

**Study Title**

**Bioinformatics Evaluation of DNA Sequences Flanking the 5' and 3' Junctions of the Inserted DNA in Soy MON 87769: Assessment of Putative Polypeptides**

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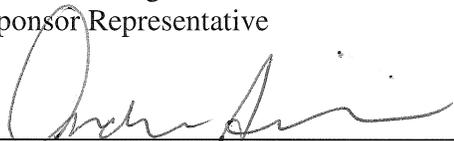
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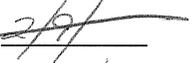
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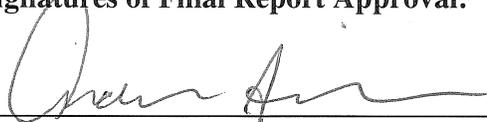
  
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### Abbreviations and Definitions

|                 |  |
|-----------------|--|
| aa              | Amino acid   |
| AD8             | Allergen, gliadin, and glutenin protein sequence database  |
| BLOCKS          | A database of amino acid motifs found in protein families  |
| BLOSUM          | BLOcks SUBstitution Matrix, used to score similarities between pairs of distantly related protein or nucleotide sequences                          |
| <i>E</i> -score | Expectation score  |
| FASTA           | Algorithm used to find local high scoring alignments between a pair of protein or nucleotide sequences   |
| GenBank         | A public genetic database maintained by the National Center for Biotechnology Information at the National Institutes of Health, Bethesda, MD, USA. |
| NCBI            | National Center of Biotechnology Information at the National Institutes of Health, Bethesda, MD, USA.  |
| ORF             | Open reading frame   |
| PROTEIN         | GenBank protein database, release 163.0 (December 15, 2007).   |
| TOXIN6          | Toxin protein sequence database  |

## 1.0 Summary

Monsanto has developed genetically derived soybean MON 87769, which produces stearidonic acid (SDA), an omega-3 fatty acid. Production of SDA in soybean seed was achieved through the introduction of genes encoding *Neurospora crassa*  $\Delta 15$  desaturase (*Nc.Fad3* or *Nc $\Delta 15D$* ) and *Primula juliae*  $\Delta 6$  desaturase (*Pj $\Delta 6D$* ) via *Agrobacterium* mediated transformation.

As part of a comprehensive safety assessment, bioinformatic analyses were performed to assess the potential for allergenicity, toxicity, or biological activity of putative polypeptides encoded by the 5' and 3' inserted DNA-soybean genomic DNA junctions. Sequences spanning the 5' soybean genomic DNA-inserted DNA junction and the 3' inserted DNA-soybean genomic DNA junction were translated from stop codon to stop codon in all six reading frames. Putative polypeptides from each reading frame, eight amino acids or greater in length were compared to allergen (AD8), toxin (TOXIN6), and public domain (PROTEIN) database sequences using bioinformatic tools.

The FASTA sequence alignment tool was used to assess structural relatedness between the query sequences and any protein sequences in the AD8, TOXIN6, and PROTEIN databases. Structural similarities shared between each putative polypeptide with each sequence in the database were examined. The extent of structural relatedness was evaluated by detailed visual inspection of the alignment, the calculated percent identity, and the *E*-score. In addition to structural similarity, each putative polypeptide was screened for short polypeptide matches using a pair-wise comparison algorithm. In these analyses, eight contiguous and identical amino acids were defined as immunologically relevant, where eight represents the typical minimum sequence length likely to represent an immunological epitope.

No biologically relevant structural similarity to allergens, toxins, or biologically active proteins was observed for any of the putative polypeptides. Furthermore, no short (eight amino acid) polypeptide matches were shared between any of the putative polypeptides and proteins in the allergen database. These data demonstrate the lack of both structurally and immunologically relevant similarity to known allergens for all of the putative polypeptides analyzed. These data also demonstrate the lack of structurally relevant correlates to toxins or other biologically active proteins for all of the putative polypeptides analyzed.

This bioinformatics analysis is theoretical. No empirical evidence exists to suggest that transcription of DNA sequence at the 5' or 3' junctions of the DNA inserted in MON 87769 occurs. Rather, the results of these bioinformatic analyses indicate that in the highly unlikely event that any of the junction sequences were to be transcribed and that a transcript were to be translated, the translation product would not share a sufficient

degree of sequence similarity or identity to indicate that it would be potentially allergenic, toxic, or have other safety implications.

## 2.0 Introduction

Monsanto has developed genetically derived soybean MON 87769, which produces stearidonic acid (SDA), an omega-3 fatty acid. Production of SDA in soybean seed was achieved through the introduction of genes encoding *Neurospora crassa*  $\Delta 15$  desaturase (*Nc.Fad3* or *Nc $\Delta 15D$* ) and *Primula juliae*  $\Delta 6$  desaturase (*Pj $\Delta 6D$* ) via *Agrobacterium* mediated transformation.

As part of a comprehensive safety assessment, bioinformatic analyses were performed to assess the potential for allergenicity, toxicity, or biological activity of putative polypeptides encoded by the 5' and 3' inserted DNA-soybean genomic DNA junctions. Sequences spanning the 5' soybean genomic DNA-inserted DNA junction and the 3' inserted DNA-soybean genomic DNA junction were translated from stop codon to stop codon in all six reading frames. Putative peptides from each reading frame were compared to allergen (AD8), toxin (TOXIN6), and public domain (PROTEIN) database sequences using bioinformatic tools.

Exposure to allergens in foods may cause sudden, medically significant reactions in susceptible individuals. Gliadins and glutenins are suspected to cause celiac disease, a non-IgE mediated disorder (gluten-sensitive enteropathy), and are also considered important immunologically active proteins. Screening the amino acid sequences of proteins introduced into plants by modern biotechnology for similarity to sequences of known allergens, gliadins, and glutenins is one of many assessments performed to support product safety. Similarly, the amino acid sequences of introduced proteins are also screened against known toxins as well as all known proteins in publicly available genetic databases.

The FASTA algorithm can be used to evaluate the extent of sequence alignment between a query protein sequence and a database sequence. In principle, if two proteins share sufficient linear sequence similarity and identity, they will likely share three-dimensional structure and, therefore, functional homology. By definition, homologous proteins share secondary structure and common three-dimensional folds (Pearson, 2000). Because the degree of relatedness between homologs varies widely, the data need to be carefully evaluated in order to maximize their potential predictive value. The allergenicity assessment is used to identify known allergens or potentially cross-reactive proteins. While related (homologous) proteins may share 25% amino acid identity in a 200 amino acid overlap (Pearson, 2000), this is not generally sufficient to indicate IgE mediated cross-reactivity (Aalberse et al., 2001). Indeed, allergenic cross-reactivity caused by proteins is rare at 50% identity and typically requires >70% amino acid identity across

the full length of the protein sequences (Aalberse, 2000). A conservative approach is currently applied by which related protein sequences are identified as potentially cross-reactive if linear identity is 35% or greater in an 80 amino acid overlap (Thomas et al, 2005). Such levels of identity are readily detected using FASTA. Additionally, proteins closely related to gliadins or glutenins, the proteins that trigger celiac disease, can be easily identified using FASTA.

A second bioinformatics tool, an eight amino acid sliding window search, is used to specifically identify short linear polypeptide matches to known or suspected allergens. It is possible that proteins structurally unrelated to allergens, gliadins, and glutenins may still contain smaller immunologically significant epitopes. A query sequence may be considered allergenic if it has an exact sequence identity of at least eight contiguous amino acids with a potential allergen epitope (Metcalf et al., 1996; Hileman et al., 2002; Goodman et al., 2002). However, most allergen epitopes have not been confirmed and the amino acid length for those that have been identified can vary widely, thus the relevance of an exact match of eight amino acids may have limited immunological relevance (Thomas et al., 2005). The eight amino acid bioinformatic strategy is currently an *in silico* search that can produce matches containing significant uncertainty depending on the length of the query sequence (Silvanovich et al., 2006).

This report describes the bioinformatics assessment of putative polypeptides encoded at the soybean genomic DNA-inserted DNA 5' junction and the inserted DNA-soybean genomic DNA 3' junction of MON 87769. Inspection of the bioinformatic analysis data can be used to indicate whether the putative polypeptides have biologically relevant sequence similarity to known allergens, toxins, or other biologically active proteins.

### **3.0 Purpose**

The purpose of this study was to evaluate the amino acid sequences of putative polypeptides obtained from all reading frames that span the soybean genomic DNA inserted DNA T-DNA 5' junction and the T-DNA inserted DNA soybean genomic DNA 3' junction in MON 87769 to sequences in established databases. Sequences spanning these two junctions were translated from stop codon to stop codon in all reading frames. Structural relatedness between the putative polypeptides and known allergens, toxins, and biologically active proteins was assessed using the FASTA sequence alignment tool. Using each putative polypeptide as a query sequence that was eight amino acids or greater in length and that spanned the soybean genomic DNA-inserted DNA 5' junction and the inserted DNA-soybean genomic DNA 3' junction, FASTA searches were performed on allergen (AD8), toxin (TOXIN6), and public domain (PROTEIN) sequence databases. Immunologically relevant correlates were assessed using the pairwise comparison algorithm using the putative polypeptide as a query sequence to search against the AD8 database.

## 4.0 Methods

**4.1** *4.1 Sequence Database Preparation.* The allergen, gliadin, and glutenin sequence database (AD8) was assembled from sequences obtained from the FARRP allergen database<sup>1</sup> (FARRP, 2008). The protein sequences in the FARRP allergen database were assembled and evaluated for evidence of allergenicity by an international panel of allergy experts. Gene identification (GI) numbers for each of the 1,311 sequences found in the FARRP database were used to assemble a list, and this list was used to batch query the NCBI protein sequence database<sup>2</sup>. For obsolete GI numbers found using the batch search, the GenPept format flat file associated with each obsolete GI number was examined and an up-to-date GI number was used to replace the obsolete GI number. Due to the removal of obsolete GI numbers, collation of short peptide sequences into larger proteins, and removal of duplicates derived from the same species, a total of 1,250 GI numbers were found to be valid. These 1,250 GI numbers were used to assemble a searchable database AD8 (Appendix 1, release date; January 11, 2008).

