II) [Lolium italicum]	4007636

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
871	<i>Lolium perenne</i>	Perennial ryegrass	Lol p 1	Pollen allergen Lol p 1 precursor (Lol p I) (Allergen R7)	126385
872	<i>Lolium perenne</i>	Perennial ryegrass	Lol p 2	Pollen allergen Lol p 2-A (Lol p II-A)	126386
873	<i>Lolium perenne</i>	Perennial ryegrass	Lol p 3	Pollen allergen Lol p 3 (Lol p III)	126387
874	<i>Lolium perenne</i>	Perennial ryegrass	Lol p 1	pollen allergen	168314
875	<i>Lolium perenne</i>	Perennial ryegrass	Unassigned	pollen allergen	168316
876	<i>Lolium perenne</i>	Perennial ryegrass	Lol p 2	allergen Lol p II [Lolium perenne]	939932
877	<i>Lolium perenne</i>	Perennial ryegrass	Lol p 5	Major pollen allergen Lol p 5a precursor (Lol p Va) (Lol p Ib)	2498581
878	<i>Lolium perenne</i>	Perennial ryegrass	Lol p 5	Major pollen allergen Lol p 5b precursor (Lol p Vb)	2498582
879	<i>Lolium perenne</i>	Perennial ryegrass	Lol p 5	pollen allergen Lol p VA precursor; major allergen [Lolium perenne]	4416516
880	<i>Lolium perenne</i>	Perennial ryegrass	Lol p 5	pollen allergen [Lolium perenne]	6634467
881	<i>Lolium perenne</i>	Perennial ryegrass	Lol p 11	Major pollen allergen Lol p 11 (Lol p XI)	47605808
882	<i>Lolium perenne</i>	Perennial ryegrass	Unassigned	pollen allergen Lol p 4 [Lolium perenne]	55859464
883	<i>Lolium perenne</i>	Perennial ryegrass	Lol p 1	Pollen allergen	75274600
884	<i>Lupinus angustifolius</i>	Blue lupine	Unassigned	conglutin beta [Lupinus angustifolius]	149208401
885	<i>Lupinus angustifolius</i>	Blue lupine	Unassigned	conglutin beta [Lupinus angustifolius]	149208403
886	<i>Lupinus angustifolius</i>	Blue lupine	Unassigned	conglutin beta [Lupinus angustifolius]	169950562
887	<i>Lycopersicon esculentum</i>	Tomato	Lyc e 1	profilin [Lycopersicon esculentum]	16555787
888	<i>Lycopersicon esculentum</i>	Tomato	Lyc e 1	profilin [Lycopersicon esculentum]	17224229
889	<i>Lycopersicon esculentum</i>	Tomato	Lyc e 2.0101	minor allergen beta-fructofuranosidase precursor [Lycopersicon esculentum]	18542113
890	<i>Lycopersicon esculentum</i>	Tomato	Lyc e 2.0102	minor allergen beta-fructofuranosidase precursor [Lycopersicon esculentum]	18542115
891	<i>Lycopersicon esculentum</i>	Tomato	Unassigned	non-specific lipid transfer protein [Lycopersicon esculentum]	71360928
892	<i>Lycopersicon esculentum</i>	Tomato	Unassigned	non-specific lipid transfer protein [Lycopersicon esculentum]	71360930

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
893	<i>Macrobrachium rosenbergii</i>	Prawn	Unassigned	tropomyosin [Macrobrachium rosenbergii]	288819271
894	<i>Malassezia furfur</i>	Yeast	Unassigned	Putative peroxiredoxin (Thioredoxin reductase) (Allergen Mal f 2) (MF1)	3914386
895	<i>Malassezia furfur</i>	Yeast	Unassigned	Putative peroxiredoxin (Thioredoxin reductase) (Allergen Mal f 3) (MF2)	3914387
896	<i>Malassezia furfur</i>	Yeast	Mala f 4	major allergenic protein Mal f4 [Malassezia furfur]	4587985
897	<i>Malassezia furfur</i>	Yeast	Unassigned	Major allergen Mal f 1 precursor (Pit o 1)	13959403
898	<i>Malassezia sympodialis</i>	Yeast	Mala s 5	allergen [Malassezia sympodialis]	4138171
899	<i>Malassezia sympodialis</i>	Yeast	Mala s 6	allergen [Malassezia sympodialis]	4138173
900	<i>Malassezia sympodialis</i>	Yeast	Mala s 7	allergen [Malassezia sympodialis]	4138175
901	<i>Malassezia sympodialis</i>	Yeast	Mala s 8	allergen [Malassezia sympodialis]	7271239
902	<i>Malassezia sympodialis</i>	Yeast	Mala s 9	allergen [Malassezia sympodialis]	19069920
903	<i>Malassezia sympodialis</i>	Yeast	Mala s 11	manganese superoxide dismutase [Malassezia sympodialis]	28569698
904	<i>Malassezia sympodialis</i>	Yeast	Unassigned	mala s 12 allergen precursor [Malassezia sympodialis]	78038796
905	<i>Malassezia sympodialis</i>	Yeast	Unassigned	Chain B, Cross-Reactivity And Crystal Structure Of Malassezia Sympodialis Thioredoxin (Mala S 13), A Member Of A New Pan-Allergen Family	119390336
906	<i>Malus x domestica</i>	Apple	Unassigned	major allergen [Malus x domestica]	886683
907	<i>Malus x domestica</i>	Apple	Mal d 1	major allergen Mal d 1 [Malus x domestica]	1313966
908	<i>Malus x domestica</i>	Apple	Mal d 1	Major allergen Mal d 1 (Mal d I)	1346478
909	<i>Malus x domestica</i>	Apple	Unassigned	31 kda major allergen/disease resistance protein homolog {N-terminal} [Malus domestica=apple trees, Golden Delicious, fruit, Peptide Partial, 26 aa]	1478293
910	<i>Malus x domestica</i>	Apple	Mal d 1	major allergen mal d 1 [Malus x domestica]	4590364
911	<i>Malus x domestica</i>	Apple	Mal d 1	major allergen mal d 1 [Malus x domestica]	4590366
912	<i>Malus x domestica</i>	Apple	Mal d 1	major allergen mal d 1 [Malus x domestica]	4590368

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
913	<i>Malus x domestica</i>	Apple	Mal d 1	major allergen mal d 1 [Malus x domestica]	4590376
914	<i>Malus x domestica</i>	Apple	Mal d 1	major allergen mal d 1 [Malus x domestica]	4590378
915	<i>Malus x domestica</i>	Apple	Mal d 1	major allergen mal d 1 [Malus x domestica]	4590380
916	<i>Malus x domestica</i>	Apple	Mal d 1	major allergen mal d 1 [Malus x domestica]	4590382
917	<i>Malus x domestica</i>	Apple	Mal d 1	major allergen mal d 1 [Malus x domestica]	4590388
918	<i>Malus x domestica</i>	Apple	Unassigned	Non-specific lipid-transfer protein precursor (LTP) (Allergen Mal d 3)	14423814
919	<i>Malus x domestica</i>	Apple	Mal d 4	Profilin-1 (GD4-1) (Pollen allergen Mal d 4)	14423873
920	<i>Malus x domestica</i>	Apple	Mal d 4	Profilin-2 (GD4-2) (Pollen allergen Mal d 4)	14423874
921	<i>Malus x domestica</i>	Apple	Mal d 4	Profilin-3 (GD4-5) (Pollen allergen Mal d 4)	14423875
922	<i>Malus x domestica</i>	Apple	Mal d 1	ypr10 [Malus x domestica]	16555783
923	<i>Malus x domestica</i>	Apple	Mal d 1	major allergen Mal d 1 [Malus x domestica]	27922941
924	<i>Malus x domestica</i>	Apple	Mal d 4	profilin [Malus x domestica]	28881453
925	<i>Malus x domestica</i>	Apple	Mal d 4	profilin [Malus x domestica]	28881455
926	<i>Malus x domestica</i>	Apple	Mal d 4	profilin [Malus x domestica]	28881457
927	<i>Malus x domestica</i>	Apple	Unassigned	Thaumatin-like protein 1a precursor (Allergen Mal d 2) (Mdt1) (Pathogenesis-related protein 5a) (PR-5a)	30316292
928	<i>Malus x domestica</i>	Apple	Unassigned	allergen Mal d 3 [Malus x domestica]	38492338
929	<i>Malus x domestica</i>	Apple	Unassigned	Major allergen Mal d 1 (Allergen Mal d I) (AP15)	42558971
930	<i>Malus x domestica</i>	Apple	Unassigned	lipid transfer protein precursor [Malus x domestica]	50659859
931	<i>Malus x domestica</i>	Apple	Unassigned	lipid transfer protein precursor [Malus x domestica]	50659879
932	<i>Malus x domestica</i>	Apple	Unassigned	lipid transfer protein precursor [Malus x domestica]	50659885
933	<i>Malus x domestica</i>	Apple	Unassigned	lipid transfer protein precursor [Malus x domestica]	50659889
934	<i>Malus x domestica</i>	Apple	Unassigned	lipid transfer protein precursor [Malus x domestica]	50659891
935	<i>Malus x domestica</i>	Apple	Unassigned	major allergen Mal d 1.07 [Malus x domestica]	60280829

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
936	<i>Malus x domestica</i>	Apple	Unassigned	major allergen Mal d 1.03D [Malus x domestica]	60280851
937	<i>Malus x domestica</i>	Apple	Unassigned	thaumatin-like protein precursor [Malus x domestica]	60418842
938	<i>Malus x domestica</i>	Apple	Unassigned	thaumatin-like protein precursor [Malus x domestica]	60418848
939	<i>Malus x domestica</i>	Apple	Unassigned	profilin 1 [Malus x domestica]	60418854
940	<i>Malus x domestica</i>	Apple	Unassigned	profilin 1 [Malus x domestica]	60418858
941	<i>Malus x domestica</i>	Apple	Unassigned	profilin 2 [Malus x domestica]	60418862
942	<i>Malus x domestica</i>	Apple	Unassigned	profilin 2 [Malus x domestica]	60418866
943	<i>Malus x domestica</i>	Apple	Unassigned	Ribonuclease-like PR-10a	75306007
944	<i>Malus x domestica</i>	Apple	Unassigned	Ribonuclease-like PR-10c (Mal d 1.0109)	75306008
945	<i>Malus x domestica</i>	Apple	Unassigned	profilin [Malus x domestica]	164510842
946	<i>Malus x domestica</i>	Apple	Unassigned	profilin [Malus x domestica]	164510858
947	<i>Malus x domestica</i>	Apple	Unassigned	profilin [Malus x domestica]	164510860
948	<i>Malus x domestica</i>	Apple	Unassigned	thaumatin-like protein [Malus x domestica]	218059715
949	<i>Malus x domestica</i>	Apple	Unassigned	thaumatin-like protein [Malus x domestica]	218059718
950	<i>Malus x domestica</i>	Apple	Unassigned	profilin [Malus x domestica]	218059728
951	<i>Malus x domestica</i>	Apple	Unassigned	profilin [Malus x domestica]	218059730
952	<i>Malus x domestica</i>	Apple	Unassigned	profilin [Malus x domestica]	218059733
953	<i>Marsupenaeus japonicus</i>	Prawn	Unassigned	tropomyosin fast isoform [Marsupenaeus japonicus]	125995159
954	<i>Mercurialis annua</i>	Annual mercury grass	Mer a 1	Profilin [Mercurialis annua]	2959898
955	<i>Metapenaeus ensis</i>	Greasyback shrimp	Unassigned	Tropomyosin (Allergen Met e 1) (Met e I)	6094504
956	<i>Mimachlamys nobilis</i>	Noble scallop	Unassigned	tropomyosin [Chlamys nobilis]	9954253
957	<i>Morus nigra</i>	Black mulberry	Unassigned	RecName: Full=Non-specific lipid-transfer protein 1; Short=LTP 1; AltName: Allergen=Mor n 3	288561913
958	<i>Mus musculus</i>	Mouse	Mus m 1	Major urinary protein 6 precursor (MUP 6) (Alpha-2U-globulin) (Group 1, BS6) (Allergen Mus m 1)	20178291
959	<i>Musa acuminata</i>	Banana	Mus xp 1	profilin [Musa acuminata]	14161635

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
960	<i>Myrmecia pilosula</i>	Jumper ant	Myr p 1	Pilosulin-1 precursor (Major allergen Myr p 1) (Myr p I) [Contains: Pilosulin-1; Pilosulin-1 65->112; Pilosulin-1 68->112; Pilosulin-1 71->112; Pilosulin-1 86->112]	730091
961	<i>Myrmecia pilosula</i>	Jumper ant	Myr p 2	major allergen Myr p II	1587177
962	<i>Myrmecia pilosula</i>	Jumper ant	Unassigned	Myr p I=allergenic polypeptide {N-terminal} [Myrmecia pilosula=jumper ants, venom, Peptide Partial, 112 aa]	1911819
963	<i>Myrmecia pilosula</i>	Jumper ant	Myr p 2	Allergen Myr p 2 precursor (Myr p II)	2498604
964	<i>Neptunea polycostata</i>	Sea snail	Unassigned	tropomyosin [Neptunea polycostata]	219806590
965	<i>Nicotiana tabacum</i>	Tobacco	Unassigned	villin 1 [Nicotiana tabacum]	57283137
966	<i>Nicotiana tabacum</i>	Tobacco	Unassigned	villin 2 [Nicotiana tabacum]	57283139
967	<i>Octopus vulgaris</i>	Octopus	Unassigned	tropomyosin [Octopus vulgaris]	83715936
968	<i>Olea europaea</i>	Olive tree	Unassigned	major allergen OLE16 - common olive (fragment)	1362128
969	<i>Olea europaea</i>	Olive tree	Unassigned	major allergen OLE17 - common olive (fragment)	1362129
970	<i>Olea europaea</i>	Olive tree	Unassigned	major allergen OLE19 - common olive (fragment)	1362130
971	<i>Olea europaea</i>	Olive tree	Ole e 1.0104	major allergen OLE1c - common olive (fragment)	1362131
972	<i>Olea europaea</i>	Olive tree	Ole e 1	major allergen OLE20 - common olive (fragment)	1362132
973	<i>Olea europaea</i>	Olive tree	Unassigned	major allergen OLE26 - common olive (fragment)	1362133
974	<i>Olea europaea</i>	Olive tree	Unassigned	major allergen OLE33/OLE37 - common olive (fragment)	1362134
975	<i>Olea europaea</i>	Olive tree	Ole e 1.0102	major allergen OLE3c - common olive	1362135
976	<i>Olea europaea</i>	Olive tree	Ole e 1.0103	major allergen OLE5c - common olive	1362136
977	<i>Olea europaea</i>	Olive tree	Unassigned	major allergen OLE6 - common olive (fragment)	1362137
978	<i>Olea europaea</i>	Olive tree	Ole e 1.0105	Ole e 1.0102 protein [Olea europaea]	2465127
979	<i>Olea europaea</i>	Olive tree	Ole e 1.0106	Ole e 1.0103 protein [Olea europaea]	2465129
980	<i>Olea europaea</i>	Olive tree	Ole e 1.0107	Ole e 1 protein [Olea europaea]	2465131
981	<i>Olea europaea</i>	Olive tree	Ole e 3	calcium-binding pollen allergen [Olea europaea]	3337403
982	<i>Olea europaea</i>	Olive tree	Ole e 2	Profilin-1 (Pollen allergen Ole e 2)	3914426

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
983	<i>Olea europaea</i>	Olive tree	Ole e 2	Profilin-2 (Pollen allergen Ole e 2)	3914427
984	<i>Olea europaea</i>	Olive tree	Ole e 2	Profilin-3 (Pollen allergen Ole e 2)	3914428
985	<i>Olea europaea</i>	Olive tree	Ole e 8	calcium-binding protein [Olea europaea]	6901654
986	<i>Olea europaea</i>	Olive tree	Ole e 1.0101	main olive allergen [Olea europaea]	13195753
987	<i>Olea europaea</i>	Olive tree	Ole e 9	beta-1,3-glucanase-like protein [Olea europaea]	14279169
988	<i>Olea europaea</i>	Olive tree	Ole e 6	Pollen allergen Ole e 6	14423643
989	<i>Olea europaea</i>	Olive tree	Ole e 8	Calcium-binding allergen Ole e 8 (PCA18/PCA23)	14423648
990	<i>Olea europaea</i>	Olive tree	Ole e 1	Major pollen allergen (Allergen Ole e 1) (Ole e I)	14424429
991	<i>Olea europaea</i>	Olive tree	Ole e 7	Pollen allergen Ole e 7 (Ole e VII)	22002032
992	<i>Olea europaea</i>	Olive tree	Ole e 10	allergen Ole e 10 [Olea europaea]	29465664
993	<i>Olea europaea</i>	Olive tree	Unassigned	major pollen allergen Ole e 1 [Olea europaea]	33325115
994	<i>Olea europaea</i>	Olive tree	Unassigned	major pollen allergen Ole e 1 [Olea europaea]	33329732
995	<i>Olea europaea</i>	Olive tree	Unassigned	major pollen allergen Ole e 1 [Olea europaea]	33329738
996	<i>Olea europaea</i>	Olive tree	Unassigned	major pollen allergen Ole e 1 [Olea europaea]	33329744
997	<i>Olea europaea</i>	Olive tree	Unassigned	major pollen allergen Ole e 1 [Olea europaea]	33329748
998	<i>Olea europaea</i>	Olive tree	Unassigned	major pollen allergen Ole e 1 [Olea europaea]	33329750
999	<i>Olea europaea</i>	Olive tree	Unassigned	major pollen allergen Ole e 1 [Olea europaea]	33329752
1000	<i>Olea europaea</i>	Olive tree	Unassigned	major pollen allergen Ole e 1 [Olea europaea]	33329754
1001	<i>Olea europaea</i>	Olive tree	Unassigned	major pollen allergen Ole e 1 [Olea europaea]	33329756
1002	<i>Olea europaea</i>	Olive tree	Unassigned	major pollen allergen Ole e 1 [Olea europaea]	33329758
1003	<i>Olea europaea</i>	Olive tree	Unassigned	major pollen allergen Ole e 1 [Olea europaea]	37548753
1004	<i>Olea europaea</i>	Olive tree	Unassigned	major pollen allergen Ole e 1 [Olea europaea]	37724593
1005	<i>Olea europaea</i>	Olive tree	Unassigned	major pollen allergen Ole e 1 [Olea europaea]	37724597
1006	<i>Olea europaea</i>	Olive tree	Ole e 3	Ole e 3 allergen [Olea europaea]	37725377
1007	<i>Olea europaea</i>	Olive tree	Ole e 11.0102	Ole e 11.01 allergen precursor [Olea europaea]	68270856
1008	<i>Olea europaea</i>	Olive tree	Ole e 5	Superoxide dismutase [Cu-Zn] (Allergen Ole e 5) (Ole e V)	122064581
1009	<i>Olea europaea</i>	Olive tree	Unassigned	pollen allergen Ole e 5 [Olea europaea]	145313972