GenBank protein database, release 163.0 (December 15, 2007), was downloaded from NCBI and formatted for use in these bioinformatic analyses and is referred to as the PROTEIN database.

The toxin database is a subset of 7176 sequences derived from the PROTEIN database that was selected using a keyword search and filtered to remove non-toxin proteins (TOXIN6 was assembled in April 2008). Initially all header lines and the associated protein sequence in PROTEIN database were screened using all possible combinations of upper and lower case characters spelling the words “toxic” and “toxin”. The resulting 9082 header lines and associated sequences were then filtered to exclude the following terms used in combination with “toxic” or “toxin” resulting in 7176 sequences; these terms were “synthetic”, “anti”, “putative”, “like”, “insect”, “Cry”, “Thuringiensis” and “toxin-reductase”.

**4.2** *Translation of Putative Polypeptides.* DNA sequence spanning the 5’ and 3’ junctions of the MON 87769 insertion site (Girault et al, 2008) was analyzed for translational stop codons (TGA, TAG, TAA). All six possible reading frames

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<sup>1</sup> located at <http://www.allergenonline.com>

<sup>2</sup> located at <http://www.ncbi.nlm.nih.gov/entrez/batchentrez.cgi>

originating or terminating within the MON 87769 insertion were translated using the standard genetic code from stop codon to stop codon.

- 4.3** *Sequence Database Searches.* FASTA analyses using the AD8, TOXIN6 and PROTEIN databases were performed on a desktop computer loaded with a SUSE LINUX version 10.1 operating system and FASTA version 3.4t26 July 7, 2006. The DNA sequence was contained in Girault et al. (2008) and translated to the amino acid sequence with DNASTar, version 7.2.1 (1), 410 (Appendices 2-10). Only those sequences of 8 amino acids or greater from stop codon to stop codon and that spanned the genomic DNA-insert DNA or insert DNA-genomic DNA junctions were considered for analysis. As a result of these selection criteria, one potential peptide was excluded from the analysis. Putative peptide 5\_2.pep was fewer than 8 amino acids in length. The structural similarity of the translated protein sequences to sequences in each database (AD8, TOXIN6, and PROTEIN) was assessed using the FASTA algorithm (Lipman and Pearson, 1985; Pearson and Lipman, 1988).

FASTA comparisons are initiated by aligning the first match of a specific wordsize. The alignment is then extended based on the chosen scoring matrix. Default FASTA comparison parameters for wordsize (*k-tuple*), gap creation penalty and gap extension penalty were used. The expectation threshold (*E-score*) limit was set to one. The *E-score* (expectation score) is a statistical measure of the likelihood that the observed similarity score could have occurred by chance in a search. A larger *E-score* indicates a lower degree of similarity between the query sequence and the sequence from the database. Typically, alignments between two sequences will need to have an *E-score* of less than  $1 \times 10^{-5}$  or smaller to be considered to have significant homology. FASTA comparisons were performed using the BLOSUM50 scoring matrix (Henikoff and Henikoff, 1992). Multiple alignments are made between the query sequence and each sequence in the database with a score calculated for each alignment. Only the top scoring alignment is extensively analyzed for each database sequence. The BLOSUM matrix series (Henikoff and Henikoff, 1992) was derived from a set of aligned, ungapped regions from protein families, called the BLOCKS database. Sequences from each block were clustered based on the percent of identical residues in the alignments (Henikoff and Henikoff, 1996). The BLOSUM50 matrix will identify blocks of conserved residues that are at least 50% identical. BLOSUM50 works well for identifying sequence similarities that include gaps, and thus recognizes distant evolutionary relationships (Pearson, 2000).

If two proteins share sufficient linear sequence similarity and identity, they will also share three-dimensional structure and, therefore, functional homology. By definition, homologous proteins share secondary structure and common three-

dimensional folds (Pearson, 2000). Because the degree of relatedness between homologs varies widely, the data need to be carefully evaluated in order to maximize their potential predictive value. The allergenicity assessment is used to identify known allergens or potentially cross-reactive proteins. While related (homologous) proteins may share 25% amino acid identity in a 200 amino acid overlap (Pearson, 2000), this is not generally sufficient to indicate IgE mediated cross-reactivity (Aalberse et al., 2001). Indeed, allergenic cross-reactivity caused by proteins is rare at 50% identity and typically requires >70% amino acid identity across the full length of the protein sequences (Aalberse, 2000). A conservative approach is currently applied by which related protein sequences are identified as potentially cross-reactive if linear identity is 35% or greater in an 80 amino acid overlap (Thomas et al, 2005). Such levels of identity are readily detected using FASTA. Additionally, proteins closely related to gliadins or glutenins, the proteins that trigger celiac disease, can be easily identified using FASTA.

In addition to the FASTA comparisons of each putative polypeptide to known allergens (to assess overall structural similarity), an eight amino acid sliding window search was performed. An algorithm was developed to identify whether or not a linearly contiguous match of eight amino acids existed between the query sequence and sequences within the allergen database (AD8). This program compares the query sequence to each protein sequence in the allergen database using a sliding-window of eight amino acids; that is, with a seven amino acid overlap relative to the preceding window. While there have been recommendations for using a shorter scanning window (Gendel, 1998; Kleter and Peijnenburg, 2002), only a few studies have actually investigated the ability of six, seven, or eight amino acid search windows to identify allergens (Hileman et al., 2002; Goodman et al., 2002; Stadler and Stadler, 2003). In these studies, randomly or specifically selected protein sequences were used as query sequences in FASTA and six, seven, and eight amino acid window searches against allergen databases. The results demonstrated that searches with six and seven amino acid windows led to high rates of false positive matches between non-allergenic query sequences and allergen database sequences. Additionally, searches with a six or seven amino acid window identified apparently random matches between totally unrelated proteins, such that the matched proteins were not likely to share any structural or sequence similarities that could act as cross-reactive epitopes. These studies concluded that six or seven amino acid sliding-window searches yielded such a high rate of false positive hits that they were of no predictive value. Furthermore, Silvanovich et al. (2006) recently demonstrated the lack of value of six or seven amino acid sliding-window searches in a comprehensive analysis of short peptide match frequencies by analyzing the match frequencies of peptides derived from ~1.95 million published protein sequences. In order to provide the best predictive capability to identify potentially cross-reactive proteins, a window of eight contiguous amino

acids is used to represent the smallest immunologically significant sequential, or linear IgE binding epitope (Metcalf et al., 1996).

- 4.4** *Significance of the Alignment.* An  $E$ -score of  $1 \times 10^{-5}$  was set as an initial high cut-off value for alignment significance. Although all alignments were inspected visually, any aligned sequence that yielded an  $E$ -score less than  $1 \times 10^{-5}$  was analyzed further to determine if such an alignment represented significant sequence homology.

## **5.0 Results and Discussion**

Bioinformatics analyses were performed on putative polypeptides deduced from DNA sequence spanning the 5' and 3' T-DNA inserted DNA genomic DNA junctions of MON 87769 to assess the potential for similarity towards known allergens, toxins, or other biologically active proteins. DNA sequence flanking the 5' (Figure 1) and 3' (Figure 2) junctions of the insertion site in MON 87769 (Girault et al., 2008) were translated from stop codon to stop codon in all possible reading frames. Polypeptide sequence from each reading frame was then inspected to confirm that the sequence was both encoded by DNA spanning the T-DNA inserted DNA genomic DNA junctions and was greater than or equal to eight amino acids in length. At the 5' flank, five deduced putative polypeptides spanned the genomic DNA inserted DNA T-DNA junction, while at the 3' flank, six putative polypeptides spanned the inserted DNA-genomic DNA junction (see Figure 3 and Table 1). Each putative polypeptide was designated as 5 or 3 (representing the 5' or 3' end, respectively), separated with an underscore by a numerical value 1 to 6 representing the respective reading frame (see Figures 1 and 2 for reading frame assignment). The putative polypeptide 5\_2.pep was not analyzed because it did not meet the aforementioned criteria. Supporting dataset output files for each putative 5' polypeptide are contained in Appendices 2-6, while dataset output files for each putative 3' polypeptide are contained in Appendices 7-12.

- 5.1** *Assessment of Potential Allergenicity:* The results of the allergenicity assessment are shown in Tables 2 and 5. Potential allergenicity of the eleven putative polypeptides was assessed using the FASTA and eight amino acid sliding window search algorithms. Using the FASTA algorithm to search the AD8 database, no alignments with any of the eleven query sequences generated an  $E$ -score of less than  $1 \times 10^{-5}$ . Likewise, no alignment met or exceeded the Codex Alimentarius (2003) FASTA alignment threshold for potential allergenicity of 35% identity over 80 amino acids. Finally, no alignments of eight or more consecutive identical amino acids with were found between any query sequence and the AD8 database.

As a result, these eleven putative polypeptides are unlikely to contain any cross-reactive IgE binding epitopes with known allergens.

- 5.2** *Assessment of Potential Toxicity:* The results of the toxicity assessment are shown in Tables 3 and 6. Potential toxicity of the eleven putative polypeptides was assessed using the FASTA algorithm. Using the FASTA algorithm to search the TOXIN6 database, no alignments with any of the eleven query sequences generated an *E*-score of less than  $1 \times 10^{-5}$ .
- 5.3** *Assessment of Potential Adverse Biological Activity:* The results of this assessment are shown in Tables 4 and 7. Potential untoward biological activity of the eleven putative polypeptides was assessed using the FASTA algorithm. Using the FASTA algorithm to search the PROTEIN database, no alignments with any of the eleven query sequences generated an *E*-score of less than  $1 \times 10^{-5}$ .

## **6.0 Conclusions**

Analyses of putative polypeptides encoded by DNA spanning the 5' and 3' junctions of the MON 87769 inserted DNA were performed using bioinformatic tools. Results of the FASTA sequence alignments demonstrated a lack of structurally relevant similarity between any known allergenic, toxic, or biologically active proteins and the eleven putative polypeptides. Moreover, results from eight amino acid sliding window search demonstrated the lack of potential immunologically relevant sequence matches between any of the putative polypeptides and the AD8 database. The results of these bioinformatic analyses demonstrate that even in the highly unlikely event that any of the junction polypeptides were translated, they would not share a sufficient degree of sequence similarity with other proteins to indicate that they would be potentially allergenic, toxic, or have other safety implications.