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
1010	<i>Olea europaea</i>	Olive tree	Unassigned	major pollen allergen Ole e 1 [Olea europaea]	145313982
1011	<i>Olea europaea</i>	Olive tree	Unassigned	major pollen allergen Ole e 1 [Olea europaea]	145313984
1012	<i>Olea europaea</i>	Olive tree	Unassigned	major pollen allergen Ole e 1 [Olea europaea]	145313988
1013	<i>Olea europaea</i>	Olive tree	Unassigned	major pollen allergen Ole e 1 [Olea europaea]	145313990
1014	<i>Olea europaea</i>	Olive tree	Unassigned	major pollen allergen Ole e 1 [Olea europaea]	145313992
1015	<i>Olea europaea</i>	Olive tree	Unassigned	allergen Ole e 5 [Olea europaea]	160347106
1016	<i>Olea europaea</i>	Olive tree	Unassigned	allergen Ole e 5 [Olea europaea]	160347108
1017	<i>Olea europaea</i>	Olive tree	Unassigned	allergen Ole e 5 [Olea europaea]	160347112
1018	<i>Olea europaea</i>	Olive tree	Unassigned	allergen Ole e 5 [Olea europaea]	160347120
1019	<i>Olea europaea</i>	Olive tree	Unassigned	allergen Ole e 5 [Olea europaea]	160347122
1020	<i>Olea europaea</i>	Olive tree	Unassigned	allergen Ole e 5 [Olea europaea]	160347124
1021	<i>Olea europaea</i>	Olive tree	Unassigned	allergen Ole e 5 [Olea europaea]	160347126
1022	<i>Olea europaea</i>	Olive tree	Unassigned	allergen Ole e 5 [Olea europaea]	160347130
1023	<i>Olea europaea</i>	Olive tree	Unassigned	allergen Ole e 5 [Olea europaea]	160347134
1024	<i>Olea europaea</i>	Olive tree	Unassigned	allergen Ole e 5 [Olea europaea]	160347138
1025	<i>Olea europaea</i>	Olive tree	Unassigned	Ole e 5 olive pollen allergen [Olea europaea]	160962543
1026	<i>Olea europaea</i>	Olive tree	Unassigned	Ole e 5 olive pollen allergen [Olea europaea]	160962547
1027	<i>Olea europaea</i>	Olive tree	Unassigned	Ole e 5 olive pollen allergen [Olea europaea]	160962557
1028	<i>Olea europaea</i>	Olive tree	Unassigned	Ole e 5 olive pollen allergen [Olea europaea]	160962577
1029	<i>Olea europaea</i>	Olive tree	Unassigned	Ole e 5 olive pollen allergen [Olea europaea]	160962583
1030	<i>Olea europaea</i>	Olive tree	Unassigned	Ole e 5 olive pollen allergen [Olea europaea]	160962587
1031	<i>Olea europaea</i>	Olive tree	Unassigned	Ole e 5 olive pollen allergen [Olea europaea]	160962591
1032	<i>Olea europaea</i>	Olive tree	Unassigned	Ole e 5 olive pollen allergen [Olea europaea]	160962597
1033	<i>Olea europaea</i>	Olive tree	Unassigned	Ole e 5 olive pollen allergen [Olea europaea]	160962611
1034	<i>Olea europaea</i>	Olive tree	Unassigned	Chain A, Solution Structure Of The C-Terminal Domain Ole E 9	166235350
1035	<i>Olea europaea</i>	Olive tree	Ole e 11.0101	Ole e 11.0101 allergen precursor [Olea europaea]	269996495

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
1036	<i>Ommastrephes bartramii</i>	Squid	Unassigned	tropomyosin [Ommastrephes bartramii]	83715934
1037	<i>Oncorhynchus mykiss</i>	Trout	Unassigned	RecName: Full=Parvalbumin beta 1	288559139
1038	<i>Oncorhynchus mykiss</i>	Trout	Unassigned	RecName: Full=Parvalbumin beta 2	288559140
1039	<i>Oratosquilla oratoria</i>	Fungus	Unassigned	tropomyosin [Oratosquilla oratoria]	162286975
1040	<i>Oryza sativa</i>	Rice	Ory s 1	Ory s 1	1173557
1041	<i>Oryza sativa</i>	Rice	Unassigned	beta-expansin [Oryza sativa]	8118439
1042	<i>Oryza sativa</i>	Rice	Unassigned	Lactoylglutathione lyase (Methylglyoxalase) (Aldoketomutase) (Glyoxalase I) (Glx I) (Ketone-aldehyde mutase) (S-D-lactoylglutathione methylglyoxal lyase) (Allergen Ory s ?) (Allergen Glb33) (PP33)	84029333
1043	<i>Oryza sativa (japonica cultivar-group)</i>	Rice	Unassigned	allergenic protein [Oryza sativa (japonica cultivar-group)]	218193
1044	<i>Oryza sativa (japonica cultivar-group)</i>	Rice	Unassigned	allergenic protein [Oryza sativa (japonica cultivar-group)]	218197
1045	<i>Oryza sativa (japonica cultivar-group)</i>	Rice	Unassigned	allergenic protein [Oryza sativa (japonica cultivar-group)]	1304216
1046	<i>Oryza sativa (japonica cultivar-group)</i>	Rice	Unassigned	allergenic protein [Oryza sativa (japonica cultivar-group)]	1304217
1047	<i>Oryza sativa (japonica cultivar-group)</i>	Rice	Unassigned	allergenic protein [Oryza sativa (japonica cultivar-group)]	1304218
1048	<i>Oryza sativa (japonica cultivar-group)</i>	Rice	Unassigned	allergenic protein [Oryza sativa (japonica cultivar-group)]	1398913
1049	<i>Oryza sativa (japonica cultivar-group)</i>	Rice	Unassigned	allergenic protein [Oryza sativa (japonica cultivar-group)]	1398915
1050	<i>Oryza sativa (japonica cultivar-group)</i>	Rice	Unassigned	allergenic protein [Oryza sativa (japonica cultivar-group)]	1398916
1051	<i>Oryza sativa (japonica cultivar-group)</i>	Rice	Unassigned	allergenic protein [Oryza sativa (japonica cultivar-group)]	1398918
1052	<i>Oryza sativa (japonica cultivar-group)</i>	Rice	Unassigned	allergenic protein [Oryza sativa]	2827316
1053	<i>Oryza sativa (japonica cultivar-group)</i>	Rice	Unassigned	glyoxalase I [Oryza sativa (japonica cultivar-group)]	16580747

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
1054	<i>Oryza sativa</i> (japonica cultivar-group)	Rice	Unassigned	allergen RA5B precursor [Oryza sativa (japonica cultivar-group)]	23495787
1055	<i>Oryza sativa</i> (japonica cultivar-group)	Rice	Unassigned	putative allergenic protein [Oryza sativa (japonica cultivar-group)]	23616947
1056	<i>Oryza sativa</i> (japonica cultivar-group)	Rice	Unassigned	allergen RA16 [Oryza sativa (japonica cultivar-group)]	23616954
1057	<i>Oryza sativa</i> (japonica cultivar-group)	Rice	Ory s 1	Expansin-B1 precursor (OsEXPB1) (Beta-expansin-1) (OsaEXPb1.2) (OsaEXPb1.3) (Major pollen allergen Ory s 1) (Ory s I)	109913547
1058	<i>Oryza sativa</i> (japonica cultivar-group)	Rice	Unassigned	Seed allergenic protein RAG1 precursor (Seed allergenic protein RA17)	114152864
1059	<i>Oryza sativa</i> (japonica cultivar-group)	Rice	Unassigned	Seed allergenic protein RAG2 precursor (Seed allergenic protein RA14)	114152865
1060	<i>Pachycondyla chinensis</i>	Ant	Unassigned	Pac c 3 allergen [Pachycondyla chinensis]	169822894
1061	<i>Pandalus eous</i>	Fungus	Unassigned	tropomyosin fast isoform [Pandalus eous]	125995161
1062	<i>Panulirus stimpsoni</i>	Lobster	Unassigned	Tropomyosin (Allergen Pan s 1) (Pan s I)	14285797
1063	<i>Paralithodes camtschaticus</i>	Crab	Unassigned	tropomyosin fast isoform [Paralithodes camtschaticus]	125995163
1064	<i>Paralithodes camtschaticus</i>	Crab	Unassigned	tropomyosin slow-tonic isoform [Paralithodes camtschaticus]	125995165
1065	<i>Parietaria judaica</i>	Weed	Par j 1	major allergen Par j I	741844
1066	<i>Parietaria judaica</i>	Weed	Par j 2.0102	P8 protein [Parietaria judaica]	1532056
1067	<i>Parietaria judaica</i>	Weed	Par j 1.0102	P9 protein [Parietaria judaica]	1532058
1068	<i>Parietaria judaica</i>	Weed	Par j 1.0201	Probable nonspecific lipid-transfer protein 1 precursor (LTP) (Major pollen allergen Par j 1.0201) (Par j I) (P1 protein)	2497749
1069	<i>Parietaria judaica</i>	Weed	Par j 2.0101	Probable nonspecific lipid-transfer protein 2 precursor (LTP 2) (Major pollen allergen Par j 2.0101) (Par j II) (P2 protein)	2497750
1070	<i>Parietaria judaica</i>	Weed	Par j 1.0101	Probable nonspecific lipid-transfer protein (LTP) (Major pollen allergen Par j 1.0101) (Par j I) (P5 protein)	3915783

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
1071	<i>Parietaria judaica</i>	Weed	Par j 3	Profilin-2 (Pollen allergen Par j 3)	14423869
1072	<i>Parietaria judaica</i>	Weed	Par j 3	Profilin-1 (Pollen allergen Par j 3)	14423876
1073	<i>Parietaria officinalis</i>	Weed	Par o 1	mAb 2F9-reactive major allergen {N-terminal} [Parietaria officinalis, pollen, Peptide Partial, 17 aa]	1311509
1074	<i>Parietaria officinalis</i>	Weed	Par o 1	mAb 8C7-reactive major allergen {N-terminal, band 1} [Parietaria officinalis, pollen, Peptide Partial, 15 aa]	1311510
1075	<i>Parietaria officinalis</i>	Weed	Par o 1	mAb 8C7-reactive major allergen {N-terminal, band 2} [Parietaria officinalis, pollen, Peptide Partial, 15 aa]	1311511
1076	<i>Parietaria officinalis</i>	Weed	Par o 1	mAb 3F8-reactive major allergen {N-terminal} [Parietaria officinalis, pollen, Peptide Partial, 15 aa]	1311512
1077	<i>Parietaria officinalis</i>	Weed	Par o 1	mAb 8B6-reactive major allergen {N-terminal} [Parietaria officinalis, pollen, Peptide Partial, 30 aa]	1311513
1078	<i>Parietaria officinalis</i>	Weed	Unassigned	Par o 1a=acidic allergen isoform {N-terminal} [Parietaria officinalis=pellitory, pollen, Peptide Partial, 25 aa]	1836010
1079	<i>Parietaria officinalis</i>	Weed	Par o 1	Par o 1b=basic allergen isoform {N-terminal} [Parietaria officinalis=pellitory, pollen, Peptide Partial, 24 aa]	1836011
1080	<i>Parietaria officinalis</i>	Weed	Par o 1	Pollen major allergen Par o 1	75139847
1081	<i>Paspalum notatum</i>	Bahia grass	Unassigned	Pas n 1 allergen precursor [Paspalum notatum]	168419914
1082	<i>Penaeus monodon</i>	Black tiger shrimp	Pen m 2	allergen Pen m 2 [Penaeus monodon]	27463265
1083	<i>Penaeus monodon</i>	Black tiger shrimp	Unassigned	tropomyosin fast isoform [Penaeus monodon]	125995157
1084	<i>Penicillium brevicompactum</i>	Fungus	Unassigned	60S acidic ribosomal P1 phosphoprotein Pen b 26 [Penicillium brevicompactum]	59894749
1085	<i>Penicillium chrysogenum</i>	Fungus	Pen ch 20	68 kDa allergen [Penicillium chrysogenum]	999009
1086	<i>Penicillium chrysogenum</i>	Fungus	Pen ch 13	allergen Pen n 13 [Penicillium chrysogenum]	6684758

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
1087	<i>Penicillium chrysogenum</i>	Fungus	Pen ch 18	allergen Pen n 18 [Penicillium chrysogenum]	7963902
1088	<i>Penicillium chrysogenum</i>	Fungus	Pen ch 18	vacuolar serine protease [Penicillium chrysogenum]	14215732
1089	<i>Penicillium chrysogenum</i>	Fungus	Pen ch 13	alkaline serine protease [Penicillium chrysogenum]	21069093
1090	<i>Penicillium citrinum</i>	Fungus	Unassigned	Pen c 1; alkaline serine protease [Penicillium citrinum]	4587983
1091	<i>Penicillium citrinum</i>	Fungus	Unassigned	alkaline serine protease Pen c2 [Penicillium citrinum]	4588118
1092	<i>Penicillium citrinum</i>	Fungus	Pen c 3	peroxisomal membrane protein [Penicillium citrinum]	5326864
1093	<i>Penicillium citrinum</i>	Fungus	Unassigned	vacuolar serine protease [Penicillium citrinum]	12005501
1094	<i>Penicillium citrinum</i>	Fungus	Pen c 19	Heat shock 70 kDa protein (Allergen Pen c 19)	14423733
1095	<i>Penicillium citrinum</i>	Fungus	Pen c 24	unknown [Penicillium citrinum]	38326693
1096	<i>Penicillium citrinum</i>	Fungus	Unassigned	Enolase (2-phosphoglycerate dehydratase) (2-phospho-D-glycerate hydro-lyase) (Allergen Pen c 22)	74664773
1097	<i>Penicillium oxalicum</i>	Fungus	Pen o 18	vacuolar serine protease [Penicillium oxalicum]	12005497
1098	<i>Periplaneta americana</i>	American cockroach	Per a 3.0201	allergen [Periplaneta americana]	1531589
1099	<i>Periplaneta americana</i>	American cockroach	Per a 3.0202	allergen [Periplaneta americana]	1580794
1100	<i>Periplaneta americana</i>	American cockroach	Per a 3.0203	allergen [Periplaneta americana]	1580797
1101	<i>Periplaneta americana</i>	American cockroach	Per a 1	Cr-P11 allergen [Periplaneta americana]	2231297
1102	<i>Periplaneta americana</i>	American cockroach	Per a 1.0104	Cr-P11 allergen [Periplaneta americana]	2253610
1103	<i>Periplaneta americana</i>	American cockroach	Per a 1	Cr-P11 [Periplaneta americana]	2580504
1104	<i>Periplaneta americana</i>	American cockroach	Per a 3.0101	Allergen Cr-P1 precursor (Allergen Per a 3)	2833325
1105	<i>Periplaneta americana</i>	American cockroach	Per a 1.0102	allergen [Periplaneta americana]	2897849
1106	<i>Periplaneta americana</i>	American cockroach	Per a 1.0101	major allergen Per a 1.0101 [Periplaneta americana]	4240399
1107	<i>Periplaneta americana</i>	American cockroach	Per a 7.0101	tropomyosin [Periplaneta americana]	4378573
1108	<i>Periplaneta americana</i>	American cockroach	Unassigned	Tropomyosin (Major allergen Per a 7)	14423957
1109	<i>Periplaneta americana</i>	American cockroach	Unassigned	major allergen Per a 1.0105 [Periplaneta americana]	30144660

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
1110	<i>Periplaneta americana</i>	American cockroach	Unassigned	Per a 4 allergen [Periplaneta americana]	60678787
1111	<i>Periplaneta americana</i>	American cockroach	Unassigned	Per a 4 allergen variant 1 [Periplaneta americana]	212675312
1112	<i>Periplaneta americana</i>	American cockroach	Unassigned	Chain A, Crystal Structure Of Major Allergens, Per A 4 From Cockroaches	215794707
1113	<i>Periplaneta americana</i>	American cockroach	Unassigned	tropomyosin [Periplaneta americana]	239740599
1114	<i>Periplaneta americana</i>	American cockroach	Unassigned	major allergen Cr-P11 [Periplaneta americana]	284518361
1115	<i>Periplaneta americana</i>	American cockroach	Unassigned	major allergen Cr-P1 [Periplaneta americana]	284518363
1116	<i>Periplaneta americana</i>	American cockroach	Unassigned	Per a 3 allergen [Periplaneta americana]	289721058
1117	<i>Periplaneta fuliginosa</i>	Smokybrown cockroach	Unassigned	tropomyosin [Periplaneta fuliginosa]	19310971
1118	<i>Perna viridis</i>	Asian green mussel	Unassigned	tropomyosin [Perna viridis]	9954251
1119	<i>Persea americana</i>	Avocado	Pers a 1	endochitinase [Persea americana]	3201547
1120	<i>Phalaris aquatica</i>	Canary grass	Unassigned	Pha a 1=34 kda pollen allergen {N-terminal} [Phalaris aquatica=canary grass, Peptide Partial, 20 aa]	409328
1121	<i>Phalaris aquatica</i>	Canary grass	Pha a 1	Major pollen allergen Pha a 1 precursor (Pha a 1)	2498576
1122	<i>Phalaris aquatica</i>	Canary grass	Unassigned	Major pollen allergen Pha a 5.1 precursor (Pha A 5) (Clone 28)	2498577
1123	<i>Phalaris aquatica</i>	Canary grass	Unassigned	Major pollen allergen Pha a 5.2 precursor (Pha a 5) (Clone 14)	2498578
1124	<i>Phalaris aquatica</i>	Canary grass	Unassigned	Major pollen allergen Pha a 5.3 precursor (Pha a 5) (Clone 29)	2498579
1125	<i>Phalaris aquatica</i>	Canary grass	Unassigned	Major pollen allergen Pha a 5.4 (Pha a 5) (Clone 5)	2498580
1126	<i>Phaseolus vulgaris</i>	Kidney bean	Unassigned	non-specific lipid transfer protein 1a precursor [Phaseolus vulgaris]	289064177
1127	<i>Phaseolus vulgaris</i>	Kidney bean	Unassigned	non-specific lipid transfer protein 1b precursor [Phaseolus vulgaris]	289064179
1128	<i>Phleum pratense</i>	Common timothy	Phl p 5.0101	Phlp5 [Phleum pratense]	398830
1129	<i>Phleum pratense</i>	Common timothy	Phl p 5	PHLP5A protein - common timothy (fragment)	422005
1130	<i>Phleum pratense</i>	Common timothy	Phl p 12	Profilin-1 (Pollen allergen Phl p 12) (Phl p 11)	464471
1131	<i>Phleum pratense</i>	Common timothy	Phl p 5	allergen Phl p Vb - common timothy	481397

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
1132	<i>Phleum pratense</i>	Common timothy	Unassigned	major allergen Phl p Va	1092249
1133	<i>Phleum pratense</i>	Common timothy	Unassigned	Pollen allergen Phl p 1 precursor (Phl p I)	1171008
1134	<i>Phleum pratense</i>	Common timothy	Unassigned	Pollen allergen Phl p 2 precursor (Phl p II)	1171009
1135	<i>Phleum pratense</i>	Common timothy	Unassigned	allergen Phl p I	1582250
1136	<i>Phleum pratense</i>	Common timothy	Phl p 5.0202	major allergen Phl p 5 [Phleum pratense]	1684718
1137	<i>Phleum pratense</i>	Common timothy	Phl p 5.0104	major allergen Phl p 5 [Phleum pratense]	1684720
1138	<i>Phleum pratense</i>	Common timothy	Phl p 5	Major Pollen Allergen Phl p Va [Phleum pratense]	2398757
1139	<i>Phleum pratense</i>	Common timothy	Phl p 12	profilin 3 [Phleum pratense]	2415700
1140	<i>Phleum pratense</i>	Common timothy	Phl p 12	profilin 4 [Phleum pratense]	2415702
1141	<i>Phleum pratense</i>	Common timothy	Phl p 5	Pollen allergen Phl p 5b precursor (Phl p Vb)	2851457
1142	<i>Phleum pratense</i>	Common timothy	Phl p 6	Phl p6 allergen [Phleum pratense]	3004465
1143	<i>Phleum pratense</i>	Common timothy	Phl p 6	Phl p6 allergen [Phleum pratense]	3004467
1144	<i>Phleum pratense</i>	Common timothy	Unassigned	Phl p6 IgE binding fragment [Phleum pratense]	3004469
1145	<i>Phleum pratense</i>	Common timothy	Phl p 5.0105	major allergen Phl p 5 [Phleum pratense]	3135497
1146	<i>Phleum pratense</i>	Common timothy	Phl p 5.0106	major allergen Phl p 5 [Phleum pratense]	3135499
1147	<i>Phleum pratense</i>	Common timothy	Phl p 5.0107	major allergen Phl p 5 [Phleum pratense]	3135501
1148	<i>Phleum pratense</i>	Common timothy	Phl p 5.0108	major allergen Phl p 5 [Phleum pratense]	3135503
1149	<i>Phleum pratense</i>	Common timothy	Phl p 5.0103	group V allergen Phl p 5.0103 precursor [Phleum pratense]	3309039
1150	<i>Phleum pratense</i>	Common timothy	Unassigned	group V allergen Phl p 5.0203 precursor [Phleum pratense]	3309041
1151	<i>Phleum pratense</i>	Common timothy	Unassigned	group V allergen Phl p 5.0206 precursor [Phleum pratense]	3309045
1152	<i>Phleum pratense</i>	Common timothy	Unassigned	group V allergen Phl p 5.0207 precursor [Phleum pratense]	3309047
1153	<i>Phleum pratense</i>	Common timothy	Phl p 1.0101	pollen allergen Phl p I [Phleum pratense]	3901094
1154	<i>Phleum pratense</i>	Common timothy	Phl p 13	polygalacturonase [Phleum pratense]	4826572
1155	<i>Phleum pratense</i>	Common timothy	Phl p 5	group V allergen Phl p 5 precursor [Phleum pratense]	13430402

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
1156	<i>Phleum pratense</i>	Common timothy	Unassigned	Polcalcin Phl p 7 (Calcium-binding pollen allergen Phl p 7) (P7)	14423846
1157	<i>Phleum pratense</i>	Common timothy	Unassigned	unnamed protein product [Phleum pratense]	21725606
1158	<i>Phleum pratense</i>	Common timothy	Unassigned	unnamed protein product [Phleum pratense]	21725608
1159	<i>Phleum pratense</i>	Common timothy	Unassigned	unnamed protein product [Phleum pratense]	21725610
1160	<i>Phleum pratense</i>	Common timothy	Unassigned	unnamed protein product [Phleum pratense]	21725612
1161	<i>Phleum pratense</i>	Common timothy	Unassigned	unnamed protein product [Phleum pratense]	21725614
1162	<i>Phleum pratense</i>	Common timothy	Unassigned	unnamed protein product [Phleum pratense]	21725616
1163	<i>Phleum pratense</i>	Common timothy	Unassigned	unnamed protein product [Phleum pratense]	21725618
1164	<i>Phleum pratense</i>	Common timothy	Unassigned	unnamed protein product [Phleum pratense]	21725620
1165	<i>Phleum pratense</i>	Common timothy	Unassigned	unnamed protein product [Phleum pratense]	21725622
1166	<i>Phleum pratense</i>	Common timothy	Unassigned	unnamed protein product [Phleum pratense]	21725624
1167	<i>Phleum pratense</i>	Common timothy	Unassigned	unnamed protein product [Phleum pratense]	21725626
1168	<i>Phleum pratense</i>	Common timothy	Unassigned	unnamed protein product [Phleum pratense]	21725628
1169	<i>Phleum pratense</i>	Common timothy	Unassigned	unnamed protein product [Phleum pratense]	21725630
1170	<i>Phleum pratense</i>	Common timothy	Unassigned	unnamed protein product [Phleum pratense]	21725632
1171	<i>Phleum pratense</i>	Common timothy	Phl p 1	Chain A, Crystal Structure Of Phl P 1, A Major Timothy Grass Pollen Allergen	28373838
1172	<i>Phleum pratense</i>	Common timothy	Unassigned	Chain N, Crystal Structure Of Phl P 6, A Major Timothy Grass Pollen Allergen Co-Crystallized With Zinc	28374072
1173	<i>Phleum pratense</i>	Common timothy	Phl p 5	Chain A, Crystal Structure Of The Functional Domain Of The Major Grass Pollen Allergen Phl P 5b	28948464
1174	<i>Phleum pratense</i>	Common timothy	Unassigned	phl p5a allergen precursor [Phleum pratense]	29500897
1175	<i>Phleum pratense</i>	Common timothy	Unassigned	unnamed protein product [Phleum pratense]	45108967
1176	<i>Phleum pratense</i>	Common timothy	Unassigned	unnamed protein product [Phleum pratense]	45108973
1177	<i>Phleum pratense</i>	Common timothy	Unassigned	unnamed protein product [Phleum pratense]	45823012
1178	<i>Phleum pratense</i>	Common timothy	Unassigned	Pollen allergen Phl p 11	47606039

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
1179	<i>Phleum pratense</i>	Common timothy	Unassigned	pollen allergen Phl p 4 [Phleum pratense]	54144332
1180	<i>Phleum pratense</i>	Common timothy	Phl p 5	Pollen allergen Phl p V	75139900
1181	<i>Phleum pratense</i>	Common timothy	Unassigned	major pollen allergen Phl p 4 precursor [Phleum pratense]	82492267
1182	<i>Phleum pratense</i>	Common timothy	Unassigned	pollen allergen Phl p 4.0102 [Phleum pratense]	189014266
1183	<i>Phleum pratense</i>	Common timothy	Unassigned	pollen allergen Phl p 4.0202 [Phleum pratense]	189014268
1184	<i>Phleum pratense</i>	Common timothy	Unassigned	pollen allergen Phl p 4.0203 [Phleum pratense]	189014270
1185	<i>Phleum pratense</i>	Common timothy	Unassigned	pollen allergen Phl p 4.0204 [Phleum pratense]	189014272
1186	<i>Phoenix dactylifera</i>	Date palm	Pho d 2	profilin [Phoenix dactylifera]	21322677
1187	<i>Pistacia vera</i>	Pistachio	Unassigned	Pis v 1 allergen 2S albumin [Pistacia vera]	110349081
1188	<i>Pistacia vera</i>	Pistachio	Unassigned	Pis v 2.0101 allergen 11S globulin precursor [Pistacia vera]	110349083
1189	<i>Pistacia vera</i>	Pistachio	Unassigned	Pis v 2.0201 allergen 11S globulin precursor [Pistacia vera]	110349085
1190	<i>Pistacia vera</i>	Pistachio	Unassigned	vicilin [Pistacia vera]	133711974
1191	<i>Pistacia vera</i>	Pistachio	Unassigned	11S globulin [Pistacia vera]	156001070
1192	<i>Pisum sativum</i>	Pea	Pis s 1	Vicilin [Pisum sativum]	42414627
1193	<i>Pisum sativum</i>	Pea	Pis s 1	Vicilin [Pisum sativum]	42414629
1194	<i>Plantago lanceolata</i>	Narrow-leaved plantain	Pla l 1	plantain pollen major allergen, Pla l 1.0101 [Plantago lanceolata]	14422359
1195	<i>Plantago lanceolata</i>	Narrow-leaved plantain	Pla l 1	plantain pollen major allergen, Pla l 1.0102 [Plantago lanceolata]	14422361
1196	<i>Plantago lanceolata</i>	Narrow-leaved plantain	Pla l 1	plantain pollen major allergen, Pla l 1.0103 [Plantago lanceolata]	14422363
1197	<i>Plantago lanceolata</i>	Narrow-leaved plantain	Unassigned	unnamed protein product [Plantago lanceolata]	29163773
1198	<i>Platanus orientalis</i>	Plane tree	Unassigned	pollen allergen Pla o 1 [Platanus orientalis]	162949336
1199	<i>Platanus x acerifolia</i>	London plane tree	Unassigned	Putative invertase inhibitor precursor (Pollen allergen Pla a 1)	29839547
1200	<i>Platanus x acerifolia</i>	London plane tree	Pla a 2	polygalacturonase [Platanus x acerifolia]	49523394
1201	<i>Plodia interpunctella</i>	Indian meal moth	Unassigned	arginine kinase [Plodia interpunctella]	15886861

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
1202	<i>Poa pratensis</i>	Kentucky bluegrass	Unassigned	Pollen allergen KBG 31 precursor (Pollen allergen Poa p 9) (Poa p IX)	113560
1203	<i>Poa pratensis</i>	Kentucky bluegrass	Unassigned	Pollen allergen KBG 41 precursor (Pollen allergen Poa p 9) (Poa p IX)	113561
1204	<i>Poa pratensis</i>	Kentucky bluegrass	Unassigned	Pollen allergen KBG 60 precursor (Pollen allergen Poa p 9) (Poa p IX)	113562
1205	<i>Poa pratensis</i>	Kentucky bluegrass	Poa p 1	pollen allergen Poa-pl - Kentucky bluegrass (fragment)	280414
1206	<i>Poa pratensis</i>	Kentucky bluegrass	Poa p 1	pollen allergen Poa p I - Kentucky bluegrass (fragment)	320620
1207	<i>Poa pratensis</i>	Kentucky bluegrass	Unassigned	pollen allergen (clone 7.2) - Kentucky bluegrass (fragment)	539056
1208	<i>Poa pratensis</i>	Kentucky bluegrass	Unassigned	pollen allergen (group II) [Poa pratensis]	4007655
1209	<i>Poa pratensis</i>	Kentucky bluegrass	Poa p 1	group I pollen allergen [Poa pratensis]	4090265
1210	<i>Poa pratensis</i>	Kentucky bluegrass	Poa p 5	pollen allergen Poa p 5 [Poa pratensis]	11991227
1211	<i>Polistes annularis</i>	Paper wasp	Pol a 5	allergen 5	160780
1212	<i>Polistes annularis</i>	Paper wasp	Pol a 2	Hyaluronoglucosaminidase precursor (Hyaluronidase) (Allergen Pol a 2)	14423735
1213	<i>Polistes annularis</i>	Paper wasp	Pol a 1	Phospholipase A1 (Allergen Pol a 1)	14423833
1214	<i>Polistes dominulus</i>	Paper wasp	Unassigned	venom serine protease precursor [Polistes dominulus]	30909091
1215	<i>Polistes dominulus</i>	Paper wasp	Unassigned	venom phospholipase A1 1 precursor [Polistes dominulus]	45510887
1216	<i>Polistes dominulus</i>	Paper wasp	Unassigned	venom phospholipase A1 2 precursor [Polistes dominulus]	45510889
1217	<i>Polistes dominulus</i>	Paper wasp	Unassigned	venom phospholipase A1 3 precursor [Polistes dominulus]	45510891
1218	<i>Polistes dominulus</i>	Paper wasp	Unassigned	venom phospholipase A1 4 precursor [Polistes dominulus]	45510893
1219	<i>Polistes dominulus</i>	Paper wasp	Pol d 5	allergen Pol d 5 precursor [Polistes dominulus]	51093377
1220	<i>Polistes exclamans</i>	Paper wasp	Pol e 5	Venom allergen 5 (Antigen 5) (Ag5) (Allergen Pol e 5) (Pol e V)	549187
1221	<i>Polistes exclamans</i>	Paper wasp	Unassigned	allergen Pol e 5 precursor [Polistes exclamans]	51093375

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
1222	<i>Polistes fuscatus</i>	Paper wasp	Pol f 5	Venom allergen 5 (Antigen 5) (Ag5) (Allergen Pol f 5) (Pol f V)	549188
1223	<i>Polistes gallicus</i>	Paper wasp	Pol g 5	Venom allergen 5 (Antigen 5) (Ag5) (Allergen Pol g 5)	25091511
1224	<i>Polistes gallicus</i>	Paper wasp	Unassigned	Phospholipase A1 (Allergen Pol g 1)	41017429
1225	<i>Protortonia cacti</i>	Cactus	Unassigned	cochineal major allergen [Protortonia cacti]	237769615
1226	<i>Prunus armeniaca</i>	Apricot	Pru ar 3	Nonspecific lipid-transfer protein 1 (LTP 1) (Major allergen Pru ar 3)	7404406
1227	<i>Prunus avium</i>	Cherry	Pru av 2	thaumatin-like protein precursor	1144346
1228	<i>Prunus avium</i>	Cherry	Pru av 1	cherry-allergen PRUA1	1513216
1229	<i>Prunus avium</i>	Cherry	Pru av 4	profilin [Prunus avium]	4761582
1230	<i>Prunus avium</i>	Cherry	Pru av 3	lipid transfer protein precursor [Prunus avium]	6715520
1231	<i>Prunus avium</i>	Cherry	Pru av 1	major cherry allergen Pru av 1.0201 [Prunus avium]	44409451
1232	<i>Prunus avium</i>	Cherry	Pru av 1	major cherry allergen Pru av 1.0202 [Prunus avium]	44409474
1233	<i>Prunus avium</i>	Cherry	Pru av 1	major cherry allergen Pru av 1.0203 [Prunus avium]	44409496
1234	<i>Prunus avium</i>	Cherry	Unassigned	Chain A, Solution Structure Of The Major Cherry Allergen Pru Av 1 Mutant E45w	159162378
1235	<i>Prunus domestica</i>	Plum	Pru d 3	Nonspecific lipid-transfer protein 1 (LTP 1) (Major allergen Pru d 3)	9297015
1236	<i>Prunus dulcis</i>	Almond	Pru du 4	profilin [Prunus dulcis]	24473794
1237	<i>Prunus dulcis</i>	Almond	Unassigned	Seed allergenic protein 2 (Conglutin gamma) (Allergen Pru du ?)	75107131
1238	<i>Prunus dulcis</i>	Almond	Unassigned	Chain A, Crystal Structure Of Pru Du Amandin, An Allergenic Protein From Prunus Dulcis	258588247
1239	<i>Prunus dulcis x Prunus persica</i>	Plum	Unassigned	putative allergen Pru du 4.01 [Prunus dulcis x Prunus persica]	190613933
1240	<i>Prunus dulcis x Prunus persica</i>	Plum	Unassigned	putative allergen Pru du 4.02 [Prunus dulcis x Prunus persica]	190613937
1241	<i>Prunus persica</i>	Peach	Pru p 3	Nonspecific lipid-transfer protein 1 (LTP 1) (Major allergen Pru p 3) (Pru p 1)	3287877
1242	<i>Prunus persica</i>	Peach	Pru p 4.01	profilin [Prunus persica]	27528310
1243	<i>Prunus persica</i>	Peach	Pru p 4.02	profilin [Prunus persica]	27528312
1244	<i>Prunus persica</i>	Peach	Unassigned	lipid transfer protein 1 precursor [Prunus persica]	54793477