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## **[CBI Cross Reference Number 1]**

Deleted Figures 1, 2 and 3 and Table 1

Deleted pages 21 – 24 are found in the Confidential Attachment, pages 4 – 7.

**Table 2.** Summary of alignments for the eight amino acid sliding window and FASTA searches of the allergen sequence database (AD8) using putative polypeptide sequences encoded by the genomic DNA inserted DNA T-DNA 5' junction in MON 87769.

| Appendix | Polypeptide | AD8 Sequence Database |              |       |                           |         |            |            |
|----------|-------------|-----------------------|--------------|-------|---------------------------|---------|------------|------------|
|          |             | Sliding window        | FASTA search |       |                           |         |            |            |
|          |             | # Hits                | # Hits       | GI #  | Description               | E score | % Identity | aa Overlap |
| 2        | 5_1.pep     | No                    | 0            | -     | -                         | -       | -          | -          |
| 3        | 5_3.pep     | No                    | 0            | -     | -                         | -       | -          | -          |
| 4        | 5_4.pep     | No                    | 0            | -     | -                         | -       | -          | -          |
| 5        | 5_5.pep     | No                    | 0            | -     | -                         | -       | -          | -          |
| 6        | 5_6.pep     | No                    | 1            | 21930 | LMW glutenin [Triticum tu | 0.76    | 44.444%    | 18         |

**Table 3.** Summary of alignments for the FASTA searches of the toxin sequence database (TOXIN6) using putative polypeptide sequences encoded by the genomic DNA inserted DNA T-DNA 5' junction in MON 87769.

| Appendix | Polypeptide | FASTA search of TOXIN6 Sequence Database |      |             |         |            |            |
|----------|-------------|--|------|-------------|---------|------------|------------|
|          |             | # Hits                                   | GI # | Description | E score | % Identity | aa Overlap |
| 2        | 5_1.pep     | 0  | -    | -           | -       | -          | -          |
| 3        | 5_3.pep     | 0  | -    | -           | -       | -          | -          |
| 4        | 5_4.pep     | 0  | -    | -           | -       | -          | -          |
| 5        | 5_5.pep     | 0  | -    | -           | -       | -          | -          |
| 6        | 5_6.pep     | 0  | -    | -           | -       | -          | -          |

**Table 4.** Summary of alignments for the FASTA searches of the PROTEIN database using putative polypeptide sequences encoded by the genomic DNA inserted DNA T-DNA 5' junction in MON 87769.

| Appendix | Polypeptide | FASTA search of PROTEIN Sequence Database |      |             |         |            |            |
|----------|-------------|---|------|-------------|---------|------------|------------|
|          |             | # Hits                                    | GI # | Description | E score | % Identity | aa Overlap |
| 2        | 5_1.pep     | 0   | -    | -           | -       | -          | -          |
| 3        | 5_3.pep     | 0   | -    | -           | -       | -          | -          |
| 4        | 5_4.pep     | 0   | -    | -           | -       | -          | -          |
| 5        | 5_5.pep     | 0   | -    | -           | -       | -          | -          |
| 6        | 5_6.pep     | 0   | -    | -           | -       | -          | -          |

**Table 5.** Summary of alignments for the eight amino acid sliding window and FASTA searches of the allergen sequence database (AD8) using putative polypeptide sequences encoded by the T-DNA inserted DNA genomic DNA 3' junction in MON 87769.

| Appendix | Polypeptide | AD8 Sequence Database |        |              |                               |         |            |            |
|----------|-------------|-----------------------|--------|--------------|-------------------------------|---------|------------|------------|
|          |             | Sliding window        |        | FASTA search |                               |         |            |            |
|          |             | # Hits                | # Hits | GI #         | Description                   | E score | % Identity | aa Overlap |
| 7        | 3_1.pep     | No                    | 0      | -            | -                             | -       | -          | -          |
| 8        | 3_2.pep     | No                    | 0      | -            | -                             | -       | -          | -          |
| 9        | 3_3.pep     | No                    | 0      | -            | -                             | -       | -          | -          |
| 10       | 3_4.pep     | No                    | 0      | -            | -                             | -       | -          | -          |
| 11       | 3_5.pep     | No                    | 2      | 256429       | Kunitz trypsin inhibitor; KTi | 0.52    | 31.915%    | 47         |
| 12       | 3_6.pep     | No                    | 14     | 24898906     | allergen Cry j 2 [Cryp        | 0.33    | 53.846%    | 13         |

**Table 6.** Summary of alignments for the FASTA searches of the toxin sequence database (TOXIN6) using putative polypeptide sequences encoded by the inserted T-DNA inserted DNA genomic DNA 3' junction in MON 87769.

| Appendix | Polypeptide | TOXIN6 Sequence Database |           |                       |         |            |            |
|----------|-------------|--------------------------|-----------|-----------------------|---------|------------|------------|
|          |             | # Hits                   | GI #      | Description           | E score | % Identity | aa Overlap |
| 7        | 3_1.pep     | 0                        | -         | -                     | -       | -          | -          |
| 8        | 3_2.pep     | 0                        | -         | -                     | -       | -          | -          |
| 9        | 3_3.pep     | 0                        | -         | -                     | -       | -          | -          |
| 10       | 3_4.pep     | 0                        | -         | -                     | -       | -          | -          |
| 11       | 3_5.pep     | 2                        | 158635887 | cytotoxic polypeptide | 0.47    | 31.250%    | 48         |
| 12       | 3_6.pep     | 0                        | -         | -                     | -       | -          | -          |

**Table 7.** Summary of alignments for the FASTA searches of the PROTEIN database using putative polypeptide sequences encoded by the inserted T-DNA inserted DNA genomic DNA 3' junction in MON 87769.

| Appendix | Polypeptide | PROTEIN Sequence Database |      |             |         |            |            |
|----------|-------------|---------------------------|------|-------------|---------|------------|------------|
|          |             | # Hits                    | GI # | Description | E score | % Identity | aa Overlap |
| 7        | 3_1.pep     | 0                         | -    | -           | -       | -          | -          |
| 8        | 3_2.pep     | 0                         | -    | -           | -       | -          | -          |
| 9        | 3_3.pep     | 0                         | -    | -           | -       | -          | -          |
| 10       | 3_4.pep     | 0                         | -    | -           | -       | -          | -          |
| 11       | 3_5.pep     | 0                         | -    | -           | -       | -          | -          |
| 12       | 3_6.pep     | 0                         | -    | -           | -       | -          | -          |

## Appendix 1 (AD8 Database Sequence Names)

### Aeroallergens Animals

| Species                 | Comments  | GI #      | AA  |
|-------------------------|---|-----------|-----|
| Canis lupus familiaris  | precursor Can f II [Canis familiaris].                              | 29292272  | 177 |
| Canis lupus familiaris  | precursor Can f II [Canis familiaris].                              | 29292274  | 179 |
| Canis lupus familiaris  | Major allergen Can f 1 precursor (Allergen Dog 1).                  | 3121745   | 174 |
| Canis lupus familiaris  | Minor allergen Can f 2 precursor (Allergen Dog 2).                  | 3121746   | 180 |
| Canis lupus familiaris  | albumin [Canis familiaris].   | 3319897   | 585 |
| Canis lupus familiaris  | albumin [Canis familiaris].   | 633938    | 265 |
| Canis lupus familiaris  | albumin [Canis familiaris].   | 6687188   | 608 |
| Cavia porcellus         | Major allergen Cav p 2.   | 32363133  | 15  |
| Cavia porcellus         | Major urinary protein (MUP) (Allergen Cav p 1).                     | 32469617  | 15  |
| Felis catus             | Major allergen I polypeptide chain 1 precursor (Allergen Fel d 1-A) | 1169665   | 92  |
| Felis catus             | fel d I chain 1 precursor with leader B [Felis catus].              | 1364212   | 88  |
| Felis catus             | fel d I chain 1 precursor with leader A [Felis catus].              | 1364213   | 92  |
| Felis catus             | major allergen I.   | 163825    | 92  |
| Felis catus             | major allergen I.   | 163827    | 88  |
| Felis catus             | cystatin [Felis catus].   | 17939981  | 98  |
| Felis catus             | Major allergen I polypeptide chain 2 precursor (Allergen Fel d 1-B) | 232086    | 109 |
| Felis catus             | fel d I chain 2 precursor [Felis catus].                            | 395407    | 107 |
| Felis catus             | Fel d 4 allergen [Felis catus].                                     | 45775300  | 186 |
| Felis catus             | albumin precursor [Felis catus].                                    | 886485    | 608 |
| Mus musculus            | Major urinary protein 6 precursor (MUP 6) (Alpha-2U-globulin)       | 20178291  | 180 |
| Rattus norvegicus       | PREDICTED: similar to Major urinary protein precursor (MUP)         | 109474987 | 181 |
| Rattus norvegicus       | Major urinary protein precursor (MUP) (Alpha-2u-globulin)           | 127533    | 181 |
| Rattus norvegicus       | Alpha-2u globulin.  | 81890324  | 181 |
| Thaumetopoea pityocampa | Tha p 1.  | 74798355  | 18  |