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
1245	<i>Prunus persica</i>	Peach	Unassigned	major allergen Pru p 1 [Prunus persica]	82492265
1246	<i>Prunus persica</i>	Peach	Pru p 3	Chain B, Crystal Structure Of Peach Pru P3, The Prototypic Member Of The Family Of Plant Non-Specific Lipid Transfer Protein Pan-Allergens	83754241
1247	<i>Pseudocardium sachalinensis</i>	Surf clam	Unassigned	tropomyosin [Pseudocardium sachalinensis]	219806598
1248	<i>Pyrus communis</i>	Pear	Pyr c 1	major allergen Pyrc1 [Pyrus communis]	3044216
1249	<i>Pyrus communis</i>	Pear	Pyr c 5	isoflavone reductase related protein [Pyrus communis]	3243234
1250	<i>Pyrus communis</i>	Pear	Pyr c 4	profilin [Pyrus communis]	4761580
1251	<i>Quercus alba</i>	Oak	Que a 1	major pollen allergen Que a 1 - white oak (fragment)	543675
1252	<i>Quercus alba</i>	Oak	Unassigned	pollen allergen Que a 1 isoform [Quercus alba]	167472847
1253	<i>Quercus alba</i>	Oak	Unassigned	pollen allergen Que a 1 isoform [Quercus alba]	167472849
1254	<i>Rana esculenta</i>	Frog	Ran e 1	parvalbumin alpha [Rana esculenta]	20796729
1255	<i>Rana esculenta</i>	Frog	Ran e 2	parvalbumin beta protein [Rana esculenta]	20797081
1256	<i>Rana sp. CH-2001</i>	Frog	Unassigned	parvalbumin alpha [Rana sp. CH-2001]	20796733
1257	<i>Rana sp. CH-2001</i>	Frog	Unassigned	parvalbumin beta protein [Rana sp. CH-2001]	20797085
1258	<i>Rattus norvegicus</i>	Rat	Rat n 1	Major urinary protein precursor (MUP) (Alpha-2u-globulin) (15.5 kDa fatty acid binding protein) (15.5 kDa FABP) (Alpha(2)-euglobulin) (Allergen Rat n 1) (Rat n I)	127533
1259	<i>Rattus norvegicus</i>	Rat	Rat n 1	Alpha-2u globulin	81890324
1260	<i>Rattus norvegicus</i>	Rat	Unassigned	PREDICTED: similar to Major urinary protein precursor (MUP) (Alpha-2u-globulin) (Alpha(2)-euglobulin) (Allergen Rat n 1) (Rat n I) [Rattus norvegicus]	109474987
1261	<i>Rhodotorula mucilaginosa</i>	Fungus	Unassigned	Enolase (2-phosphoglycerate dehydratase) (2-phospho-D-glycerate hydro-lyase) (Allergen Rho m 1)	37078092
1262	<i>Rhodotorula mucilaginosa</i>	Fungus	Unassigned	vacuolar serine protease [Rhodotorula mucilaginosa]	54654335

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
1263	<i>Ricinus communis</i>	Castor bean	Ric c 1	2S albumin precursor (Allergen Ric c 1)	112762
1264	<i>Salmo salar</i>	Salmon	Sal s 1	Parvalbumin beta 1 (Major allergen Sal s 1)	2493445
1265	<i>Salmo salar</i>	Salmon	Sal s 1	Parvalbumin beta 2 (Major allergen Sal s 1)	18281421
1266	<i>Salmo salar</i>	Salmon	Unassigned	Parvalbumin beta 1 [Salmo salar]	209734468
1267	<i>Salsola kali</i>	Thistle	Sal k 1	[Segment 1 of 4] Pollen allergen Sal k 1	25090948
1268	<i>Salsola kali</i>	Thistle	Sal k 1	[Segment 2 of 4] Pollen allergen Sal k 1	25090949
1269	<i>Salsola kali</i>	Thistle	Sal k 1	[Segment 3 of 4] Pollen allergen Sal k 1	25090950
1270	<i>Salsola kali</i>	Thistle	Sal k 1	[Segment 4 of 4] Pollen allergen Sal k 1	25090951
1271	<i>Salsola kali</i>	Thistle	Unassigned	pectin-methyltransferase precursor [Salsola kali]	51242679
1272	<i>Salsola kali</i>	Thistle	Unassigned	pectin methylesterase allergenic protein [Salsola kali]	59895728
1273	<i>Salsola kali</i>	Thistle	Unassigned	pectin methylesterase allergenic protein [Salsola kali]	59895730
1274	<i>Salsola kali</i>	Thistle	Unassigned	Sal k 1 pollen allergen [Salsola kali]	225810597
1275	<i>Salsola kali</i>	Thistle	Unassigned	Sal k 4 pollen allergen [Salsola kali]	239916566
1276	<i>Salvelinus fontinalis</i>	Brook trout	Unassigned	parvalbumin [Salvelinus fontinalis]	288557438
1277	<i>Salvelinus fontinalis</i>	Brook trout	Unassigned	parvalbumin [Salvelinus fontinalis]	288557440
1278	<i>Sarcoptes scabiei</i> type <i>hominis</i>	Scabies mite	Unassigned	glutathione S-transferase [Sarcoptes scabiei type <i>hominis</i>]	27462836
1279	<i>Sarcoptes scabiei</i> type <i>hominis</i>	Scabies mite	Unassigned	glutathione transferase mu class Yv5004H11 [Sarcoptes scabiei type <i>hominis</i>]	60920770
1280	<i>Sardinops sagax</i>	Pacific sardine	Unassigned	parvalbumin [Sardinops sagax]	193247972
1281	<i>Scapharca broughtonii</i>	Clam	Unassigned	tropomyosin [Scapharca broughtonii]	219806592
1282	<i>Schedonorus arundinaceus</i>	Tall fescue	Unassigned	pollen allergen Fes e I type A - reed fescue (fragment)	320610
1283	<i>Schedonorus arundinaceus</i>	Tall fescue	Unassigned	pollen allergen Fes e I type B - reed fescue (fragment)	320611
1284	<i>Schedonorus arundinaceus</i>	Tall fescue	Unassigned	Group I allergen FeS e I, pollen	75139991
1285	<i>Schistosoma japonicum</i>	Schistosoma	Unassigned	22.6 kDa tegumental antigen [Schistosoma japonicum]	2739154

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
1286	<i>Schistosoma japonicum</i>	Schistosoma	Unassigned	hypothetical protein, putative Profilin/allergen [Schistosoma japonicum]	29841461
1287	<i>Scomber japonicus</i>	Chub mackerel	Unassigned	parvalbumin [Scomber japonicus]	29420793
1288	<i>Scomber scombrus</i>	Atlantic mackerel	Unassigned	parvalbumin [Scomber scombrus]	288557436
1289	<i>Secale cereale</i>	Rye	Unassigned	pollen allergen Sec c 4 [Secale cereale]	55859454
1290	<i>Secale cereale</i>	Rye	Unassigned	pollen allergen Sec c 4 [Secale cereale]	55859456
1291	<i>Secale cereale</i>	Rye	Unassigned	30K allergen	75140047
1292	<i>Secale cereale</i>	Rye	Sec c 1	Major BAKER'S ASTHMA allergen SEC C 1	75198875
1293	<i>Sepia esculenta</i>	Golden cuttlefish	Unassigned	tropomyosin [Sepia esculenta]	83715928
1294	<i>Sepioteuthis lessoniana</i>	Fungus	Unassigned	tropomyosin [Sepioteuthis lessoniana]	83715930
1295	<i>Sesamum indicum</i>	Sesame	Ses i 2	2S albumin precursor [Sesamum indicum]	5381323
1296	<i>Sesamum indicum</i>	Sesame	Ses i 1	2S albumin [Sesamum indicum]	13183175
1297	<i>Sesamum indicum</i>	Sesame	Ses i 3	7S globulin [Sesamum indicum]	13183177
1298	<i>Sesamum indicum</i>	Sesame	Unassigned	15 kDa oleosin	75315271
1299	<i>Sesamum indicum</i>	Sesame	Unassigned	main allergen 15 kDa oleosin [Sesamum indicum]	198250343
1300	<i>Sesamum indicum</i>	Sesame	Unassigned	2S albumin [Sesamum indicum]	209165427
1301	<i>Sinapis alba</i>	White mustard	Sin a 1	allergen sin a 1.0104 [Sinapis alba]	1009434
1302	<i>Sinapis alba</i>	White mustard	Sin a 1	allergen sin a 1.0105 [Sinapis alba]	1009436
1303	<i>Sinapis alba</i>	White mustard	Sin a 1	allergen sin a 1.0106 [Sinapis alba]	1009438
1304	<i>Sinapis alba</i>	White mustard	Sin a 1	allergen sin a 1.0107 [Sinapis alba]	1009440
1305	<i>Sinapis alba</i>	White mustard	Sin a 1	allergen sin a 1.0108 [Sinapis alba]	1009442
1306	<i>Sinapis alba</i>	White mustard	Sin a 1	Allergen Sin a 1 precursor (Sin a I) [Contains: Allergen Sin a 1 small chain; Allergen Sin a 1 large chain]	51338758
1307	<i>Sinapis alba</i>	White mustard	Unassigned	11S globulin precursor [Sinapis alba]	62240390
1308	<i>Sinapis alba</i>	White mustard	Unassigned	11S globulin precursor [Sinapis alba]	62240392
1309	<i>Solanum tuberosum</i>	Potato	Unassigned	aspartic proteinase inhibitor [Solanum tuberosum]	21413
1310	<i>Solanum tuberosum</i>	Potato	Unassigned	patatin B2 (AA 1 - 386) [Solanum tuberosum]	21510

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
1311	<i>Solanum tuberosum</i>	Potato	Unassigned	patatin [Solanum tuberosum]	21512
1312	<i>Solanum tuberosum</i>	Potato	Unassigned	patatin [Solanum tuberosum]	21514
1313	<i>Solanum tuberosum</i>	Potato	Sola t 2	Aspartic protease inhibitor 11 (Cathepsin D inhibitor PDI) (Allergen Sola t 2)	124148
1314	<i>Solanum tuberosum</i>	Potato	Unassigned	patatin	169500
1315	<i>Solanum tuberosum</i>	Potato	Sola t 3	Cysteine protease inhibitor 1 precursor (PCPI 8.3) (P340) (P34021)	20141344
1316	<i>Solanum tuberosum</i>	Potato	Sola t 4	Serine protease inhibitor 7 precursor (PIG) (PIGEN1) (Allergen Sola t 4) (STPIB) (STPIA) (pKEN14-28) (pF4)	20141714
1317	<i>Solanum tuberosum</i>	Potato	Unassigned	profilin-like [Solanum tuberosum]	77416979
1318	<i>Solanum tuberosum</i>	Potato	Unassigned	profilin-like protein [Solanum tuberosum]	77999277
1319	<i>Solanum tuberosum</i>	Potato	Sola t 1	RecName: Full=Patatin-B1; Flags: Precursor	158517845
1320	<i>Solen strictus</i>	Clam	Unassigned	tropomyosin [Solen strictus]	219806602
1321	<i>Solenopsis geminata</i>	Tropical Fire Ant	Sol g 4	venom allergen Sol g 4.01 precursor [Solenopsis geminata]	7638028
1322	<i>Solenopsis geminata</i>	Tropical Fire Ant	Sol g 4	venom allergen Sol g 4.02 precursor [Solenopsis geminata]	7638030
1323	<i>Solenopsis invicta</i>	Red fire ant	Sol i 2	Venom allergen 2 precursor (Venom allergen II) (Allergen Sol i 2) (Sol i II)	549179
1324	<i>Solenopsis invicta</i>	Red fire ant	Unassigned	Sol i 1=antigen {N-terminal} [Solenopsis invicta=imported fire ants, venom, Peptide Partial, 58 aa, segment 1 of 5]	1336809
1325	<i>Solenopsis invicta</i>	Red fire ant	Unassigned	Sol i 1=antigen {N-terminal} [Solenopsis invicta=imported fire ants, venom, Peptide Partial, 25 aa, segment 3 of 5]	1336811
1326	<i>Solenopsis invicta</i>	Red fire ant	Unassigned	Sol i 1=antigen {N-terminal} [Solenopsis invicta=imported fire ants, venom, Peptide Partial, 26 aa, segment 4 of 5]	1336812
1327	<i>Solenopsis invicta</i>	Red fire ant	Unassigned	Sol i 1=antigen {N-terminal} [Solenopsis invicta=imported fire ants, venom, Peptide Partial, 26 aa, segment 5 of 5]	1336813

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
1328	<i>Solenopsis invicta</i>	Red fire ant	Sol i 4	venom allergen Sol i 4.02 precursor [Solenopsis invicta]	4038411
1329	<i>Solenopsis invicta</i>	Red fire ant	Sol i 4	Venom allergen IV precursor (Allergen Sol i 4) (Sol i IV)	14424465
1330	<i>Solenopsis invicta</i>	Red fire ant	Sol i 3	Venom allergen III precursor (Allergen Sol i 3) (Sol i III)	14424466
1331	<i>Solenopsis invicta</i>	Red fire ant	Unassigned	allergen Sol i 1 precursor [Solenopsis invicta]	51093373
1332	<i>Solenopsis richteri</i>	Black fire ant	Unassigned	Venom allergen 2 (Venom allergen II) (Allergen Sol r 2) (Sol r II)	6136162
1333	<i>Solenopsis richteri</i>	Black fire ant	Unassigned	Venom allergen III (Allergen Sol r 3) (Sol r III)	6136163
1334	<i>Staphylococcus aureus</i>	Bacteria	Unassigned	RecName: Full=Enterotoxin type D; AltName: Full=SED; Flags: Precursor	119654
1335	<i>Staphylococcus aureus</i>	Bacteria	Unassigned	RecName: Full=Toxic shock syndrome toxin-1; Short=TSST-1; Flags: Precursor	136457
1336	<i>Staphylococcus aureus</i>	Bacteria	Unassigned	RecName: Full=Enterotoxin type C-2; AltName: Full=SEC2; Flags: Precursor	462026
1337	<i>Staphylococcus aureus</i>	Bacteria	Unassigned	Chain B, Staphylococcal Enterotoxin A	1633233
1338	<i>Staphylococcus aureus</i>	Bacteria	Unassigned	staphylococcal enterotoxin B precursor (SEB) [Staphylococcus aureus]	83308249
1339	<i>Suidasia medanensis</i>	Fungus	Unassigned	group 2 allergen Sui m 2 [Suidasia medanensis]	45738062
1340	<i>Sus scrofa</i>	Boar	Unassigned	RecName: Full=Pepsin A; Flags: Precursor	118572685
1341	<i>Syringa vulgaris</i>	Lilac	Syr v 1.0101	allergen-like protein Syr v I isoform 1 - Syringa vulgaris	631911
1342	<i>Syringa vulgaris</i>	Lilac	Syr v 1.0102	allergen-like protein Syr v I isoform 2 - Syringa vulgaris	631912
1343	<i>Syringa vulgaris</i>	Lilac	Syr v 1.0103	allergen-like protein Syr v I isoform 3 - Syringa vulgaris	631913
1344	<i>Tabanus yao</i>	Horse fly	Unassigned	putative tabinhibitin 9 [Tabanus yao]	253683676
1345	<i>Thaumetopoea pityocampa</i>	Pine moth	Tha p 1	Tha p 1	74798355
1346	<i>Theragra chalcogramma</i>	Alaska pollock	Unassigned	parvalbumin [Theragra chalcogramma]	14531018
1347	<i>Theragra chalcogramma</i>	Alaska pollock	Unassigned	parvalbumin [Theragra chalcogramma]	14531020

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
1348	<i>Todarodes pacificus</i>	Squid	Unassigned	tropomyosin [Todarodes pacificus]	83715932
1349	<i>Trachurus japonicus</i>	Jack mackerel	Unassigned	dark muscle parvalbumin [Trachurus japonicus]	77799800
1350	<i>Tresus keenae</i>	Horse Clam	Unassigned	tropomyosin [Tresus keenae]	219806600
1351	<i>Triatoma protracta</i>	Western conenose	Tria p 1	procalin [Triatoma protracta]	15426413
1352	<i>Trichophyton rubrum</i>	Fungus	Tri r 4	Tri r 4 allergen [Trichophyton rubrum]	5813788
1353	<i>Trichophyton rubrum</i>	Fungus	Tri r 2	Tri r 2 allergen [Trichophyton rubrum]	5813790
1354	<i>Trichophyton schoenleinii</i>	Fungus	Unassigned	tri s 4 allergen [Trichophyton schoenleinii]	23894227
1355	<i>Triticum aestivum</i>	Wheat	Unassigned	unnamed protein product [Triticum aestivum]	21673
1356	<i>Triticum aestivum</i>	Wheat	Unassigned	unnamed protein product [Triticum aestivum]	21701
1357	<i>Triticum aestivum</i>	Wheat	Unassigned	CM 17 protein precursor [Triticum aestivum]	21711
1358	<i>Triticum aestivum</i>	Wheat	Unassigned	unnamed protein product [Triticum aestivum]	21713
1359	<i>Triticum aestivum</i>	Wheat	Unassigned	high molecular weight glutenin subunit 1Ax1 [Triticum aestivum]	21743
1360	<i>Triticum aestivum</i>	Wheat	Unassigned	high molecular weight glutenin subunit 10 [Triticum aestivum]	21751
1361	<i>Triticum aestivum</i>	Wheat	Unassigned	unnamed protein product [Triticum aestivum]	21755
1362	<i>Triticum aestivum</i>	Wheat	Unassigned	unnamed protein product [Triticum aestivum]	21757
1363	<i>Triticum aestivum</i>	Wheat	Unassigned	unnamed protein product [Triticum aestivum]	21761
1364	<i>Triticum aestivum</i>	Wheat	Unassigned	unnamed protein product [Triticum aestivum]	21765
1365	<i>Triticum aestivum</i>	Wheat	Unassigned	unnamed protein product [Triticum aestivum]	21773
1366	<i>Triticum aestivum</i>	Wheat	Unassigned	unnamed protein product [Triticum aestivum]	21779
1367	<i>Triticum aestivum</i>	Wheat	Unassigned	unnamed protein product [Triticum aestivum]	21783
1368	<i>Triticum aestivum</i>	Wheat	Unassigned	unnamed protein product [Triticum aestivum]	21793
1369	<i>Triticum aestivum</i>	Wheat	Unassigned	HMW glutenin subunit 1By9 [Triticum aestivum]	22090
1370	<i>Triticum aestivum</i>	Wheat	Unassigned	gamma gliadin precursor	170702
1371	<i>Triticum aestivum</i>	Wheat	Unassigned	gamma-gliadin B precursor	170708
1372	<i>Triticum aestivum</i>	Wheat	Unassigned	alpha-type gliadin precursor protein	170710
1373	<i>Triticum aestivum</i>	Wheat	Unassigned	pre-alpha-/beta-gliadin A-II	170712
1374	<i>Triticum aestivum</i>	Wheat	Unassigned	alpha/beta-gliadin precursor	170718