### Aeroallergens Fungi

| Species               | Comments  | GI #     | AA  |
|-----------------------|---|----------|-----|
| Alternaria alternata  | 60S acidic ribosomal protein P1 (Allergen Alt a 12) (Alt a XII).  | 1350779  | 110 |
| Alternaria alternata  | Enolase (2-phosphoglycerate dehydratase) (2-phospho-D-glycerate   | 14423684 | 438 |
| Alternaria alternata  | Heat shock 70 kDa protein (Allergen Alt a 3).                     | 14423730 | 152 |
| Alternaria alternata  | major allergen Alt a 1 subunit [Alternaria alternata].            | 1842045  | 157 |
| Alternaria alternata  | ribosomal P2 phosphoprotein [Alternaria alternata].               | 1850540  | 113 |
| Alternaria alternata  | putative nuclear transport factor 2 [Alternaria alternata].       | 21748153 | 124 |
| Alternaria alternata  | major allergen alt a1 [Alternaria alternata].                     | 21913174 | 115 |
| Alternaria alternata  | glutathione-S-transferase [Alternaria alternata].                 | 41057621 | 231 |
| Alternaria alternata  | major allergen Alt a 1 subunit [Alternaria alternata].            | 45680856 | 157 |
| Alternaria alternata  | minor allergen, ribosomal protein [Alternaria alternata].         | 467617   | 113 |
| Alternaria alternata  | minor allergen [Alternaria alternata].                            | 467619   | 204 |
| Alternaria alternata  | aldehyde dehydrogenase (NAD+) [Alternaria alternata].             | 76666767 | 497 |
| Alternaria alternata  | Protein disulfide-isomerase (PDI) (Allergen Alt a 4).             | 85701160 | 436 |
| Arthroderma benhamiae | tri m 4 allergen [Arthroderma benhamiae].                         | 23894232 | 726 |
| Arthroderma benhamiae | tri m 2 allergen [Arthroderma benhamiae].                         | 23894240 | 292 |
| Arthroderma benhamiae | tri m 2 allergen [Arthroderma benhamiae].                         | 23894244 | 404 |
| Aspergillus oryzae    | Oryzin precursor (Alkaline proteinase) (ALP) (Aspergillus         | 129235   | 403 |
| Aspergillus fumigatus | enolase [Aspergillus fumigatus].                                  | 13925873 | 438 |
| Aspergillus fumigatus | manganese superoxide dismutase [Aspergillus fumigatus].           | 1648970  | 221 |
| Aspergillus fumigatus | large subunit ribosomal protein L3 [Aspergillus fumigatus].       | 21215170 | 392 |
| Aspergillus fumigatus | cellular serine proteinase [Aspergillus fumigatus].               | 2143220  | 495 |
| Aspergillus niger     | xylosidase [Aspergillus niger].                                   | 2181180  | 804 |
| Aspergillus fumigatus | rAsp f 9 [Aspergillus fumigatus].                                 | 2879890  | 302 |
| Aspergillus niger     | serine protease.  | 289172   | 533 |
| Aspergillus fumigatus | rAsp f 4 [Aspergillus fumigatus].                                 | 3005839  | 286 |
| Aspergillus fumigatus | Aspf1 allergen [Aspergillus fumigatus].                           | 3021324  | 125 |
| Aspergillus fumigatus | allergen [Aspergillus fumigatus].                                 | 3643813  | 427 |
| Aspergillus niger     | beta-xylosidase [Aspergillus niger].                              | 4235093  | 804 |
| Aspergillus fumigatus | PP1ase [Aspergillus fumigatus].                                   | 5019414  | 178 |
| Aspergillus fumigatus | Ribonuclease mitogillin precursor (Major allergen Asp f 1) (Asp f | 54039254 | 176 |

|                             |   |           |     |
|-----------------------------|---|-----------|-----|
| Aspergillus fumigatus       | Asp FII [Aspergillus fumigatus].                                    | 664852    | 250 |
| Aspergillus fumigatus Af293 | allergen Asp F3 [Aspergillus fumigatus Af293].                      | 66845476  | 168 |
| Aspergillus fumigatus Af293 | major allergen Asp F2 [Aspergillus fumigatus Af293].                | 66849502  | 304 |
| Aspergillus fumigatus       | rAsp f 8 [Aspergillus fumigatus].                                   | 6686524   | 111 |
| Aspergillus flavus          | Allergen Asp fl 1.  | 74665726  | 403 |
| Aspergillus fumigatus       | Enolase (2-phosphoglycerate dehydratase) (2-phospho-D-glycerate     | 83288046  | 438 |
| Aspergillus fumigatus       | Major allergen Asp f 2 precursor (Asp f II).                        | 83300352  | 310 |
| Aspergillus fumigatus       | Allergen Asp f 4 precursor.   | 83300369  | 322 |
| Aspergillus fumigatus       | Allergen Asp f 7 precursor.   | 83300389  | 270 |
| Aspergillus fumigatus       | Heat shock protein 90 (Heat shock protein hsp1) (65 kDa IgE-binding | 83303658  | 706 |
| Aspergillus fumigatus       | 60S ribosomal protein L3 (Allergen Asp f 23).                       | 83305621  | 392 |
| Aspergillus fumigatus       | 60S acidic ribosomal protein P2 (Allergen Asp f 8) (AfP2).          | 83305635  | 111 |
| Aspergillus fumigatus       | Superoxide dismutase [Mn], mitochondrial precursor (Allergen Asp f  | 83305645  | 210 |
| Aspergillus fumigatus       | Probable glycosidase crf1 precursor (Crh-like protein 1) (Allergen  | 85540942  | 395 |
| Aspergillus fumigatus       | major allergen I 18kDa antigen [Aspergillus fumigatus].             | 9280360   | 150 |
| Aspergillus oryzae          | Alpha-amylase A type-1/2 precursor (Taka-amylase A) (TAA)           | 94706935  | 499 |
| Aspergillus fumigatus       | aspergillopepsin i [Aspergillus fumigatus].                         | 963013    | 395 |
| Candida albicans            | Enolase 1 (2-phosphoglycerate dehydratase) (2-phospho-D-glycerate   | 232054    | 440 |
| Candida albicans            | 29 kDa IgE-binding protein [Candida albicans].                      | 37548637  | 236 |
| Cochliobolus lunatus        | enolase [Curvularia lunata].  | 14585753  | 440 |
| Coprinus comatus            | Cop c1 allergen [Coprinus comatus].                                 | 4538529   | 81  |
| Davidiella tassiana         | Minor allergen Cla h 7 (Cla h 5) (Cla h V).                         | 1168970   | 204 |
| Davidiella tassiana         | 60S acidic ribosomal protein P2 (Allergen Cla h 3) (Cla h III).     | 1173074   | 111 |
| Davidiella tassiana         | 60S acidic ribosomal protein P2 (Minor allergen Cla h 4) (Cla h     | 21542440  | 111 |
| Davidiella tassiana         | putative nuclear transport factor 2 [Davidiella tassiana].          | 21748151  | 125 |
| Davidiella tassiana         | hydrophobin [Davidiella tassiana].                                  | 22796153  | 105 |
| Davidiella tassiana         | enolase; phosphopyruvate hydratase [Davidiella tassiana].           | 467660    | 440 |
| Davidiella tassiana         | Enolase (2-phosphoglycerate dehydratase) (2-phospho-D-glycerate     | 6015094   | 440 |
| Davidiella tassiana         | Heat shock 70 kDa protein (Allergen Cla h 4) (Cla h IV).            | 729764    | 643 |
| Davidiella tassiana         | aldehyde dehydrogenase (NAD+) [Davidiella tassiana].                | 76666769  | 496 |
| Davidiella tassiana         | Probable NADP-dependent mannitol dehydrogenase (MtDH) (Mannitol     | 85701146  | 267 |
| Epicoccum nigrum            | Major allergen Epi p 1 (Epi n I4625*).                              | 24636820  | 18  |
| Fusarium culmorum           | thioredoxin-like protein [Fusarium culmorum].                       | 19879659  | 121 |
| Fusarium culmorum           | helix-loop-helix protein [Fusarium culmorum].                       | 25361513  | 450 |
| Gibberella zeae PH-1        | RLA2_ALTAL 60S acidic ribosomal protein P2 (Minor allergen Alt a 6) | 46122455  | 109 |
| Malassezia sympodialis      | Chain B, Cross-Reactivity And Crystal Structure Of Malassezia       | 119390336 | 121 |
| Malassezia furfur           | Major allergen Mal f 1 precursor (Pit o 1).                         | 13959403  | 350 |
| Malassezia sympodialis      | allergen [Malassezia sympodialis].                                  | 19069920  | 342 |
| Malassezia sympodialis      | manganese superoxide dismutase [Malassezia sympodialis].            | 28569698  | 237 |
| Malassezia furfur           | MF1 [Malassezia furfur].  | 3445490   | 177 |
| Malassezia furfur           | Putative peroxiredoxin (Thioredoxin reductase) (Allergen Mal f 3)   | 3914387   | 166 |
| Malassezia sympodialis      | allergen [Malassezia sympodialis].                                  | 4138171   | 172 |
| Malassezia sympodialis      | allergen [Malassezia sympodialis].                                  | 4138173   | 162 |
| Malassezia sympodialis      | allergen [Malassezia sympodialis].                                  | 4138175   | 187 |
| Malassezia furfur           | major allergenic protein Mal f4 [Malassezia furfur].                | 4587985   | 342 |
| Malassezia sympodialis      | allergen [Malassezia sympodialis].                                  | 7271239   | 179 |
| Malassezia sympodialis      | mala s 12 allergen precursor [Malassezia sympodialis].              | 78038796  | 618 |
| Penicillium oxalicum        | vacuolar serine protease [Penicillium oxalicum].                    | 12005497  | 503 |
| Penicillium citrinum        | vacuolar serine protease [Penicillium citrinum].                    | 12005501  | 358 |
| Penicillium citrinum        | enolase [Penicillium citrinum].                                     | 13991101  | 438 |
| Penicillium chrysogenum     | vacuolar serine protease [Penicillium chrysogenum].                 | 14215732  | 494 |
| Penicillium citrinum        | Heat shock 70 kDa protein (Allergen Pen c 19).                      | 14423733  | 503 |
| Penicillium chrysogenum     | alkaline serine protease [Penicillium chrysogenum].                 | 21069093  | 398 |
| Penicillium citrinum        | unknown [Penicillium citrinum].                                     | 38326693  | 228 |
| Penicillium citrinum        | Pen c 1; alkaline serine protease [Penicillium citrinum].           | 4587983   | 397 |
| Penicillium citrinum        | alkaline serine protease Pen c2 [Penicillium citrinum].             | 4588118   | 457 |
| Penicillium citrinum        | peroxisomal membrane protein [Penicillium citrinum].                | 5326864   | 167 |
| Penicillium brevicompactum  | 60S acidic ribosomal P1 phosphoprotein Pen b 26 [Penicillium        | 59894749  | 107 |
| Penicillium chrysogenum     | allergen Pen n 13 [Penicillium chrysogenum].                        | 6684758   | 397 |
| Penicillium chrysogenum     | allergen Pen n 18 [Penicillium chrysogenum].                        | 7963902   | 494 |
| Penicillium chrysogenum     | 68 kDa allergen [Penicillium chrysogenum].                          | 999009    | 117 |
| Rhodotorula mucilaginosa    | Enolase (2-phosphoglycerate dehydratase) (2-phospho-D-glycerate     | 37078092  | 439 |
| Rhodotorula mucilaginosa    | vacuolar serine protease [Rhodotorula mucilaginosa].                | 54654335  | 342 |

|                           |   |          |     |
|---------------------------|---|----------|-----|
| Scomber japonicus         | parvalbumin [Scomber japonicus].              | 29420793 | 109 |
| Trichophyton schoenleinii | tri s 4 allergen [Trichophyton schoenleinii]. | 23894227 | 726 |
| Trichophyton schoenleinii | tri m 2 allergen [Trichophyton schoenleinii]. | 23894260 | 405 |
| Trichophyton rubrum       | Tri r 4 allergen [Trichophyton rubrum].       | 5813788  | 726 |
| Trichophyton rubrum       | Tri r 2 allergen [Trichophyton rubrum].       | 5813790  | 412 |

## Aeroallergens Insects

| Species                | Comments  | GI #     | AA  |
|------------------------|---|----------|-----|
| Argas reflexus         | Arg r 1 precursor [Argas reflexus].                               | 58371884 | 159 |
| Blattella germanica    | allergen Bla g 4.   | 1166573  | 182 |
| Blattella germanica    | Aspartic protease Bla g 2 precursor (Allergen Bla g II).          | 1703445  | 352 |
| Blattella germanica    | major allergen Bla g 1.02 [Blattella germanica].                  | 4240395  | 492 |
| Blattella germanica    | major allergen Bla g 1.0101 [Blattella germanica].                | 4572592  | 412 |
| Blattella germanica    | 36 kda allergen {peptide 143-111} [Blattella germanica=German     | 544618   | 20  |
| Blattella germanica    | 36 kda allergen {peptide 143-115} [Blattella germanica=German     | 544619   | 25  |
| Blattella germanica    | Glutathione S-transferase (GST class-sigma) (Major allergen Bla g | 6225491  | 204 |
| Blattella germanica    | Chain A, The Structure Of Mutant (N93q) Of Bla G 2.               | 62738637 | 330 |
| Blattella germanica    | tropomyosin [Blattella germanica].                                | 8101069  | 284 |
| Lepisma saccharina     | tropomyosin [Lepisma saccharina].                                 | 20387027 | 284 |
| Lepisma saccharina     | tropomyosin [Lepisma saccharina].                                 | 20387029 | 243 |
| Periplaneta americana  | allergen [Periplaneta americana].                                 | 1531589  | 631 |
| Periplaneta americana  | allergen [Periplaneta americana].                                 | 1580792  | 685 |
| Periplaneta americana  | allergen [Periplaneta americana].                                 | 1580794  | 470 |
| Periplaneta americana  | allergen [Periplaneta americana].                                 | 1580797  | 393 |
| Periplaneta fuliginosa | tropomyosin [Periplaneta fuliginosa].                             | 19310971 | 284 |
| Periplaneta americana  | Cr-P11 allergen [Periplaneta americana].                          | 2231297  | 446 |
| Periplaneta americana  | Cr-P11 allergen [Periplaneta americana].                          | 2253610  | 274 |
| Periplaneta americana  | Cr-P11 [Periplaneta americana].                                   | 2580504  | 395 |
| Periplaneta americana  | allergen [Periplaneta americana].                                 | 2897849  | 228 |
| Periplaneta americana  | major allergen Per a 1.0105 [Periplaneta americana].              | 30144660 | 124 |
| Periplaneta americana  | major allergen Per a 1.0101 [Periplaneta americana].              | 4240399  | 231 |
| Periplaneta americana  | tropomyosin [Periplaneta americana].                              | 4378573  | 284 |
| Periplaneta americana  | tropomyosin [Periplaneta americana].                              | 4468639  | 284 |
| Plodia interpunctella  | arginine kinase [Plodia interpunctella].                          | 15886861 | 355 |
| Suidasia medanensis    | group 2 allergen Sui m 2 [Suidasia medanensis].                   | 45738062 | 141 |

## Aeroallergens Mites

| Species                  | Comments   | GI #      | AA  |
|--------------------------|--|-----------|-----|
| Acarus siro              | lipid binding protein [Acarus siro].                   | 4049356   | 64  |
| Blomia tropicalis        | Blo t 21 allergen [Blomia tropicalis].                 | 111120420 | 129 |
| Blomia tropicalis        | Blo t 21 allergen [Blomia tropicalis].                 | 111120424 | 129 |
| Blomia tropicalis        | Blo t 21 allergen [Blomia tropicalis].                 | 111120428 | 129 |
| Blomia tropicalis        | Blo t 21 allergen [Blomia tropicalis].                 | 111120432 | 129 |
| Blomia tropicalis        | Blo t 21 allergen [Blomia tropicalis].                 | 111494253 | 129 |
| Blomia tropicalis        | allergen [Blomia tropicalis].                          | 1377859   | 130 |
| Blomia tropicalis        | cysteine protease precursor [Blomia tropicalis].       | 14276828  | 221 |
| Blomia tropicalis        | paramyosin allergen [Blomia tropicalis].               | 21954740  | 875 |
| Blomia tropicalis        | trypsin [Blomia tropicalis].                           | 25989482  | 266 |
| Blomia tropicalis        | Blo t 1 allergen [Blomia tropicalis].                  | 33667928  | 333 |
| Blomia tropicalis        | Blo t 3 allergen [Blomia tropicalis].                  | 33667930  | 266 |
| Blomia tropicalis        | Blo t 13 allergen [Blomia tropicalis].                 | 37958153  | 130 |
| Blomia tropicalis        | major IgE-binding protein Blo t 5 [Blomia tropicalis]. | 4204917   | 134 |
| Chironomus thummi thummi | Globin CTT-III precursor (Erythrocrucorin III).        | 121219    | 151 |
| Chironomus thummi thummi | Globin CTT-IV precursor.                               | 121227    | 151 |
| Chironomus thummi thummi | Globin CTT-VIII.                                       | 121237    | 151 |
| Chironomus thummi thummi | Globin CTT-VIIB-3 precursor.                           | 121244    | 161 |
| Chironomus thummi thummi | Globin CTT-VIIB-6 precursor.                           | 121248    | 161 |
| Chironomus thummi thummi | Globin CTT-VIIB-7 precursor.                           | 121249    | 162 |
| Chironomus thummi thummi | Globin CTT-IIIA.                                       | 121256    | 151 |
| Chironomus thummi thummi | Globin CTT-X.  | 121259    | 151 |
| Chironomus thummi thummi | Globin CTT-II beta precursor.                          | 1707908   | 160 |

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| Chironomus thummi thummi       | Globin CTT-VI precursor.   | 2506461  | 162  |
| Chironomus thummi thummi       | Globin CTT-VIIB-4 precursor (Erythrocrurin).                       | 56405052 | 161  |
| Chironomus thummi thummi       | Globin CTT-VIIB-5/CTT-VIIB-9 precursor.                            | 56405054 | 161  |
| Chironomus kiiensis            | tropomyosin [Chironomus kiiensis].                                 | 7321108  | 285  |
| Dermatophagoides pteronyssinus | unnamed protein product [Dermatophagoides pteronyssinus].          | 10189811 | 215  |
| Dermatophagoides pteronyssinus | Der p 7 allergen polypeptide.                                      | 1045602  | 215  |
| Dermatophagoides microceras    | Peptidase 1 (Major mite fecal allergen Der m 1) (Allrgen Der m I). | 127205   | 30   |
| Dermatophagoides farinae       | Der f 3 mite allergen.   | 1314736  | 232  |
| Dermatophagoides pteronyssinus | Alpha-amylase (Allergen Der p 4) (Der p IV).                       | 1351935  | 19   |
| Dermatophagoides pteronyssinus | Mite group 2 allergen Der p 2 precursor (Der p II) (DPX).          | 1352237  | 146  |
| Dermatophagoides pteronyssinus | Mite allergen Der p 5 (Der p V) (IgE-binding allergen).            | 1352238  | 132  |
| Dermatophagoides pteronyssinus | Mite allergen Der p 6 (Der p VI) (DP5).                            | 1352239  | 20   |
| Dermatophagoides farinae       | Mag44 [Dermatophagoides farinae].                                  | 1359436  | 299  |
| Dermatophagoides farinae       | paramyosin-like allergen [Dermatophagoides farinae].               | 13785807 | 692  |
| Dermatophagoides farinae       | Mite allergen Der f 6 precursor (Der f VI) (DF5).                  | 14424450 | 279  |
| Dermatophagoides pteronyssinus | cysteine protease [Dermatophagoides pteronyssinus].                | 1460058  | 211  |
| Dermatophagoides farinae       | Mag3 [Dermatophagoides farinae].                                   | 1545803  | 349  |
| Dermatophagoides farinae       | major Der f 2 isoform [Dermatophagoides farinae].                  | 17978844 | 129  |
| Dermatophagoides pteronyssinus | group 14 allergen protein [Dermatophagoides pteronyssinus].        | 20385544 | 1662 |
| Dermatophagoides pteronyssinus | Chain A, X-Ray Structure Of Der P 2, The Major House Dust Mite     | 21465915 | 129  |
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| Dermatophagoides pteronyssinus | unnamed protein product [Dermatophagoides pteronyssinus].          | 21725560 | 222  |
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| Dermatophagoides pteronyssinus | unnamed protein product [Dermatophagoides pteronyssinus].          | 21725604 | 129  |
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| Dermatophagoides farinae       | Mite allergen Der f 3 precursor (Der f III).                       | 2507248  | 259  |
| Dermatophagoides farinae       | Der f 1 allergen preproenzyme [Dermatophagoides farinae].          | 27530349 | 321  |
| Dermatophagoides farinae       | 60 kDa allergen Der f 18p [Dermatophagoides farinae].              | 27550039 | 462  |
| Dermatophagoides pteronyssinus | unnamed protein product [Dermatophagoides pteronyssinus].          | 28798085 | 132  |
| Dermatophagoides pteronyssinus | HDM allergen [Dermatophagoides pteronyssinus].                     | 37778944 | 875  |
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| Dermatophagoides farinae       | DF5=allergen {N-terminal} [Dermatophagoides farinae=mites, Peptide | 404371   | 20   |
| Dermatophagoides pteronyssinus | alpha-amylase [Dermatophagoides pteronyssinus].                    | 5059162  | 496  |
| Dermatophagoides pteronyssinus | Der p 3 allergen.  | 511476   | 261  |
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| Dermatophagoides farinae       | mite allergen Der f 2 [Dermatophagoides farinae].                  | 55859466 | 146  |
| Dermatophagoides farinae       | Der f 2 [Dermatophagoides farinae].                                | 55859468 | 146  |