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
1375	<i>Triticum aestivum</i>	Wheat	Unassigned	alpha/beta-gliadin precursor [Triticum aestivum]	170720
1376	<i>Triticum aestivum</i>	Wheat	Unassigned	pre-alpha-/beta-gliadin A-I	170722
1377	<i>Triticum aestivum</i>	Wheat	Unassigned	pre-alpha-/beta-gliadin A-IV	170724
1378	<i>Triticum aestivum</i>	Wheat	Unassigned	pre-alpha-/beta-gliadin A-III	170726
1379	<i>Triticum aestivum</i>	Wheat	Unassigned	alpha-type gliadin	170728
1380	<i>Triticum aestivum</i>	Wheat	Unassigned	pre-gamma-gliadin B-I	170730
1381	<i>Triticum aestivum</i>	Wheat	Unassigned	gamma-gliadin	170732
1382	<i>Triticum aestivum</i>	Wheat	Unassigned	gamma gliadin B-III	170734
1383	<i>Triticum aestivum</i>	Wheat	Unassigned	gamma-gliadin	170736
1384	<i>Triticum aestivum</i>	Wheat	Unassigned	gamma-gliadin	170738
1385	<i>Triticum aestivum</i>	Wheat	Unassigned	HMW glutenin subunit Ax2* [Triticum aestivum]	170743
1386	<i>Triticum aestivum</i>	Wheat	Unassigned	RecName: Full=Non-specific lipid-transfer protein; Short=LTP; AltName: Full=Phospholipid transfer protein; Short=PLTP; AltName: Full=ns-LTP1; Flags: Precursor	417370
1387	<i>Triticum aestivum</i>	Wheat	Unassigned	alpha-gliadin	473876
1388	<i>Triticum aestivum</i>	Wheat	Unassigned	glutenin [Triticum aestivum]	736319
1389	<i>Triticum aestivum</i>	Wheat	Unassigned	low molecular weight glutenin [Triticum aestivum]	886963
1390	<i>Triticum aestivum</i>	Wheat	Unassigned	low molecular weight glutenin [Triticum aestivum]	886965
1391	<i>Triticum aestivum</i>	Wheat	Unassigned	low molecular weight glutenin [Triticum aestivum]	886967
1392	<i>Triticum aestivum</i>	Wheat	Unassigned	unnamed protein product [Triticum aestivum]	897811
1393	<i>Triticum aestivum</i>	Wheat	Unassigned	profilin [Triticum aestivum]	1008443
1394	<i>Triticum aestivum</i>	Wheat	Unassigned	profilin [Triticum aestivum]	1008445
1395	<i>Triticum aestivum</i>	Wheat	Unassigned	profilin [Triticum aestivum]	1052817
1396	<i>Triticum aestivum</i>	Wheat	Unassigned	gamma-gliadin precursor [Triticum aestivum]	1063270
1397	<i>Triticum aestivum</i>	Wheat	Unassigned	allergenic peptide=low-molecular-weight glutenin chain [wheat, flour, gluten, Peptide, 30 aa]	1168171
1398	<i>Triticum aestivum</i>	Wheat	Unassigned	alpha-gliadin [Triticum aestivum]	1304264
1399	<i>Triticum aestivum</i>	Wheat	Unassigned	serpin [Triticum aestivum]	1885350
1400	<i>Triticum aestivum</i>	Wheat	Unassigned	Allergen C-C	3913017

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
1401	<i>Triticum aestivum</i>	Wheat	Unassigned	triosephosphat-isomerase [Triticum aestivum]	11124572
1402	<i>Triticum aestivum</i>	Wheat	Unassigned	putative gamma-gliadin [Triticum aestivum]	62484809
1403	<i>Triticum aestivum</i>	Wheat	Unassigned	putative LMW-glutenin subunit [Triticum aestivum]	62550933
1404	<i>Triticum aestivum</i>	Wheat	Unassigned	serine carboxypeptidase II [Triticum aestivum]	66840994
1405	<i>Triticum aestivum</i>	Wheat	Unassigned	putative leucine-rich repeat protein [Triticum aestivum]	66840996
1406	<i>Triticum aestivum</i>	Wheat	Unassigned	5a2 protein [Triticum aestivum]	66840998
1407	<i>Triticum aestivum</i>	Wheat	Unassigned	omega-5 gliadin [Triticum aestivum]	73912496
1408	<i>Triticum aestivum</i>	Wheat	Unassigned	LMM glutenin 1	75219081
1409	<i>Triticum aestivum</i>	Wheat	Unassigned	LMM glutenin 3	75317968
1410	<i>Triticum aestivum</i>	Wheat	Unassigned	RecName: Full=Subtilisin-chymotrypsin inhibitor WSCI; Flags: Precursor	122065237
1411	<i>Triticum aestivum</i>	Wheat	Unassigned	RecName: Full=Serine carboxypeptidase 2; AltName: Full=Serine carboxypeptidase II; AltName: Full=Carboxypeptidase D; AltName: Full=CPDW-II; Short=CP-WII; Contains: RecName: Full=Serine carboxypeptidase 2 chain A; AltName: Full=Serine carboxypeptidase II c	125987805
1412	<i>Triticum aestivum</i>	Wheat	Unassigned	serine proteinase inhibitor-like allergen [Triticum aestivum]	154101366
1413	<i>Triticum aestivum</i>	Wheat	Unassigned	thioredoxin H [Triticum aestivum]	190684055
1414	<i>Triticum aestivum</i>	Wheat	Unassigned	glutathione transferase [Triticum aestivum]	190684057
1415	<i>Triticum aestivum</i>	Wheat	Unassigned	peroxiredoxin [Triticum aestivum]	190684059
1416	<i>Triticum aestivum</i>	Wheat	Unassigned	profilin [Triticum aestivum]	190684061
1417	<i>Triticum aestivum</i>	Wheat	Unassigned	dehydrin [Triticum aestivum]	190684063
1418	<i>Triticum aestivum</i>	Wheat	Unassigned	major allergen CM16 [Triticum aestivum]	195957140
1419	<i>Triticum aestivum</i>	Wheat	Unassigned	D-type LMW glutenin subunit [Triticum aestivum]	208605344
1420	<i>Triticum aestivum</i>	Wheat	Unassigned	D-type LMW glutenin subunit [Triticum aestivum]	208605346
1421	<i>Triticum aestivum</i>	Wheat	Unassigned	D-type LMW glutenin subunit [Triticum aestivum]	208605348
1422	<i>Triticum aestivum</i>	Wheat	Unassigned	alpha amylase inhibitor CM1 [Triticum aestivum]	253783731

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
1423	<i>Triticum aestivum</i>	Wheat	Unassigned	putative alpha-amylase inhibitor CM2 [<i>Triticum aestivum</i>]	283465827
1424	<i>Triticum turgidum</i>	Wheat	Unassigned	tetrameric alpha-amylase inhibitor 16 kDa subunit, CM16* [<i>Triticum turgidum</i> L.=pasta wheat, cv. Senatore Capelli, Peptide Partial, 18 aa]	244610
1425	<i>Triticum turgidum</i> subsp. <i>durum</i>	Wheat	Unassigned	precursor (AA -24 to 119) [<i>Triticum turgidum</i> subsp. <i>durum</i>]	21916
1426	<i>Triticum turgidum</i> subsp. <i>durum</i>	Wheat	Unassigned	CM2 protein [<i>Triticum turgidum</i> subsp. <i>durum</i>]	21920
1427	<i>Triticum turgidum</i> subsp. <i>durum</i>	Wheat	Unassigned	unnamed protein product [<i>Triticum turgidum</i> subsp. <i>durum</i>]	21926
1428	<i>Triticum turgidum</i> subsp. <i>durum</i>	Wheat	Unassigned	LMW glutenin [<i>Triticum turgidum</i> subsp. <i>durum</i>]	21930
1429	<i>Triticum turgidum</i> subsp. <i>durum</i>	Wheat	Unassigned	alpha-amylase inhibitor, tetrameric, chain CM3 precursor - durum wheat	100834
1430	<i>Triticum urartu</i>	Wheat	Unassigned	gliadin	170740
1431	<i>Tyrophagus putrescentiae</i>	Dust mite	Unassigned	Mite group 2 allergen Tyr p 2 precursor	3182907
1432	<i>Tyrophagus putrescentiae</i>	Dust mite	Unassigned	tropomyosin [<i>Tyrophagus putrescentiae</i>]	48249227
1433	<i>Tyrophagus putrescentiae</i>	Dust mite	Tyr p 13	fatty acid-binding protein [<i>Tyrophagus putrescentiae</i>]	51860756
1434	<i>Tyrophagus putrescentiae</i>	Dust mite	Unassigned	mite allergen Tyr p 13 [<i>Tyrophagus putrescentiae</i>]	121296500
1435	<i>Tyrophagus putrescentiae</i>	Dust mite	Unassigned	tropomyosin [<i>Tyrophagus putrescentiae</i>]	148615631
1436	<i>Tyrophagus putrescentiae</i>	Dust mite	Unassigned	tropomyosin [<i>Tyrophagus putrescentiae</i>]	156938915
1437	<i>Tyrophagus putrescentiae</i>	Dust mite	Unassigned	allergen Tyr p 13 [<i>Tyrophagus putrescentiae</i>]	156938917
1438	<i>Tyrophagus putrescentiae</i>	Dust mite	Unassigned	Tyr p 3 [<i>Tyrophagus putrescentiae</i>]	167540622
1439	<i>Tyrophagus putrescentiae</i>	Dust mite	Unassigned	troponin C [<i>Tyrophagus putrescentiae</i>]	219815476
1440	<i>Vespa crabro</i>	European hornet	Vesp c 5	Venom allergen 5.01 (Antigen 5-1) (Ag5-1) (Allergen Vesp c 5.01) (Vesp c V.01)	549184
1441	<i>Vespa crabro</i>	European hornet	Vesp c 5	Venom allergen 5.02 (Antigen 5-2) (Ag5-2) (Allergen Vesp c 5.02) (Vesp c V.02)	549185

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
1442	<i>Vespa mandarinia</i>	Wasp	Vesp m 5	Venom allergen 5 (Antigen 5) (Ag5) (Allergen Vesp m 5)	6136165
1443	<i>Vespula flavopilosa</i>	Wasp	Ves f 5	Venom allergen 5 (Antigen 5) (Ag5) (Allergen Ves f 5) (Ves f V)	549189
1444	<i>Vespula germanica</i>	Wasp	Ves g 5	Venom allergen 5 (Antigen 5) (Ag5) (Allergen Ves g 5) (Ves g V)	549190
1445	<i>Vespula germanica</i>	Wasp	Unassigned	Ves g 5 allergen precursor [Vespula germanica]	74035841
1446	<i>Vespula germanica</i>	Wasp	Unassigned	Ves g 1 allergen precursor [Vespula germanica]	74035843
1447	<i>Vespula germanica</i>	Wasp	Unassigned	hyaluronidase [Vespula germanica]	116174180
1448	<i>Vespula germanica</i>	Wasp	Unassigned	hyaluronidase homologue [Vespula germanica]	116174182
1449	<i>Vespula maculifrons</i>	Wasp	Ves m 5	Venom allergen 5 (Antigen 5) (Ag5) (Allergen Ves m 5) (Ves m V)	549191
1450	<i>Vespula maculifrons</i>	Wasp	Ves m 1	Phospholipase A1 (Allergen Ves m 1) (Ves m I)	1709545
1451	<i>Vespula maculifrons</i>	Wasp	Unassigned	venom allergen 5 [Vespula maculifrons]	85681830
1452	<i>Vespula pensylvanica</i>	Wasp	Ves p 5	Venom allergen 5 (Antigen 5) (Ag5) (Allergen Ves p 5) (Ves p V)	549192
1453	<i>Vespula squamosa</i>	Wasp	Ves s 5	Venom allergen 5 (Antigen 5) (Ag5) (Allergen Ves s 5) (Ves s V)	549193
1454	<i>Vespula vidua</i>	Wasp	Ves vi 5	Venom allergen 5 (Antigen 5) (Ag5) (Allergen Ves vi 5) (Ves vi V)	549194
1455	<i>Vespula vulgaris</i>	Wasp	Ves v 5	allergen 5	162551
1456	<i>Vespula vulgaris</i>	Wasp	Ves v 1	allergen and phospholipase A1	897647
1457	<i>Vespula vulgaris</i>	Wasp	Ves v 2	Hyaluronoglucosaminidase (Hyaluronidase) (Allergen Ves v 2) (Ves v II)	1346323
1458	<i>Vespula vulgaris</i>	Wasp	Ves v 5	allergen 5; antigen 5 [Vespula vulgaris]	4826574
1459	<i>Vespula vulgaris</i>	Wasp	Ves v 5	Chain A, Ves V 5, An Allergen From Vespula Vulgaris Venom	11514279
1460	<i>Vespula vulgaris</i>	Wasp	Unassigned	hyaluronidase b [Vespula vulgaris]	62147665
1461	<i>Vespula vulgaris</i>	Wasp	Unassigned	Chain A, Crystal Structure Of The Recombinant Allergen Ves V 2	109157163
1462	<i>Vigna radiata</i>	Mung bean	Unassigned	pathogenesis-related protein 10 [Vigna radiata]	60418924
1463	<i>Vitis sp.</i>	Grape	Unassigned	Nonspecific lipid-transfer protein P2 (LTP P2)	462717

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
1464	<i>Vitis sp.</i>	Grape	Vit v 1	Nonspecific lipid-transfer protein P4 (LTP P4)	462719
1465	<i>Vitis sp.</i>	Grape	Unassigned	Nonspecific lipid-transfer protein P3 (LTP P3)	145559502
1466	<i>Xiphias gladius</i>	Swordfish	Unassigned	beta-parvalbumin [Xiphias gladius]	222352960
1467	<i>Zea mays</i>	Corn	Zea m 14	Nonspecific lipid-transfer protein precursor (LTP) (Phospholipid transfer protein) (PLTP) (Allergen Zea m 14)	128388
1468	<i>Zea mays</i>	Corn	Unassigned	Zm13	1588669
1469	<i>Zea mays</i>	Corn	Unassigned	profilin [Zea mays]	2642324
1470	<i>Zea mays</i>	Corn	Unassigned	beta-expansin 1 [Zea mays]	14193761
1471	<i>Zea mays</i>	Corn	Unassigned	beta-expansin 9 protein [Zea mays]	28630919
1472	<i>Zea mays</i>	Corn	Unassigned	beta-expansin 1 protein [Zea mays]	28630923
1473	<i>Zea mays</i>	Corn	Unassigned	thioredoxin h1 protein [Zea mays]	66841002
1474	<i>Zea mays</i>	Corn	Unassigned	Zea m 1 allergen [Zea mays]	89892721
1475	<i>Zea mays</i>	Corn	Unassigned	Zea m 1 allergen [Zea mays]	89892723
1476	<i>Zea mays</i>	Corn	Unassigned	Zea m 13 allergen [Zea mays]	89892725
1477	<i>Zea mays</i>	Corn	Unassigned	Zea m 13 allergen [Zea mays]	89892727
1478	<i>Zea mays</i>	Corn	Unassigned	Zea m 13 allergen [Zea mays]	89892729
1479	<i>Zea mays</i>	Corn	Unassigned	EXPB10 [Zea mays]	105969543
1480	<i>Zea mays</i>	Corn	Unassigned	EXPB10 [Zea mays]	105969545
1481	<i>Zea mays</i>	Corn	Unassigned	pollen profilin variant 1 [Zea mays]	110644952
1482	<i>Zea mays</i>	Corn	Unassigned	pollen profilin variant 2 [Zea mays]	110644954
1483	<i>Zea mays</i>	Corn	Unassigned	pollen profilin variant 3 [Zea mays]	110644956
1484	<i>Zea mays</i>	Corn	Unassigned	pollen profilin variant 4 [Zea mays]	110644958
1485	<i>Zea mays</i>	Corn	Unassigned	pollen profilin variant 5 [Zea mays]	110644960
1486	<i>Zea mays</i>	Corn	Unassigned	pollen profilin variant 6 [Zea mays]	110644962
1487	<i>Zea mays</i>	Corn	Unassigned	pollen profilin variant 7 [Zea mays]	110644964
1488	<i>Zea mays</i>	Corn	Unassigned	Chain X, Crystal Structure Of Expb1 (Zea M 1), A Beta-Expansin And Group-1 Pollen Allergen From Maize	114794319

APPENDIX A. Protein sequences included in the FARRP AllergenOnline database, version 11.0 (Continued)

Entry	Organism	Common name	Allergen name	Description	GenInfo identifier
1489	<i>Zea mays</i>	Corn	Unassigned	Expansin-B10 precursor (ZmEXPB10) (Beta-expansin-10) (Pollen allergen Zea m 1c)	115502167
1490	<i>Zea mays</i>	Corn	Unassigned	Expansin-B11 precursor (ZmEXPB11) (Beta-expansin-11) (Pollen allergen Zea m 1a) (Pollen allergen Zea m 1b)	115502168
1491	<i>Ziziphus mauritiana</i>	Chinese-date	Unassigned	allergen Ziz m 1 [Ziziphus mauritiana]	61225281

APPENDIX B HILGER ET AL. 2002 REFERENCE

Allergy 2002; 57: 1053–1058
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ALLERGY
ISSN 0105-4538

Short communication

Severe IgE-mediated anaphylaxis following consumption of fried frog legs: definition of α -parvalbumin as the allergen in cause

Background: IgE-mediated allergic reactions to bullfrog and edible frog have been reported. The implicated allergens have not been defined so far. The frog material and the patient's serum from a case of severe food-induced anaphylaxis were used to define the implicated allergen at the protein and DNA level.