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| Dermatophagoides pteronyssinus | Der p 1 allergen [Dermatophagoides pteronyssinus].                  | 61608445 | 216 |
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| Dermatophagoides farinae       | Allergen Mag.   | 729979   | 341 |
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| Dermatophagoides pteronyssinus | Peptidase 1 precursor (Major mite fecal allergen Der p 1) (Allergen | 730036   | 320 |
| Dermatophagoides farinae       | Der f 1 allergen precursor [Dermatophagoides farinae].              | 76097507 | 276 |
| Dermatophagoides pteronyssinus | Der p 2 allergen precursor [Dermatophagoides pteronyssinus].        | 76097509 | 129 |
| Dermatophagoides farinae       | Der f 2 allergen precursor [Dermatophagoides farinae].              | 76097511 | 129 |
| Dermatophagoides pteronyssinus | tropomyosin [Dermatophagoides pteronyssinus].                       | 80553470 | 281 |
| Dermatophagoides pteronyssinus | major allergen p Dp 15 [Dermatophagoides pteronyssinus].            | 807138   | 219 |
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| Dermatophagoides siboney       | Der s 2 a allergen [Dermatophagoides siboney].                      | 86450747 | 146 |
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| Euroglyphus maynei             | Mite group 2 allergen Eur m 2 precursor.                            | 14423649 | 145 |
| Euroglyphus maynei             | group 2 allergen Eur m 2 102 [Euroglyphus maynei].                  | 3941386  | 135 |
| Glycyphagus domesticus         | Gly d 2.03 [Glycyphagus domesticus].                                | 33772588 | 141 |
| Glycyphagus domesticus         | Gly d 2 [Glycyphagus domesticus].                                   | 6179520  | 128 |
| Glycyphagus domesticus         | gly d 2.02 isoform [Glycyphagus domesticus].                        | 7160811  | 125 |
| Lepidoglyphus destructor       | Mite allergen Lep d 7 precursor.                                    | 14423650 | 216 |
| Lepidoglyphus destructor       | Mite allergen Lep d 5.  | 14423651 | 110 |
| Lepidoglyphus destructor       | Fatty acid-binding protein (Allergen Lep d 13).                     | 14423714 | 131 |
| Lepidoglyphus destructor       | Tropomyosin (Allergen Lep d 10).                                    | 14423956 | 284 |
| Lepidoglyphus destructor       | allergen Lep d 1.01.  | 1582222  | 141 |
| Lepidoglyphus destructor       | allergen Lep d 1.02.  | 1582223  | 141 |
| Lepidoglyphus destructor       | Lep D 2 precursor [Lepidoglyphus destructor].                       | 21213898 | 141 |
| Lepidoglyphus destructor       | Lep D 2 precursor [Lepidoglyphus destructor].                       | 21213900 | 141 |
| Lepidoglyphus destructor       | type 2 allergen Lep d 2.013 [Lepidoglyphus destructor].             | 34495274 | 141 |
| Lepidoglyphus destructor       | type 2 allergen Lep d 2.023 [Lepidoglyphus destructor].             | 34495278 | 141 |
| Lepidoglyphus destructor       | type 2 allergen Lep d 2.024 [Lepidoglyphus destructor].             | 34495280 | 140 |
| Lepidoglyphus destructor       | type 2 allergen Lep d 2.025 [Lepidoglyphus destructor].             | 34495282 | 141 |
| Lepidoglyphus destructor       | type 2 allergen Lep d 2.031 [Lepidoglyphus destructor].             | 34495284 | 141 |
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| Lepidoglyphus destructor       | type 2 allergen Lep d 5.02 [Lepidoglyphus destructor].              | 34495292 | 171 |
| Lepidoglyphus destructor       | type 2 allergen Lep d 5.04 [Lepidoglyphus destructor].              | 34495294 | 169 |
| Lepidoglyphus destructor       | Lep D 2 allergen [Lepidoglyphus destructor].                        | 999462   | 141 |
| Tyrophagus putrescentiae       | group 2 allergen [Tyrophagus putrescentiae].                        | 2182106  | 141 |
| Tyrophagus putrescentiae       | fatty acid-biding protein [Tyrophagus putrescentiae].               | 51860756 | 131 |

## Aeroallergens Pollen

| Species                 | Comments   | GI #     | AA  |
|-------------------------|--|----------|-----|
| Agrostis alba           | pollen allergen Agr a I - bent grass (fragment).                   | 320606   | 26  |
| Agrostis alba           | Group I allergen Agr a I (Form 2), pollen.                         | 75139987 | 35  |
| Agrostis alba           | Group I allergen Agr a I (Form 1), pollen.                         | 75139989 | 35  |
| Alnus glutinosa         | Aln g I [Alnus glutinosa].   | 261407   | 160 |
| Alnus glutinosa         | pollen allergen Aln g 4 [Alnus glutinosa].                         | 3319651  | 85  |
| Ambrosia artemisiifolia | Pollen allergen Amb a 1.1 precursor (Antigen E) (AgE) (Antigen Amb | 113475   | 396 |
| Ambrosia artemisiifolia | Pollen allergen Amb a 1.2 precursor (Antigen E) (Antigen Amb a I)  | 113476   | 398 |
| Ambrosia artemisiifolia | Pollen allergen Amb a 1.3 precursor (Antigen E) (Antigen Amb a I). | 113477   | 397 |
| Ambrosia artemisiifolia | Pollen allergen Amb a 1.4 precursor (Antigen E) (Antigen Amb a I). | 113478   | 392 |
| Ambrosia artemisiifolia | Pollen allergen Amb a 2 precursor (Antigen K) (Antigen Amb a II).  | 113479   | 397 |
| Ambrosia elatior        | Pollen allergen Amb a 5 (Amb a V) (Allergen Ra5).                  | 114090   | 45  |
| Ambrosia trifida        | Pollen allergen Amb t 5 precursor (Amb t V) (Allergen Ra5G).       | 114091   | 73  |
| Ambrosia artemisiifolia | Non-specific lipid-transfer protein precursor (LTP) (Pollen        | 14285595 | 118 |
| Ambrosia artemisiifolia | antigen E.   | 166443   | 397 |
| Ambrosia artemisiifolia | profilin-like protein [Ambrosia artemisiifolia].                   | 34851178 | 131 |

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| Ambrosia artemisiifolia          | profilin-like protein [Ambrosia artemisiifolia].                  | 34851180  | 131 |
| Ambrosia artemisiifolia          | profilin-like protein [Ambrosia artemisiifolia].                  | 34851182  | 133 |
| Ambrosia elatior                 | Pollen allergen Amb a 3 (Amb a III) (Allergen Ra3).               | 416636    | 101 |
| Ambrosia psilostachya            | Amb p V allergen.   | 515953    | 77  |
| Ambrosia psilostachya            | Amb p V allergen.   | 515954    | 77  |
| Ambrosia psilostachya            | Amb p V allergen.   | 515955    | 77  |
| Ambrosia psilostachya            | Amb p V allergen.   | 515956    | 77  |
| Ambrosia psilostachya            | Amb p V allergen.   | 515957    | 77  |
| Ambrosia artemisiifolia          | profilin isoallergen 1 [Ambrosia artemisiifolia].                 | 62249502  | 133 |
| Ambrosia artemisiifolia          | profilin isoallergen 2 [Ambrosia artemisiifolia].                 | 62249512  | 133 |
| Anthoxanthum odoratum            | pollen allergen Ant o I - sweet vernal grass (fragment).          | 320607    | 26  |
| Anthoxanthum odoratum            | Group I allergen Ant o I (Form 1), pollen.                        | 75139986  | 32  |
| Anthoxanthum odoratum            | Group I allergen Ant o I (Form 2), pollen.                        | 75139990  | 32  |
| Artemisia vulgaris               | major pollen allergen Art v 1 precursor [Artemisia vulgaris].     | 27818335  | 132 |
| Artemisia vulgaris               | Amb a 1-like protein [Artemisia vulgaris].                        | 62530263  | 396 |
| Artemisia vulgaris               | Non-specific lipid-transfer protein (LTP) (Pollen allergen Art v  | 73621307  | 37  |
| Artemisia vulgaris               | Profilin-1 (Pollen allergen Art v 4.01).                          | 73621415  | 133 |
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| Artemisia vulgaris               | Allergen Art v 2 (Art v II) (Allergen Ag7).                       | 73622184  | 71  |
| Betula pendula                   | allergenic isoflavone reductase-like protein Bet v 6.0102 [Betula | 10764491  | 308 |
| Betula pendula                   | Major pollen allergen Bet v 1-A (Allergen Bet v I-A).             | 114922    | 160 |
| Betula pendula                   | Chain A, Birch Pollen Allergen Bet V 1 Mutant N28t, K32q, E45s,   | 11514622  | 159 |
| Betula pendula                   | Calcium-binding allergen Bet v 3 (Allergen Bet v III).            | 1168696   | 205 |
| Betula pendula                   | Major pollen allergen Bet v 1-B (Allergen Bet v I-B).             | 1168701   | 160 |
| Betula pendula                   | Major pollen allergen Bet v 1-C (Allergen Bet v I-C).             | 1168702   | 160 |
| Betula pendula                   | Major pollen allergen Bet v 1-D/H (Allergen Bet v I-D/H).         | 1168703   | 160 |
| Betula pendula                   | Major pollen allergen Bet v 1-E (Allergen Bet v I-E).             | 1168704   | 160 |
| Betula pendula                   | Major pollen allergen Bet v 1-F/I (Allergen Bet v I-F/I).         | 1168705   | 160 |
| Betula pendula                   | Major pollen allergen Bet v 1-G (Allergen Bet v I-G).             | 1168706   | 160 |
| Betula pendula                   | Major pollen allergen Bet v 1-J (Allergen Bet v I-J).             | 1168707   | 160 |
| Betula pendula                   | Major pollen allergen Bet v 1-K (Allergen Bet v I-K).             | 1168708   | 160 |
| Betula pendula                   | Major pollen allergen Bet v 1-L (Allergen Bet v I-L).             | 1168709   | 160 |
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| Betula platyphylla var. japonica | Bet vI jap2 [Betula platyphylla var. japonica].                   | 12583683  | 160 |
| Betula platyphylla var. japonica | Bet vI jap3 [Betula platyphylla var. japonica].                   | 12583685  | 160 |
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| Betula pendula                   | major allergen Bet v 1 [Betula pendula].                          | 1321716   | 160 |
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| Betula                           | isoallergen {N-terminal} [birch, pollen, Peptide Partial, 51 aa]. | 298736    | 51  |
| Betula                           | isoallergen {N-terminal} [birch, pollen, Peptide Partial, 51 aa]. | 298737    | 51  |