Methods: Immunoblotting techniques and *N*-terminal protein microsequencing were used to define the allergen recognized by the patient's serum. Back translation from the identified protein sequence was used to design degenerated primers to amplify the allergen's cDNA by polymerase chain reaction (PCR). We defined the nucleotide sequence of the allergen from the frog of Indonesian origin that was consumed by the patient, and the homologous cDNA from *Rana esculenta*.

Results: Protein microsequencing revealed that the implicated frog allergen belonged to the parvalbumin family. cDNAs coding for α - and β -parvalbumin of *R. esculenta* and *Rana species* were cloned. Recombinant proteins were expressed in *Escherichia coli*. The patient's serum IgE antibodies recognized parvalbumin prepared from frog muscle and recombinant α -parvalbumin from *R. species* but not from *R. esculenta*. Recombinant β -parvalbumin was not recognized by the IgE antibodies.

Conclusion: This work defines at the protein and DNA levels α -parvalbumin as the allergen implicated in a case of IgE-mediated anaphylaxis to frog muscle. It also shows that a protein belonging to the parvalbumin family is implicated in type I allergies outside the fish species.

C. Hilger¹, F. Grigioni¹, L. Thill¹,
L. Mertens², F. Hentges¹

¹Unit of Immunology and Allergy, Center Hospitalier de Luxembourg and the CHL CRP Research Laboratory on Immunogenetics and Allergy; ²Intensive Care Unit CHL, Luxembourg

Key words: allergens; angiotensin-converting enzyme inhibitor; beta-blocker; cDNA; food allergy; frog; parvalbumin; *Rana esculenta*

Dr Christiane Hilger
Laboratory of Immunogenetics and Allergy
4 rue Barblé
L-1210 Luxembourg
e-mail: hilgerchristiane@chl.lu

Accepted for publication 13 May 2002

IgE-mediated allergic reactions (1) to frogs or frog material have been the topic of a number of case reports. The symptoms and situations in which these allergic reactions occur fall into two categories: airborne and contact-mediated reactions provoked by catching or handling frogs, and food-induced anaphylactic reactions following consumption of frog meat. Asthma, rhinitis, conjunctivitis, and skin reactions have been described in a laboratory technician (2, 3), a professional frog-catcher (4), and a female frog-skinner (5). A cook presented eczematous reactions after preparing frog legs; when he tasted some he developed constriction and severe itching of the throat, and difficulty in swallowing (6). Recently a severe anaphylactic reaction was reported in a 6-year-old child after eating boiled frogs (7).

The exact nature of the antigen remains elusive. Nevertheless in the cases of occupational allergic reactions, the allergen was shown to be present in the skin (2, 5), in venom expelled from skin glands (4), or in brain extract (3). In one case of occupational asthma the

patient's serum recognized skin extract proteins of 19 and 55 kDa (5). However the subclass of the reacting antibodies was not defined. In the reports on IgE-mediated food allergic reactions the allergen was present in frog muscle (6, 7). We report the case of a near fatal IgE-mediated anaphylactic reaction in an adult that developed within minutes of starting a meal of fried frog legs. IgE immunoblotting, *N*-terminal protein sequencing, cDNA isolation and expression of the corresponding recombinant proteins allowed us to pin down the responsible allergen.

Material and methods

A couple of minutes after eating several fried frog legs, a 47-year-old man felt itching and discomfort in his throat. He rapidly developed breathing problems, with edema of the face and tongue, and a few minutes later he fainted. In the emergency ambulance he was intubated, ventilated, and given epinephrine (adrenaline). On admission to the intensive care unit the patient was "semicomatous", with a blood pressure of 60/40 mmHg, and heart frequency 130 beats/min. He had angioedema, with edema of the tongue, and generalized urticaria. During the next 24 h, despite treatment, it was

Parvalbumin cDNA sequences have been deposited in EMBL under accession numbers AJ 315960, AJ 315959, AJ 414731, AJ 414730.

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difficult to maintain normal blood pressure. The patient had been treated regularly with sotalol 160 mg and perindopril 4 mg once daily for hypertension. The electrocardiogram showed ischemia in lateral areas associated with a significant rise in heart muscle enzymes. He developed signs of intravascular coagulopathy.

With treatment, the patient recovered within 48 h from all his complications. Coronography showed no sign of stenosis. He was transferred to the Immunology and Allergy unit for further work-up. Clinical history revealed that he had previously experienced mild seasonal conjunctivitis. Several times during the last year he had eaten frog legs of Indonesian origin, purchased in a supermarket. On the previous occasion of eating fried frog legs he had experienced slight oral itching. Skin prick tests (SPT) performed with an extensive series of food and respiratory allergens (Allerbio, Neuilly sur-Seine, France) showed a weak positive reaction to grass pollen, birch pollen and hazelnuts. SPT with the fluid left in the bag that wrapped the skinned frog legs was strongly positive, causing a wheal diameter of 10 mm. Total IgE titer was 80 kU/l; specific-IgE determination by ImmunoCAP method (Pharmacia-Upjohn Uppsala, Sweden) was 1.1 kU/l for meadow grass, 0.8 kU/l for birch, and was below 0.35 kU/l for hazelnut, peanut, pepper, garlic, cod, tuna, and several other food allergens.

Patient serum and frog material

Serum samples were obtained at days 1, 2 and 4 after anaphylaxis and frozen in aliquots at -80°C until testing. The serum of a grass-pollen allergic patient was used as a negative control. Frog legs originating from the same batch as the ones consumed by the patient were kept frozen. Frog legs from *R. esculenta* were obtained from an animal breeding center, immediately frozen on dry ice, and stored at -80°C .

Preparation of protein extracts

Frog skeletal muscle was disrupted in single detergent lysis buffer (50 mM Tris-HCl pH 8, 150 mM NaCl, 1% Triton X-100, 100 $\mu\text{g}/\text{ml}$ Phenylmethylsulfonyl fluoride (PMSF) (Sigma, St. Louis, MO, USA) by a rotor-stator homogenizer (Kinematica; Lucerne, Switzerland). The extract was centrifuged for 10 min at 5300 g to remove insoluble particles and the protein concentration of the supernatant was determined by Bio-Rad protein assay (Biorad, Nazareth, Belgium).

Protein sequencing

Frog muscle extract (370 μg) was separated by a 18% preparative SDS-PAGE gel and blotted onto a polyvinylidene difluoride (PVDF) membrane (Millipore, Bedford, MA). A piece of membrane containing the band of interest was isolated. The protein was subjected to automated N-terminal sequencing. Microsequencing was performed by Edman degradation using an Applied Biosystems 473 A sequencer (Paris, France).

Purification of parvalbumin by SDS-PAGE

Frog muscle extract was centrifuged for 1 h at 50 000 g at 4°C and concentrated with an Ultrafree concentrator (Millipore, Bedford, MA), and 40 mg of extract were separated by a 18% PAGE in a MiniPrep Cell (Bio-Rad). Eluted proteins were analyzed by SDS-PAGE followed by silver staining (Amersham Pharmacia, Uppsala, Sweden). Fractions were pooled and concentrated by centrifugation as above.

SDS-PAGE and immunoblot

Proteins were separated by 18% SDS-PAGE gels under denaturing conditions and visualized by Coomassie Brilliant Blue colloidal staining. For immunoblotting, proteins were separated by 18% SDS-PAGE and transferred onto PVDF membranes. To reduce nonspecific binding, blotted membranes were incubated in blocking buffer (PBS/Tween 20 0.05%, 2% cold water fish gelatine (Sigma, St. Louis, MO)). The PVDF membrane was cut into strips which were incubated over night with patients' sera diluted 1/10 in blocking buffer. Control strips were incubated with buffer alone or with serum from a grass-pollen allergic patient. Bound IgE were detected with antihuman IgE antibody labeled with alkaline phosphatase (Sigma) and the blots were developed by addition of nitro-blue tetrazolium/5-bromo-4-chloro-3-indolyl-phosphate (NBT/BCIP) (Promega, Madison, WI). A mouse mAb directed against frog skeletal muscle parvalbumin (clone Parv-19, Sigma) was used for detection of parvalbumin.

Primer design for RACE

Back translations from the α - and β -parvalbumin protein sequences of *R. esculenta* (PRVA ranes and PRVB ranes, edible frog) were used to design degenerated 5' and 3' primers for polymerase chain reaction (PCR). Parv-24 α (TTC AAC CAC AAG AAR TTY TTY GAR) and Parv-96 α (AAT YTT NCC RTC NCC RTC YTT RTC) are located at amino acid positions 24 and 96. Parv-25 β (TTT AAC TAY AAR ATH TTY TTY CAR AAR) and Parv-96 β (GCC ATC TCC RTC NSW RTC NCC NGC YTT) are located at amino acid positions 25 and 96.

RNA extraction, cDNA synthesis and RACE

Frog skeletal muscle was disrupted in lysis buffer by a rotor-stator homogenizer and RNA was extracted according to the RNeasy kit procedure (Qiagen, Hilden, Germany). cDNA synthesis and PCR were performed using the SMART RACE cDNA amplification kit (Rapid Amplification of cDNA Ends by SMART technology; Clontech, Palo Alto, CA) according to the manufacturer's instructions. PowerScript reverse transcriptase (Clontech) was used for reverse transcription of total RNA.

 α -Parvalbumin

PCR was performed with sense (Parv-24 α) and antisense (UPM, Universal Primer Mix) primers for 3'RACE and sense (UPM) and antisense (Parv-96 α) primers for 5' RACE. In a first step these RACE reactions failed and only an internal cDNA fragment delimited by the primers Parv-24 α and -96 α could be amplified. Sequencing of the cloned fragment provided enough sequence data to design new nondegenerated primers for the RACE protocol.

 β -Parvalbumin

PCR was performed with sense (Parv-25 β) and antisense (UPM) primers for 3'RACE and sense (UPM) and antisense (Parv-96 β) primers for 5'RACE. The 3'RACE failed, but in the 5'RACE a 200-base pair fragment was amplified. The fragment was cloned and sequenced and the sequences obtained were used to design new nondegenerated primers for the RACE protocol.

α -parvalbumin in frog leg anaphylaxis*Expression of recombinant α - and β -parvalbumin in Escherichia coli*

After 5' and 3' RACE products had been characterized by sequencing, new primers were designed to amplify the whole protein coding region of the genes coding for α - and β -parvalbumin. The cDNAs were inserted into the pQE40 expression vector (Qiagen, Hilden, Germany) digested with *Bam*HI/*Sal*I. Recombinant parvalbumin was expressed in *E. coli* M15 with an N-terminal 6-histidine tail. The recombinant protein was purified by Nickel-nitrilotriacetic acid (Ni-NTA) resin (Qiagen, Hilden, Germany) under denaturing conditions according to the manufacturer's protocol.

Sequence analysis and database searches

Database homology searches, multiple sequence alignments, and sequence analyses were done with HUSAR (Heidelberg Unix Sequence Analysis Resources, DKFZ, Heidelberg, Germany).

Results

Allergen characterization by immunoblot and protein sequencing

Frozen frog legs provided by the patient were used for protein extraction. Proteins were separated by SDS-PAGE under denaturing conditions. The patient's serum IgE antibodies recognized protein bands of about 10 kDa in the frog muscle extract (data not shown).

The predominant band in this region was prepared for protein sequencing. The N-terminal sequence was PMTDVLAAGDISKAXXAFXAXEFNH. The peptide sequence was used for searching the protein database SwissProt with the program BLAST. Two sequences with high sequence identity were retrieved: α -parvalbumin of *R. esculenta* (PRVA ranes) with an homology of 76%, and parvalbumin α of *R. catesbiana* (PRVA ranca), homology 72%.

Mouse monoclonal antiparvalbumin antibody and patient IgE antibodies recognized a protein purified from frog muscle extract.

The predominant low molecular weight protein in frog muscle extract was purified by preparative SDS-PAGE. Figure 1 shows the silver stained SDS-gel with the frog muscle extract and two eluted protein fractions (A), and the corresponding immunoblots incubated with the mouse antiparvalbumin antibody and the patient's serum (B). The mouse monoclonal antibody (mAb) identifies the purified protein as parvalbumin. As the IgE antibodies from the patient recognize the same protein fraction, it seems highly probable that the allergen is parvalbumin.

Cloning of the cDNA coding for α -parvalbumin

Total RNA from frozen frog muscle provided by the patient was used to synthesise and amplify the parvalbumin cDNA using a RACE protocol. Degenerated sense and antisense primers were designed based on the back translation of the parvalbumin protein sequence of *R. esculenta*. For primer localization, two regions were chosen with high sequence homology between the two species *R. esculenta* and *R. cates*, and with less degenerated codons. The amplification of the cDNA ends failed, but the gene-specific primers could amplify an internal cDNA fragment of 220 bp. This DNA fragment was cloned and the DNA sequence determined. The sequence information was used to design new nondegenerated gene specific primers. cDNA synthesis, and amplification with these new primers was done using the RACE method. A parallel cDNA cloning was done with RNA extracted from *R. esculenta*.

The cDNA was cloned and the nucleotide sequences determined for several clones. The two sequences have an identity of 91.8% on the nucleotide sequence level and

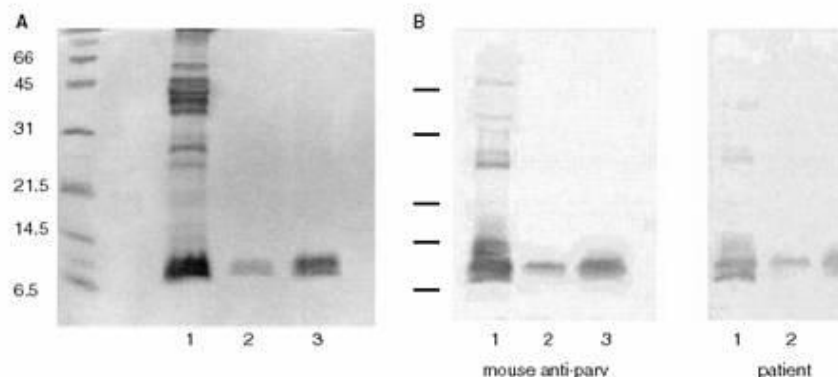


Figure 1. Purification of frog parvalbumin (A) by preparative electrophoresis monitored by SDS-PAGE and silver-staining. (B) Immunoblot analysis of frog muscle extract and fractions of purified parvalbumin. Proteins blotted onto polyvinylidene difluoride (PVDF) membranes were exposed to a mouse antiparvalbumin mAb (mouse anti-parv) and to the patient's serum for detection of IgE binding. 1, frog muscle extract (*Rana species*); 2 and 3, protein fractions eluted from preparative electrophoresis.

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82.7% on the amino-acid sequence level. The calculated molecular weights of the two proteins are 12.002 and 11.93 kDa; the calculated isoelectric point is 4.69 for both. At amino-acid positions 10 (C) and 16 (M) the deduced cDNA sequence differs from the amino-acid sequence found by protein sequencing. This probably reflects the fact that the quantity of the isolated protein was too small to allow an unequivocal interpretation of the sequencing data.

Cloning of the cDNA coding for β -parvalbumin

Most muscles contain parvalbumin of either α - and β -lineage, although in frog skeletal muscle both α and β parvalbumins have been found (8). To determine if the patient's IgE were directed against α - and β -parvalbumin or both, we cloned the corresponding β -parvalbumin gene both from *R. species* and *R. esculenta* and expressed the corresponding protein in *E. coli*. The sequence identity is 94% on the nucleotide sequence level and 88.1% on the amino-acid sequence level. The calculated molecular weight and isoelectric point is 11.88 kDa and 4.51 for *R. species* and 11.71 kDa and 4.53 for *R. esculenta*.

Expression of recombinant parvalbumin in *E. coli*

The cDNAs coding for α - and β -parvalbumin from both frog species were inserted into an expression vector and

recombinant proteins were produced in *E. coli*. Purified proteins were separated by SDS-PAGE and subjected to immunoblotting with the patient's serum and the mouse antiparvalbumin mAb. The mouse mAb recognized parvalbumin of α - and β -lineage from *R. esculenta* but also from *R. species*. However, IgE antibodies of the patient only recognized α -parvalbumin from *R. species* (Fig. 2), the frog material that had initially provoked the anaphylactic reaction.

Sequence comparison of the deduced α - and β -parvalbumin amino acid sequences

R. sp. Parv- α and *R. sp.* Parv- β isolated from *R. species* represent new parvalbumin sequences. *R. esc.* Parv- α and *R. esc.* Parv- β , the deduced protein sequences of the cDNA clones isolated from *R. esculenta*, are identical to the α - and β -parvalbumin sequences of *R. esculenta* retrieved from the SwissProt database. Protein sequences of the α - and β -parvalbumins of *R. species* and *R. esculenta* were aligned (Fig. 3). The two EF-hand domains that bind Ca^{2+} ions, are conserved regions. α - and β -parvalbumins of both species present many more sequence identities (82.7% and 88.1%) than α - and β -parvalbumins of one species (53.3% for *R. species* and 52.3% for *R. esculenta*). The frog-allergic patient's serum

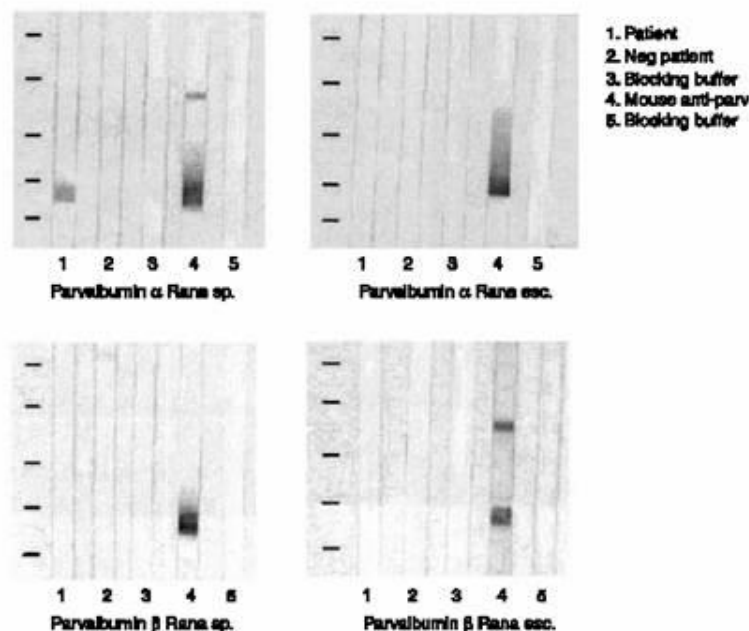


Figure 2. Immunoblot analysis of recombinant α - and β -parvalbumin. Polyvinylidene difluoride (PVDF) membrane strips with recombinant α -parvalbumin from *Rana species* and *Rana esculenta* and β -parvalbumin from both were incubated with different sera. 1, frog-allergic patient; 2, grass-pollen allergic patient; 3, negative control; 4, mouse antiparvalbumin mAb, and 5, corresponding negative control.