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| Betula pendula       | Chain A, Birch Pollen Allergen Bet V 1 Mutant E45s.                 | 38492423  | 159 |
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| Betula pendula       | pollen allergen Betv1, isoform at14 [Betula pendula].               | 4006947   | 120 |
| Betula pendula       | pollen allergen Betv1, isoform at37 [Betula pendula].               | 4006953   | 160 |
| Betula pendula       | pollen allergen Betv1, isoform at42 [Betula pendula].               | 4006955   | 160 |
| Betula pendula       | pollen allergen Betv1, isoform at45 [Betula pendula].               | 4006957   | 160 |
| Betula pendula       | pollen allergen Betv1, isoform at50 [Betula pendula].               | 4006959   | 160 |
| Betula pendula       | pollen allergen Betv1, isoform at59 [Betula pendula].               | 4006961   | 160 |
| Betula pendula       | pollen allergen Betv1, isoform at87 [Betula pendula].               | 4006963   | 120 |
| Betula pendula       | pollen allergen Betv1, isoform at5 [Betula pendula].                | 4006965   | 160 |
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| Carpinus betulus     | pollen allergen Car b 1 [Carpinus betulus].                         | 1545877   | 160 |
| Carpinus betulus     | pollen allergen Car b 1 [Carpinus betulus].                         | 1545879   | 160 |
| Carpinus betulus     | pollen allergen Car b 1 [Carpinus betulus].                         | 1545887   | 160 |
| Carpinus betulus     | pollen allergen Car b 1 [Carpinus betulus].                         | 1545891   | 160 |
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| Poa pratensis         | group I pollen allergen [Poa pratensis].                          | 4090265  | 263 |
| Poa pratensis         | pollen allergen (clone 7.2) - Kentucky bluegrass (fragment).      | 539056   | 131 |
| Quercus alba          | major pollen allergen Que a I - white oak (fragment).             | 543675   | 24  |
| Salsola kali          | Pollen allergen Sal k 1.  | 25090947 | 42  |
| Salsola kali          | pectin-methyltransferase precursor [Salsola kali].                | 51242679 | 362 |
| Salsola kali          | pectin methylesterase allergenic protein [Salsola kali].          | 59895728 | 339 |
| Salsola kali          | pectin methylesterase allergenic protein [Salsola kali].          | 59895730 | 339 |
| Syringa vulgaris      | allergen-like protein Syr v I isoform 1 - Syringa vulgaris.       | 631911   | 145 |
| Syringa vulgaris      | allergen-like protein Syr v I isoform 2 - Syringa vulgaris.       | 631912   | 145 |
| Syringa vulgaris      | allergen-like protein Syr v I isoform 3 - Syringa vulgaris.       | 631913   | 145 |

## Food Allergens Animals

| Species                 | Comments  | GI #      | AA  |
|-------------------------|---|-----------|-----|
| Batillus cornutus       | Tropomyosin (Major allergen Tur c 1).                               | 47117349  | 146 |
| Bos taurus              | kappa-casein [Bos taurus].  | 1228078   | 190 |
| Bos taurus              | alpha-lactalbumin precursor (EC 2.4.1.22).                          | 162644    | 142 |
| Bos taurus              | albumin [Bos taurus].   | 162648    | 607 |
| Bos taurus              | alpha-s1-casein.  | 162650    | 93  |
| Bos taurus              | beta-lactoglobulin.   | 162748    | 151 |
| Bos taurus              | beta-lactoglobulin.   | 162750    | 14  |
| Bos taurus              | alpha-s1-casein precursor.  | 162792    | 214 |
| Bos taurus              | alpha-S1-casein.  | 162794    | 214 |
| Bos taurus              | beta-casein precursor.  | 162797    | 224 |
| Bos taurus              | beta-casein.  | 162805    | 224 |
| Bos taurus              | kappa-casein precursor.   | 162811    | 190 |
| Bos taurus              | alpha-s1-casein.  | 162927    | 76  |
| Bos taurus              | alpha-s2-like casein precursor.                                     | 162929    | 222 |
| Bos taurus              | beta-casein precursor.  | 162931    | 224 |
| Bos taurus              | Protein S100-A7 (S100 calcium-binding protein A7) (Allergen Bos d   | 2493414   | 101 |
| Bos taurus              | alpha-lactalbumin [Bos taurus].                                     | 295774    | 142 |
| Bos taurus              | lactotransferrin [Bos taurus].                                      | 30794292  | 708 |
| Bos taurus              | bovine serum albumin [Bos taurus].                                  | 3336842   | 607 |
| Bos taurus              | beta-casein A3 [Bos taurus].  | 459292    | 224 |
| Bos taurus              | beta-lactoglobulin [Bos taurus].                                    | 520       | 178 |
| Bos taurus              | beta-lactoglobulin variant B precursor [Bos taurus].                | 669061    | 178 |
| Bos taurus              | major allergen BDA20 [Bos taurus].                                  | 886215    | 172 |
| Charybdis feriatus      | heat stable allergen tropomyosin [Charybdis feriatus].              | 7024506   | 264 |
| Chionoecetes opilio     | tropomyosin slow-tonic isoform [Chionoecetes opilio].               | 125995167 | 284 |
| Crassostrea gigas       | tropomyosin [Crassostrea gigas].                                    | 15419048  | 233 |
| Cyprinus carpio         | parvalbumin [Cyprinus carpio].                                      | 17977825  | 109 |
| Cyprinus carpio         | parvalbumin [Cyprinus carpio].                                      | 17977827  | 109 |
| Erimacrus isenbeckii    | tropomyosin slow-twitch isoform [Erimacrus isenbeckii].             | 125995169 | 284 |
| Erimacrus isenbeckii    | tropomyosin slow-tonic isoform [Erimacrus isenbeckii].              | 125995171 | 284 |
| Farfantepenaeus aztecus | Pen a 1 allergen [Farfantepenaeus aztecus].                         | 73532979  | 284 |
| Gadus callarias         | Parvalbumin beta (Allergen Gad c 1) (Gad c I) (Allergen M).         | 131112    | 113 |
| Gadus morhua            | parvalbumin beta [Gadus morhua].                                    | 14531014  | 109 |
| Gadus morhua            | parvalbumin beta [Gadus morhua].                                    | 14531016  | 109 |
| Gallus gallus           | PREDICTED: similar to Ovomuroid precursor (Allergen Gal d 1) (Gal d | 118097409 | 208 |
| Gallus gallus           | Ovomuroid precursor (Allergen Gal d 1) (Allergen Gal d I).          | 124757    | 210 |

|                            |   |           |     |
|----------------------------|---|-----------|-----|
| Gallus gallus              | Lysozyme C precursor (1,4-beta-N-acetylmuramidase C) (Allergen Gal  | 126608    | 147 |
| Gallus gallus              | Ovalbumin (Egg albumin) (Plakalbumin) (Allergen Gal d 2) (Allergen  | 129293    | 386 |
| Gallus gallus              | Ovotransferrin precursor (Conalbumin) (Serum transferrin) (Allergen | 1351295   | 705 |
| Gallus gallus              | Chain A, Loop-Inserted Structure Of P1-P1' Cleaved Ovalbumin Mutant | 15826578  | 385 |
| Gallus gallus              | lysozyme protein.   | 212279    | 24  |
| Gallus gallus              | Chain D, Crystal Structure Of S-Ovalbumin At 1.9 Angstrom           | 34811333  | 385 |
| Gallus gallus              | unnamed protein product [Gallus gallus].                            | 63052     | 155 |
| Gallus gallus              | preproalbumin (serum albumin) [Gallus gallus].                      | 63748     | 615 |
| Gallus gallus              | ovotransferrin [Gallus gallus].                                     | 757851    | 705 |
| Gallus gallus              | unnamed protein product [Gallus gallus].                            | 808969    | 386 |
| Helix aspersa              | tropomyosin [Helix aspersa].  | 4468224   | 284 |
| Homarus americanus         | Tropomyosin (Allergen Hom a 1).                                     | 14285796  | 284 |
| Homarus americanus         | fast tropomyosin isoform [Homarus americanus].                      | 2660868   | 284 |
| Litopenaeus vannamei       | arginine kinase [Litopenaeus vannamei].                             | 115492980 | 356 |
| Marsupenaeus japonicus     | tropomyosin fast isoform [Marsupenaeus japonicus].                  | 125995159 | 284 |
| Metapenaeus ensis          | tropomyosin.  | 607633    | 274 |
| Mimachlamys nobilis        | tropomyosin [Mimachlamys nobilis].                                  | 9954253   | 284 |
| Octopus vulgaris           | tropomyosin [Octopus vulgaris].                                     | 83715936  | 284 |
| Ommastrephes bartramii     | tropomyosin [Ommastrephes bartramii].                               | 83715934  | 284 |
| Pandalus eous              | tropomyosin fast isoform [Pandalus eous].                           | 125995161 | 284 |
| Panulirus stimpsoni        | Tropomyosin (Allergen Pan s 1) (Pan s I).                           | 14285797  | 274 |
| Paralithodes camtschaticus | tropomyosin fast isoform [Paralithodes camtschaticus].              | 125995163 | 284 |
| Paralithodes camtschaticus | tropomyosin slow-tonic isoform [Paralithodes camtschaticus].        | 125995165 | 284 |
| Penaeus monodon            | tropomyosin fast isoform [Penaeus monodon].                         | 125995157 | 284 |
| Penaeus monodon            | allergen Pen m 2 [Penaeus monodon].                                 | 27463265  | 356 |
| Perna viridis              | tropomyosin [Perna viridis].  | 9954251   | 284 |
| Rana esculenta             | parvalbumin alpha [Rana esculenta].                                 | 20796729  | 110 |
| Rana sp. CH-2001           | parvalbumin alpha [Rana sp. CH-2001].                               | 20796733  | 110 |
| Rana esculenta             | parvalbumin beta protein [Rana esculenta].                          | 20797081  | 109 |
| Rana sp. CH-2001           | parvalbumin beta protein [Rana sp. CH-2001].                        | 20797085  | 109 |
| Salmo salar                | Parvalbumin beta 2 (Major allergen Sal s 1).                        | 18281421  | 108 |
| Salmo salar                | Parvalbumin beta 1 (Major allergen Sal s 1).                        | 2493445   | 109 |
| Sepia esculenta            | tropomyosin [Sepia esculenta].                                      | 83715928  | 284 |
| Sepioteuthis lessoniana    | tropomyosin [Sepioteuthis lessoniana].                              | 83715930  | 284 |
| Theragra chalcogramma      | parvalbumin [Theragra chalcogramma].                                | 14531018  | 109 |
| Theragra chalcogramma      | parvalbumin [Theragra chalcogramma].                                | 14531020  | 109 |
| Todarodes pacificus        | tropomyosin [Todarodes pacificus].                                  | 83715932  | 284 |
| Trachurus japonicus        | dark muscle parvalbumin [Trachurus japonicus].                      | 77799800  | 107 |