α -parvalbumin in frog leg anaphylaxis

Figure 3. Alignment of the amino acid sequences deduced from the cloned cDNAs coding for α - and β -parvalbumin of *Rana species* and *Rana esculenta* EF-hand motifs (two perpendicularly placed α -helices E and F which form together with an interhelical loop a single Ca^{2+} binding site) are underlined. Amino acid identities are shown in light grey, amino acid positions unique to *R. species* Parv- α are in dark grey. *R. sp.* Parv- α and *R. sp.* Parv- β are parvalbumins from *R. species*; *R. esc.* Parv- α and *R. esc.* Parv- β are parvalbumins from *R. esculenta*.

reacted specifically to recombinant α -parvalbumin of *R. species* (*R. sp.* Parv- α). A total of 13 amino acid positions are unique to this protein in comparison to the other 3 recombinant α - and β -parvalbumins, resulting in a limited number of possible continuous as well as discontinuous IgE epitopes.

Discussion

The reported case of anaphylaxis induced by frog meat was especially severe in its intensity and its resistance to treatment. The patient was being treated for hypertension and was taking a β -blocker drug as well as an inhibitor of the angiotensin-converting enzyme. Particularly severe anaphylactic reactions and resistance to treatment in patients treated with β -blockers are well known (9–11). The aggravating effect of angiotensin-converting enzyme inhibitor (ACE inhibitor) treatment on anaphylactic reactions and especially on its edematous manifestations has also been reported (12, 13).

Microsequencing of the purified protein band recognized by the patient's serum IgE antibodies on the immunoblot performed with frog muscle extract, revealed high sequence identity with α -parvalbumin of *R. esculenta* and α -parvalbumin of *R. catesbiana*. This suggested that α -parvalbumin, a well-known frog muscle component, whose protein sequence but not DNA sequence was known, was the culprit allergen. Parvalbumins are Ca^{2+} binding proteins of low molecular weight, initially detected in relatively high amounts in the white muscle of lower vertebrates (14). Parvalbumins were subsequently found, although in lesser amounts, in the fast-twitch skeletal muscles of higher vertebrates (15). Parvalbumins were suggested to be important in fiber relaxation (16).

To obtain confirmatory evidence that α -parvalbumin was the allergen responsible for the patient's anaphylactic reaction, two complementary approaches were taken: one at the protein level, the other at the DNA level. Parvalbumin was isolated from the frozen frog muscle provided by the patient. The nature of the isolated protein was confirmed by a commercial mAb recognizing frog parvalbumin. This antiparvalbumin mAb as well as the patient's serum recognized the same protein in a highly purified protein preparation, confirming that the patient's IgE were indeed directed against parvalbumin.

As parvalbumins comprise α - and β -parvalbumin which have both been shown to coexist in frog muscle (8), further characterization of the allergen was performed at the DNA and protein level. In a multistep procedure cDNAs from α - and β -parvalbumins were cloned from frog muscle of Indonesian origin and from the common edible frog *R. esculenta*. Recombinant molecules of the α - and β -parvalbumins were produced in *E. coli*. All four recombinant parvalbumins were recognized by a commercial mAb directed against frog parvalbumin. The patient's serum IgE antibodies recognized only recombinant α -parvalbumin of the *R. species* from Indonesia that he had been consuming, showing that the patient was specifically sensitized to this protein. There was no reactivity to a muscle extract from *R. esculenta*, confirming the specific sensitization to the consumed frog species (data not shown). α -Parvalbumin from *R. species* and *R. esculenta* have an amino-acid identity of 83%. Extensive homologies between α - and β -parvalbumin are mainly found in the conserved regions of the EF-hand motifs (amino acids 52–63 and 91–102).

Parvalbumins have been shown to represent the major allergen in fish (17). Parvalbumin from fish is a very stable allergen: extremes in pH, temperature, or random folding of the molecule following exposure to dissociating agents do not significantly alter its allergenicity (18, 19). Parvalbumins from different fish species, for instance cod, tuna, salmon have been shown to contain cross-reactive as well as species specific epitopes when tested with the sera of fish allergic patients (20). The patient analyzed in our study presented only antibodies specifically directed at the *R. species* from Indonesia without any cross-reactivity for *R. esculenta*.

Even more, the reactivity was limited to α -parvalbumin, with no cross-reactivity to β -parvalbumin. In the case of a laboratory technician described by Charpin (2), skin tests performed with the skin of *R. esculenta* were positive while tests with *R. temporaria* were negative. Although this narrow specificity might not be the rule, one must be cautious about including the correct frog species in a diagnostic procedure to avoid false-negative results.

The clinical cases reported so far in the literature were caused by *R. esculenta*, but also by *R. catesbiana*. Incriminated antigen sources are skin (2, 5), venom (4),

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brain (3), and legs (6, 7). The distribution of parvalbumin in different frog tissues should be evaluated in further studies. In rat, the presence of parvalbumin has been described in a variety of tissues, including endocrine glands, skin and neurons (21–24). It has also to be seen whether other molecules besides parvalbumin are responsible for allergic reactions to frogs.

Allergic reactions to fish are frequent, especially in countries with a developed fish industry, affecting up to 3% of children in Finland (25). Frog meat is a delicacy, consumed by a limited number of people; this might explain the limited reports of allergic reactions to frog meat. Parvalbumins are present in greater amount in fish and frog muscle than in other species (15). It remains to be seen whether parvalbumins of other species are also capable of eliciting allergic reactions.

This study shows that α -parvalbumin from frog tissue, a protein previously not known as an allergen, was

involved in a case of severe IgE-mediated food anaphylaxis. This is the first report that implicates parvalbumins in a case of immediate-type allergy outside the fish species. The α - and β -parvalbumin cDNA sequences of *R. esculenta* and *R. species* from Indonesia have been defined. We found that the corresponding recombinant parvalbumin molecules produced in *E. coli* are recognized by IgE, as well as murine mAbs, showing that the recombinant molecules may be useful diagnostically.

Acknowledgments

We gratefully acknowledge the collaboration of Dr André Steinmetz in protein microsequencing and the assistance of Patrick Schmit with protein purification. This work was supported by grants from the CRP-Santé (97-12) and the Fondation Recherche Cancer et Sang (98-03), in Luxembourg.

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**APPENDIX C REPORT BY C. HILGER TITLED “EVALUATION OF
SYNGENTA PROTEIN SAMPLES POI1 AND POI2 FOR REACTIVITY WITH SERUM
IGE FROM A PATIENT ALLERGIC TO FROG ALPHA-PARVALBUMIN FROM RANA
SPECIES”**

Report : Evaluation of Syngenta Protein Samples POI1 and POI2 for Reactivity with
Serum IgE from a Patient Allergic to Frog Alpha-Parvalbumin from *Rana* Species

Dr. Christiane Hilger

Laboratory of Immunogenetics and Allergology

CRP-Santé

4 rue Barblé

L-1210 Luxembourg

17.09.04

This experiment was conducted, at the request of Syngenta, to determine whether Syngenta protein samples designated POI1 and POI2 were immunoreactive with serum IgE from a patient who exhibited IgE-mediated clinical food allergy and specific serum reactivity to parvalbumin alpha from a frog species designated *Rana species*, while no reactivity was observed to parvalbumin beta from *R. species* or parvalbumin alpha or beta from frog species *Rana esculenta*.

Description of the experiment:

Two proteins from Syngenta, designated POI1 (45kD) and POI2 (66kD), were separated by SDS-PAGE 15% under denaturing conditions. As controls, recombinant proteins parvalbumin alpha from *R. species* CH2001 (positive control), parvalbumin alpha from *Rana esculenta* (negative control) and parvalbumin beta from *Rana esculenta* (negative control)² were run in parallel. 2 µg of protein were loaded per lane.

Two gels were run in parallel. The first gel was used for Coomassie-staining. On the second gel, samples 1-5 were loaded twice. After the run, the gel was transferred onto a PVDF membrane. To reduce nonspecific binding, the membrane were incubated in blocking buffer (TBS/Tween-20 0.05%, 2% cold water fish gelatine (Sigma)) for 30 min. The membrane was cut into two pieces. One half was incubated with the serum of the patient with specific IgE to parvalbumin alpha (described in C. Hilger et al. Severe IgE-mediated anaphylaxis following consumption of fried frog legs. Definition of α-parvalbumin as the allergen in cause. Allergy 2002;57:1053-1058). The other half was incubated with serum from a non-allergic individual. Sera were diluted 1/20 in blocking buffer and incubated overnight with the membrane. Both sera have been collected from individuals that have given an oral informed consent. Intermediate washing steps were performed with TBST 0.05% for 4x10 min. Bands were detected with an anti-human IgE antibody labeled with alkaline phosphatase (Sigma A-3525) diluted 1/1000 in blocking buffer and the blot was developed by addition of NBT/BCIP (Promega).

Results:

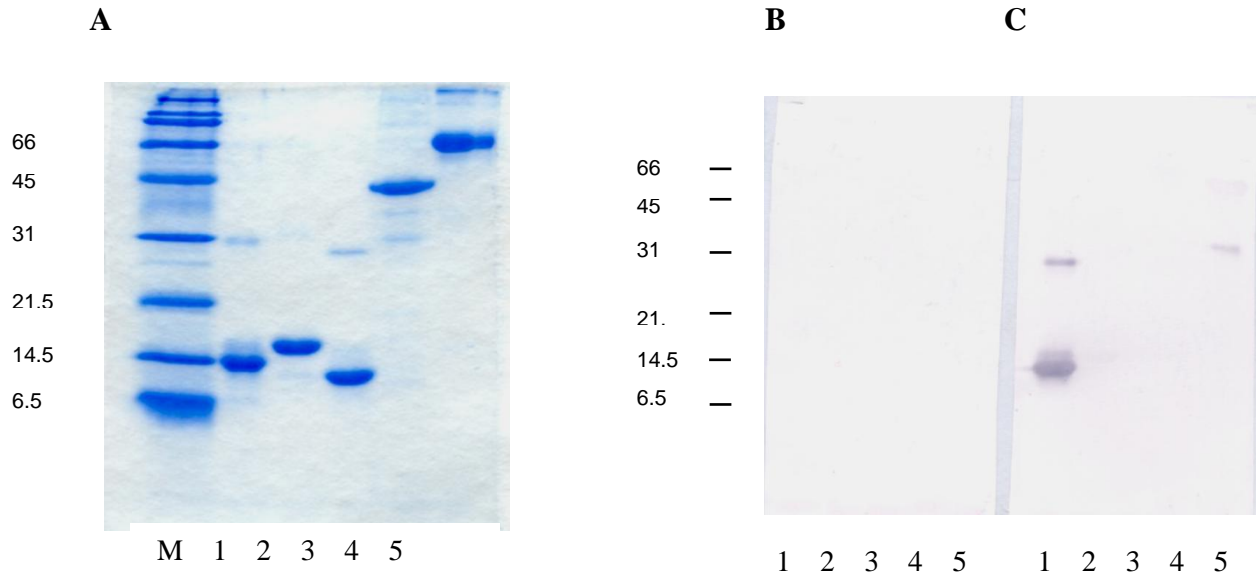
Patient serum: There was a strong IgE reactivity to the positive control parvalbumin alpha from *R. species* and no reactivity to parvalbumin alpha and beta from *R. esculenta* (see Figure below).

There is no reactivity to the test protein POI1 (45kD). With test protein POI2 (66 kD) there is a very weak signal at 66 kD, but a reactive band at about 35 kD.

Control serum : No reactivity was observed with any of the protein samples.

Conclusion:

Protein P0I1 is negative under the conditions tested. Protein P0I2 is weakly recognized, but this is probably not significant. However there is a smaller protein band in this test preparation (perhaps due to degradation or contamination) that is clearly reactive.



A) Coomassie-stained gel; B) immunoblot with negative control serum; C) immunoblot with patient serum. M, marker ; 1, parvalbumin alpha *Rana* species; 2, parvalbumin alpha *Rana esculenta*; 3, parvalbumin beta *Rana esculenta*; 4, P0I1; 5, P0I2.

Reference:

Hilger, C., Grigioni, F., Thill, L., Mertens, L. and Hentges, F. (2002) Severe IgE-mediated anaphylaxis following consumption of fried frog legs : definition of α -parvalbumin as the allergen in cause. Allergy 57 :1053-1058.

A handwritten signature in blue ink, appearing to be "Ch. Hilger", written over a horizontal line.

Dr. Christiane Hilger

Date : 17.09.04

APPENDIX D. FASTA Search Alignments

Hit Name	E value	Percent Identity	Hit Length
>>ALLERGEN_2011 gi 18770 emb CAA45777.1 trypsin inhibit (217 aa)	0.33	29.605	152
>>ALLERGEN_2011 gi 18772 emb CAA45778.1 trypsin inhibit (217 aa)	0.46	27.703	148
>>ALLERGEN_2011 gi 1304264 dbj BAA12318.1 alpha-gliadin (259 aa)	0.75	24.39	82
>>ALLERGEN_2011 gi 256429 gb AAB23464.1 Kunitz trypsin (216 aa)	0.76	29.139	151
>>ALLERGEN_2011 gi 170740 gb AAA34290.1 gliadin [Tritic (296 aa)	2.7	30.588	85
>>ALLERGEN_2011 gi 170724 gb AAA34282.1 pre-alpha-/beta (297 aa)	2.7	21.687	83
>>ALLERGEN_2011 gi 2739154 gb AAC67308.1 22.6 kDa tegum (191 aa)	3.6	44.118	34
>>ALLERGEN_2011 gi 14279169 gb AAK58515.1 AF249675_1 bet (460 aa)	3.8	23.913	92
>>ALLERGEN_2011 gi 2497701 sp Q28133.1 ALL2_BOVIN RecNam (172 aa)	3.9	32.653	49
>>ALLERGEN_2011 gi 18542115 gb AAL75450.1 AF465613_1 min (636 aa)	5	25.735	136
>>ALLERGEN_2011 gi 256636 gb AAB23483.1 Kunitz trypsin (204 aa)	5.3	29.825	57
>>ALLERGEN_2011 gi 170728 gb AAA34284.1 alpha-type glia (186 aa)	6.8	25.373	67
>>ALLERGEN_2011 gi 162794 gb AAA30429.1 alpha-S1-casein (214 aa)	7.7	28.571	49
>>ALLERGEN_2011 gi 162811 gb AAA30433.1 kappa-casein pr (190 aa)	9.7	47.059	17
>>ALLERGEN_2011 gi 21761 emb CAA26384.1 unnamed protein (286 aa)	9.8	25.373	67
>>ALLERGEN_2011 gi 21755 emb CAA25593.1 unnamed protein (286 aa)	9.8	32.558	86
>>ALLERGEN_2011 gi 170720 gb AAA34280.1 alpha/beta-glia (286 aa)	9.8	25.373	67

>>ALLERGEN_2011|gi|18770|emb|CAA45777.1| trypsin inhibit (217 aa)
 initn: 37 initl: 37 opt: 85 Z-score: 111.0 bits: 28.5 E(): 0.33
 Smith-Waterman score: 85; 29.605% identity (34.351% ungapped) in 152
 aa overlap (246-387:8-148)

```

      220      230      240      250      260      270
PMI      TIRLISEFYPEDSGLFSPLLLNVVKLNPGAMFLFAETPHAYL-QGVALEVMANSNDNVL
ALLERG      MKSTIFFALFLFCAFTTSYLPSAIADFVLDNEGNPLE
              10      20      30

      280      290      300      310      320
PMI      AGLTPKYIDIPELVANVKFEAKPA-NQLLTQPVKQG-AELDFPI-----PVD-DFAFSL
ALLERG NGGT--YYILSDITAFGGIRAAPTGNERCPLTVVQSRNELDKGIGITIISSPYRIRFIAEG
              40      50      60      70      80      90

      330      340      350      360      370      380
PMI      HDLSDKETTISQQSAAILFCVEGDATLWKGSQQLQKPGESAFIAANESPVTVKGHGRLA
ALLERG HPLSLKFDSF---AVIMLCV-GIPTEWSVEDLPEGPA---VKIGENKDAMDGWFRLE
              100      110      120      130      140

      390
PMI      RVYNKL
ALLERG RVSDDEFNNYKLVFCPQQAEDDKCGDIGISIDHDDGTRRLVVSKNKPLVVQFQKLDKESL
              150      160      170      180      190      200

```

>>ALLERGEN_2011|gi|18772|emb|CAA45778.1| trypsin inhibit (217 aa)
 initn: 37 initl: 37 opt: 83 Z-score: 108.5 bits: 28.0 E(): 0.46
 Smith-Waterman score: 83; 27.703% identity (30.370% ungapped) in 148
 aa overlap (246-387:8-148)

```

      220      230      240      250      260      270
PMI      TIRLISEFYPEDSGLFSPLLLNVVKLNPGAMFLFAETPHAYL-QGVALEVMANSNDNVL
ALLERG      MKSTIFFALFLFCAFTTSYLPSAIADFVLDNEGNPLD
              10      20      30

      280      290      300      310      320      330
PMI      AGLTPKYIDIPELVANVKFEAKPA-NQLLTQPVKQG-AELDFPI-PVDDFAFSLHDLSD-
ALLERG SGGT--YYILSDITAFGGIRAAPTGNERCPLTVVQSRNELDKGIGITIISSPFIRIRFIAEG
              40      50      60      70      80      90

      340      350      360      370      380
PMI      KETTISQQS-AAILFCVEGDATLWKGSQQLQKPGESAFIAANESPVTVKGHGRLARVYN
ALLERG NPLRLKFDSFAVIMLCV-GIPTEWSVEDLPEGPA---VKIGENKDAVDGWFRIERVSD
              100      110      120      130      140      150

      390
PMI      KL
ALLERG DEFNNYKLVFCTQQAEDDKCGDIGISIDHDDGTRRLVVSKNKPLVVQFQKVDKESLAKKN
              160      170      180      190      200      210

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      130      140      150      160      170      180
PMI      KDPNHKPELVFALTPFLAMNAFREFSEIVSLLQPVAGAHPAIAHFLQQPDAERLSELFAS
      .::      :: : .. ::      . :.: .
ALLERG QQQQQQQQQQQQQQILPQILQQQLIPCRDVLQQHNIH-ARSQVLQQSTYQPLQQQLCCQ
      130      140      150      160      170      180

```

```

      190      200      210      220      230
PMI      LLNMQGEEKSRALAI---LKSALDSQQGEPWQTIRLIS-----EFYPEDSGLFSPLLLNV
      : : :.: : : . . . . : : : : : : : : : : : : : : : : : : : :
ALLERG QL-WQIPEQSRCQAIHNVVHAILHQQQQQQQPSSQVSLQQPQQQYPSGQGFQPSQQNP
      190      200      210      220      230      240

```

```

      240      250      260      270      280      290
PMI      VKLNPGEAMFLFAETPHAYLQGVALEVMANSNDNVLRAGLTPKYIDIPELVANVKFEAKPA
ALLERG QAQGSVQPQQLPQFEEIRNLALQTLPRMCNVYIPPYCSTTTAPFGIFGTN
      250      260      270      280      290

```

>>ALLERGEN_2011|gi|170724|gb|AAA34282.1| pre-alpha-/beta (297 aa)
 initn: 75 initl: 51 opt: 74 Z-score: 94.8 bits: 25.9 E(): 2.7
 Smith-Waterman score: 74; 21.687% identity (23.684% ungapped) in 83 aa
 overlap (279-358:112-190)

```

      250      260      270      280      290      300
PMI      LFAETPHAYLQGVALEVMANSNDNVLRAGLTPKYIDIPELVANVKFEAKPANQLLTQPVKQ
      .:: . . . . . . . : : : :
ALLERG PQPQLPYQPQLPYQPQPFRRPQQSYQPQPQYSQPQQPISQQQQQQQQQQQQQQQILQQ
      90      100      110      120      130      140

```

```

      310      320      330      340      350      360
PMI      GAELDFPIPVDDFAFSLHDLSDKETTISQQSAAIL---FCVEGDATLWKGSQQLQPKGE
      . . . : : . . . . . . : : : : : : : : : :
ALLERG ILQQQL-IPCRDVLQQHSIAHGSSQVLQQSTYQLVQQFCCQ---QLWQIPEQSRCQAIH
      150      160      170      180      190

```

```

      370      380      390
PMI      SAFIAANESPVTVKGHGRLARVYNKL
ALLERG NVVHAILHQQQQQQQQQQQQQQQPLSQVCFQQSQQQYPSGQGSFQPSQQNPQAQGSVQP
      200      210      220      230      240      250

```

>>ALLERGEN_2011|gi|2739154|gb|AAC67308.1| 22.6 kDa tegum (191 aa)
 initn: 94 initl: 65 opt: 70 Z-score: 92.5 bits: 24.9 E(): 3.6
 Smith-Waterman score: 70; 44.118% identity (46.875% ungapped) in 34 aa
 overlap (192-224:131-163)

```

      170      180      190      200      210      220
PMI      AGAHPAIAHFLQQPDAERLSELFASLLNMQGEEKSRALAI-LKSALDSQQGEPWQTIRLI
      .:: :.: : : :.: : : : :
ALLERG IQIIAATMSKAKQYNICCKFKELLDKTSRTGDE-VRAVANDLKAFLDSEYGRVWQVIILT
      110      120      130      140      150

```

```

                230          240          250          260          270          280
PMI      SEFYPEDSGLFSPLLLNVVKLNPGGEAMFLFAETPHAYLQGVALEVMANSNDNVLRAGLTPK
        . . .
ALLERG  GSYWMNFSHEPFLSMQFKYSNYVCLLWRT PSS
        160          170          180          190

```

>>ALLERGEN_2011|gi|14279169|gb|AAK58515.1|AF249675_1 bet (460 aa)
 initn: 56 initl: 56 opt: 74 Z-score: 92.0 bits: 26.1 E(): 3.8
 Smith-Waterman score: 74; 23.913% identity (27.500% ungapped) in 92 aa
 overlap (172-257:125-210)

```

                150          160          170          180          190          200
PMI      FLAMNAFREFSEIVSLLQPVAGAHPAIAHFLQPPDAERLSELFASLLNMQGEEKSRALAI
        : . : . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
ALLERG  PNVASQFVKSNVMSFYPPASNIIAITVGNEVLTSQDQKLISQLLPAMQNVQNALNAASLGG
        100          110          120          130          140          150

```

```

                210          220          230          240          250
PMI      LKSALDSQQGEPWQTIRLISEFYPEDSGLFSPLLLNVVKL-----NPGEAMFLFAETPH-
        : . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
ALLERG  -KVKVSTVHA-----MAVLSSQSYPPSSGVFNPGLGDTMKALLQFQSANDAPFMISPYPYF
        160          170          180          190          200

```

```

                260          270          280          290          300          310
PMI      AYLQGVALEVMANSNDNVLRAGLTPKYIDIPELVANVKFEAKPANQLLTQPVKQGAELDFP
        ::
ALLERG  AYKNQPTPDTLAFCLFQPNAGQVDSGNHGKYTNMFDAQVDAVHSALNAMGFKDIEIVVAE
        210          220          230          240          250          260

```

>>ALLERGEN_2011|gi|2497701|sp|Q28133.1|ALL2_BOVIN RecNam (172 aa)
 initn: 56 initl: 56 opt: 69 Z-score: 91.9 bits: 24.6 E(): 3.9
 Smith-Waterman score: 69; 32.653% identity (34.783% ungapped) in 49 aa
 overlap (81-126:6-54)

```

                60          70          80          90          100
PMI      AAGDIVSLRDVIESDKSTLLGEAVAKRFGELPFLFKVLCAAQPLSIQVHPNKHNS---I
        : . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
ALLERG  MKAVFLTLLFGLVCTAQETPAEIDPSKIPGEWRII
        10          20          30

```

```

                110          120          130          140          150          160
PMI      GFAKENAAGIPMDAAERNYKDPNHKPELVFALTPFLAMNAFREFSEIVSLLQPVAGAHPA
        : . . : . . . . . . . . . . . . . . . . . . . . . . . . . . . .
ALLERG  YAAADNKDKIVEGGPLRNYYRRIECINDCESLSITFYLKDQGTCLLLTEVAKRQEGYVYV
        40          50          60          70          80          90

```

>>ALLERGEN_2011|gi|18542115|gb|AAL75450.1|AF465613_1 min (636 aa)
 initn: 63 initl: 40 opt: 74 Z-score: 89.9 bits: 26.1 E(): 5
 Smith-Waterman score: 74; 25.735% identity (28.000% ungapped) in 136
 aa overlap (259-389:188-317)

```

                230          240          250          260          270          280
PMI      GLFSPLLLNVVKLNPGGEAMFLFAETPHAYLQGVALEVMANSNDNVLRAGLT-PKYIDIPEL
        : . : . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
ALLERG  WLYLPFAMVPDQWYDINGVWTGSATILPDGQIIMLYTGDTDDYVQVQNLAYPANLSDPLL
        160          170          180          190          200          210

```

```

      290      300      310      320      330      340
PMI    VANVKFEAKPANQLLTQPVKQGAELDFPIPVDDFAFSLHDLSDKETTISQ--QSAAILF
      . : : : : : . . : . . : : . . . : : . . . :
ALLERG LDWVKFKANP--VLVPPPGIGVK-DFRDPIT--AWTGPQNGQWLLTIGSKIGKTGVALV
      220      230      240      250      260      270

```

```

      350      360      370      380      390
PMI    CVEGDATLWKG-SQQLQLKPGESAFIAANESPVTVKGHGRRLARVYNKL
      : . . : . : . : : . . . : : : . : : :
ALLERG CETSNTSFSKLLDGVLHAVPGTGMWECVDFYPVSTKKTNGLDTSYNGPGVKHVLKASLDD
      280      290      300      310      320      330

```

```

ALLERG NKQDHYAIGTYDLGKNKWTDPNPELDCGIGLRLDYGKYYASKTFYDPKRERRVLWGWIGE
      340      350      360      370      380      390

```

>>ALLERGEN_2011|gi|256636|gb|AAB23483.1| Kunitz trypsin (204 aa)
 initn: 65 initl: 65 opt: 68 Z-score: 89.5 bits: 24.4 E(): 5.3
 Smith-Waterman score: 68; 29.825% identity (34.000% ungapped) in 57 aa
 overlap (86-142:62-111)

```

      60      70      80      90      100      110
PMI    VSLRDVIESDKSTLLGEAVAKRFGELPFLFKVLCAAQPLSIQVHPNKHNSIIGFAKENAA
      : . : : : : : : : : : : : : :
ALLERG DDDPLQNGGTYMPLVMRGKSGGIEGNSTGKEIC---PLTVVQSPNKHNGIGLVFKS--
      40      50      60      70      80

```

```

      120      130      140      150      160      170
PMI    GIPMDAAERNYKDPNHKPELVFALTFFLAMNAFREFSEIVSLLQPVAGAHPAIAHFLQQP
      : . : . : : : : : : : : :
ALLERG --PLHALFIAERYPLSIKFDSFAVIPLCGVMPTKWAIVEREGLQAVTLAARDTVDGWFNI
      90      100      110      120      130      140

```

>>ALLERGEN_2011|gi|170728|gb|AAA34284.1| alpha-type glia (186 aa)
 initn: 53 initl: 53 opt: 66 Z-score: 87.5 bits: 23.9 E(): 6.8
 Smith-Waterman score: 66; 25.373% identity (27.419% ungapped) in 67 aa
 overlap (294-360:27-88)

```

      270      280      290      300      310      320
PMI    EVMANSDNVLRAGLTPKYIDIPELVANVKFEAKPANQLLTQPVKQGAELDFPIPVDDFAF
      . . : : : : : : : : : :
ALLERG PQPQPQYSQPQQPISQQQQQQQQQQQQQQQQEQQILQQILQQ--QL---IPCMDVVL
      10      20      30      40      50

```

```

      330      340      350      360      370      380
PMI    SLHDLSDKETTISQSAAILFCVEGDATLWKGSQQLQLKPGESAFIAANESPVTVKGHGR
      . : : . . : : : . : : : :
ALLERG QQHNIAHGRSQVLQQSTYQLLQELCCQHLWQIPEQSQCQAIHNVVHAIILHQQQQKQQQQ
      60      70      80      90      100      110

```

```

      390
PMI    LARVYNKL
ALLERG PSSQFSFQQPLQQYPLGQGSFRPSQQNPQAQGSVQPQQLPQFEIRNLALQTLPAMCNVYI
      120      130      140      150      160      170

```

>>ALLERGEN_2011|gi|162794|gb|AAA30429.1| alpha-S1-casein (214 aa)
 initn: 47 initl: 47 opt: 66 Z-score: 86.6 bits: 24.0 E(): 7.7

Smith-Waterman score: 66; 28.571% identity (29.167% ungapped) in 49 aa overlap (179-226:115-163)

```

      150      160      170      180      190      200
PMI    REFSEIVSLLQPVAGAHPAIAHFLQQPDAERLSELFASLLNMQGEEKSRALAILKSALDS
      :... . :... . . : : :...
ALLERG EIVPNSVEQKHIQKEDVPSERYLGYLEQLRLKKYKVPQLEIVPNSAEERLHSMKEGIDA
      90      100      110      120      130      140

      210      220      230      240      250      260
PMI    QQGEPWQTI-RLISEFYPEDSGLFSPLLLNVVKLNPGAMFLFAETPHAYLQGVALEVMA
      :: :: . . . :...
ALLERG QQKEPMIGVNQELAYFYPELFRQFYQLDAYPSGAWYYVPLGTQYTDAPSFSIDIPNPIGSE
      150      160      170      180      190      200

```

>>ALLERGEN_2011|gi|162811|gb|AAA30433.1| kappa-casein pr (190 aa)
 initn: 52 initl: 52 opt: 64 Z-score: 84.8 bits: 23.4 E(): 9.7
 Smith-Waterman score: 64; 47.059% identity (47.059% ungapped) in 17 aa overlap (89-105:109-125)

```

      60      70      80      90      100      110
PMI    RDVIESDKSTLLGEAVAKRFGELPFLFKVLCAAQPLSIQVHPNKHNSIGFAKENAAGIP
      : : : : . : : : :
ALLERG YPYAKPAAVRSPAQILQWQVLSNTVPAKSCQAQPTTMRHPHPLSFMIAIPKKNQDKT
      80      90      100      110      120      130

      120      130      140      150      160      170
PMI    MDAAERNYKDPNHKPELVFALTPFLAMNAFREFSEIVSLLQPVAGAHPAIAHFLQQPDAE
ALLERG EIPTINTIASGEPTSTPTIEAVESTVATLEASPEVTESPEINTVQVTSTAV
      140      150      160      170      180      190

```

>>ALLERGEN_2011|gi|21761|emb|CAA26384.1| unnamed protein (286 aa)
 initn: 53 initl: 53 opt: 66 Z-score: 84.7 bits: 24.0 E(): 9.8
 Smith-Waterman score: 66; 25.373% identity (27.419% ungapped) in 67 aa overlap (294-360:127-188)

```

      270      280      290      300      310      320
PMI    EVMANSNDNVLRLAGLTPKYIDIPELVANVKFEAKPANQLLTQPVKQGAELDFPIPVDDFAF
      . . : : : : : : : : : :
ALLERG QQPYPQPQPQYSQPQQPISQQQQQQQQQQQQQQQQQQQILQQILQQ--QL---IPCMDVVL
      100      110      120      130      140      150

      330      340      350      360      370      380
PMI    SLHDLSDKETTISQSAAILFCVEGDATLWKGSQQLQLKPGESAFIAANESPVTVKGHGR
      . :... . . :... : : :
ALLERG QQHNIAGRSQVLQQSTYQLLQELCCQHLWQIPEQSQCQAIHNVVHAILHQQQKQQQQP
      160      170      180      190      200      210

      390
PMI    LARVYNKL
ALLERG SSQVSFQQPLQQYPLGQGSFRPSQQNPQAQGSVQPQQLPQFEEIRNLALQTLPAMCNVYI
      220      230      240      250      260      270

```

>>ALLERGEN_2011|gi|21755|emb|CAA25593.1| unnamed protein (286 aa)
 initn: 53 initl: 53 opt: 66 Z-score: 84.7 bits: 24.0 E(): 9.8

Smith-Waterman score: 72; 32.558% identity (37.333% ungapped) in 86 aa overlap (157-233:150-233)

```

      130      140      150      160      170      180
PMI    KDPNHKPELVFALTPFLAMNAFREFSEIVSLLQPVAGAHPAIAHFLQQPDARLSSELFAS
      .::  ::  .. :::  . ::::  .
ALLERG QQQQQQQQQQQQQQILQQILQQQLIPCMDVVLQQHNIAGHGR-SQVLQQSTYQLLQELCCQ
      120      130      140      150      160      170

```

```

      190      200      210      220      230
PMI    LLNMQGEKSRALAILKSA----LDSQQGEPWQTIRLIS-----EFYPEDSGLFSPLLLN
      : :  :... ::::  . : :... : :  . : :  . : :  . : :  . : :
ALLERG HL-WQIPEQSQCQAILKVVAIILHQQQKQQQPSQVSFQQPLQQYPLGQGSFRPSQQN
      180      190      200      210      220      230

```

```

      240      250      260      270      280      290
PMI    VVKLNPGAMFLFAETPHAYLQGVALEVMANSNDNVLRAGLTPKYIDIPELVANVKFEAKP
ALLERG PQAQGSVQPQQLPQFEEIRNLALQTLPAMCNVYIPPYCTIAPFGIFGTN
      240      250      260      270      280

```

>>ALLERGEN_2011|gi|170720|gb|AAA34280.1| alpha/beta-glia (286 aa)
 initn: 53 initl: 53 opt: 66 Z-score: 84.7 bits: 24.0 E(): 9.8
 Smith-Waterman score: 66; 25.373% identity (27.419% ungapped) in 67 aa overlap (294-360:127-188)

```

      270      280      290      300      310      320
PMI    EVMANSNDNVLRAGLTPKYIDIPELVANVKFEAKPANQLLTQPVKQGAELDFPIPVDDFAF
      . .  :... : :... : :  . : :  . : :
ALLERG QQPYPQPQPQYSQPQQPISQQQQQQQQQQQQQQQQQQQILQQILQQ--QL---IPCMDVVL
      100      110      120      130      140      150

```

```

      330      340      350      360      370      380
PMI    SLHDLSDKETTISQQAAILFCVEGDATLWKGSQQLQLKPGESAFIAANESPVTVKGHGR
      . :... .. :... :. :... : :
ALLERG QQHNIAGHGRSQVLQQSTYQLLQELCCQHLWQIPEQSQCQAIHNVVHAIILHQQQKQQQPP
      160      170      180      190      200      210

```

```

      390
PMI    LARVYNKL
ALLERG SSQVSFQQPLQQYPLGQGSFRPSQQNPQAQGSVQPQQLPQFEEIRNLALQTLPAMCNVYI
      220      230      240      250      260      270

```