## Food Allergens Plants

| Species                | Comments  | GI #      | AA  |
|------------------------|---|-----------|-----|
| Actinidia deliciosa    | unnamed protein product [Actinidia deliciosa].            | 15984     | 380 |
| Actinidia deliciosa    | actinidin.  | 166317    | 380 |
| Actinidia deliciosa    | phytolectin [Actinidia deliciosa].                        | 40807635  | 116 |
| Actinidia chinensis    | Thaumatococcal-like protein (Allergen Act c 2).           | 68064399  | 20  |
| Actinidia deliciosa    | thaumatococcal-like protein [Actinidia deliciosa].        | 71057064  | 225 |
| Actinidia deliciosa    | Kiwellin (Allergen Act d 5).                              | 85701136  | 189 |
| Anacardium occidentale | vicilin-like protein [Anacardium occidentale].            | 21666498  | 536 |
| Anacardium occidentale | vicilin-like protein [Anacardium occidentale].            | 21914823  | 538 |
| Anacardium occidentale | 2s albumin [Anacardium occidentale].                      | 24473800  | 138 |
| Anacardium occidentale | allergen Ana o 2 [Anacardium occidentale].                | 25991543  | 457 |
| Ananas comosus         | profilin [Ananas comosus].                                | 14161637  | 131 |
| Ananas comosus         | Fruit bromelain precursor (Allergen Ana c 2).             | 75277440  | 351 |
| Apium graveolens       | Major allergen Api g 1 (Api g 1.0101) (Allergen Api g I). | 1346568   | 154 |
| Apium graveolens       | Api g 1.0201 allergen [Apium graveolens].                 | 1769847   | 159 |
| Apium graveolens       | Allergen Api g 5.   | 33300920  | 86  |
| Apium graveolens       | profilin [Apium graveolens].                              | 4761578   | 134 |
| Arachis hypogaea       | iso-Ara h3 [Arachis hypogaea].                            | 112380623 | 512 |
| Arachis hypogaea       | Allergen Ara h 1, clone P17 precursor (Ara h I).          | 1168390   | 614 |
| Arachis hypogaea       | Allergen Ara h 1, clone P41B precursor (Ara h I).         | 1168391   | 626 |
| Arachis hypogaea       | unnamed protein product [Arachis hypogaea].               | 14347293  | 207 |
| Arachis hypogaea       | Chain A, Allergen Ara h6 From Peanut (Arachis Hypogaea).  | 159163254 | 127 |

|                                 |  |          |     |
|---------------------------------|--|----------|-----|
| Arachis hypogaea                | conglutin [Arachis hypogaea].                                      | 17225991 | 144 |
| Arachis hypogaea                | allergen Ara h 3/Ara h 4 [Arachis hypogaea].                       | 21314465 | 538 |
| Arachis hypogaea                | trypsin inhibitor [Arachis hypogaea].                              | 22135348 | 219 |
| Arachis hypogaea                | peanut agglutinin precursor; prePNA [Arachis hypogaea].            | 253289   | 273 |
| Arachis hypogaea                | allergen Ara h 2.02 [Arachis hypogaea].                            | 26245447 | 172 |
| Arachis hypogaea                | allergen Ara h 2 isoform [Arachis hypogaea].                       | 31322017 | 169 |
| Arachis hypogaea                | glycinin [Arachis hypogaea].                                       | 3703107  | 507 |
| Arachis hypogaea                | Ara h 8 allergen [Arachis hypogaea].                               | 37499626 | 157 |
| Arachis hypogaea                | conarachin [Arachis hypogaea].                                     | 46560472 | 303 |
| Arachis hypogaea                | conarachin [Arachis hypogaea].                                     | 46560474 | 299 |
| Arachis hypogaea                | conarachin [Arachis hypogaea].                                     | 46560476 | 428 |
| Arachis hypogaea                | glycinin [Arachis hypogaea].                                       | 5712199  | 530 |
| Arachis hypogaea                | profilin [Arachis hypogaea].                                       | 5902968  | 131 |
| Arachis hypogaea                | allergen Ara h 6 [Arachis hypogaea].                               | 5923742  | 129 |
| Arachis hypogaea                | allergen [Arachis hypogaea].                                       | 5931948  | 160 |
| Bertholletia excelsa            | 2S sulfur-rich seed storage protein precursor (Allergen Ber e 1)   | 112754   | 146 |
| Bertholletia excelsa            | 2S albumin [Bertholletia excelsa].                                 | 17713    | 154 |
| Bertholletia excelsa            | 11S globulin [Bertholletia excelsa].                               | 30313867 | 465 |
| Brassica napus                  | pollen allergen group II (clone 42) - rape.                        | 2129801  | 83  |
| Brassica napus                  | pollen allergen group II (clone 44) - rape.                        | 2129802  | 83  |
| Brassica rapa                   | pollen allergen group II (clone 4) - turnip (fragment).            | 2129805  | 80  |
| Brassica napus                  | recombinant Ib pronapin precursor [Brassica napus].                | 26985163 | 109 |
| Brassica rapa subsp. rapa       | Chitin-binding allergen Bra r 2.                                   | 32363456 | 91  |
| Brassica juncea                 | Bra j IE small chain=allergen [Brassica juncea=oriental-mustard,   | 407609   | 37  |
| Brassica juncea                 | Bra j IE large chain=allergen [Brassica juncea=oriental-mustard,   | 407610   | 92  |
| Brassica rapa subsp. rapa       | Polcalcin Bra r 1 (Calcium-binding pollen allergen Bra r 1).       | 59800144 | 79  |
| Brassica rapa subsp. rapa       | Polcalcin Bra r 2 (Calcium-binding pollen allergen Bra r 2).       | 59800146 | 83  |
| Capsicum annuum                 | profilin [Capsicum annuum].  | 16555785 | 131 |
| Carica papaya                   | papain precursor.  | 167391   | 345 |
| Castanea sativa                 | chitinase Ib [Castanea sativa].                                    | 1359600  | 316 |
| Castanea sativa                 | ypr10 [Castanea sativa].   | 16555781 | 160 |
| Castanea sativa                 | CAS S 1 major allergen.  | 75199059 | 24  |
| Citrus sinensis                 | lipid transfer protein [Citrus sinensis].                          | 50199132 | 91  |
| Citrus sinensis                 | Germin-like protein (Allergen Cit s 1).                            | 52782810 | 25  |
| Citrus limon                    | Non-specific lipid-transfer protein (LTP) (Allergen Cit 13).       | 52783176 | 20  |
| Citrus sinensis                 | Non-specific lipid-transfer protein (LTP) (Allergen Cit s 3.0101). | 52783177 | 20  |
| Citrus sinensis                 | Profilin (Allergen Cit s 2).                                       | 54036219 | 10  |
| Citrus sinensis                 | profilin [Citrus sinensis].  | 56000996 | 131 |
| Corylus avellana                | putative luminal binding protein [Corylus avellana].               | 10944737 | 668 |
| Corylus avellana                | major allergen variant Cor a 1.0402 [Corylus avellana].            | 11762102 | 161 |
| Corylus avellana                | major allergen variant Cor a 1.0403 [Corylus avellana].            | 11762104 | 161 |
| Corylus avellana                | major allergen variant Cor a 1.0404 [Corylus avellana].            | 11762106 | 161 |
| Corylus avellana                | minor allergen hazelnut profilin [Corylus avellana].               | 12659206 | 131 |
| Corylus avellana                | minor allergen hazelnut profilin [Corylus avellana].               | 12659208 | 131 |
| Corylus avellana                | major allergen Cor a 1 [Corylus avellana].                         | 1321731  | 160 |
| Corylus avellana                | major allergen Cor a 1 [Corylus avellana].                         | 1321733  | 160 |
| Corylus avellana                | lipid transfer protein precursor [Corylus avellana].               | 13507262 | 115 |
| Corylus avellana                | 11S globulin-like protein [Corylus avellana].                      | 18479082 | 515 |
| Corylus avellana                | 48-kDa glycoprotein precursor [Corylus avellana].                  | 19338630 | 448 |
| Corylus avellana                | major allergen [Corylus avellana].                                 | 22684    | 160 |
| Corylus avellana                | major allergen [Corylus avellana].                                 | 22686    | 160 |
| Corylus avellana                | major allergen [Corylus avellana].                                 | 22690    | 160 |
| Corylus avellana                | oleosin [Corylus avellana].  | 29170509 | 140 |
| Corylus avellana                | major allergen Cor a 1.0401 [Corylus avellana].                    | 5726304  | 161 |
| Corylus avellana                | Major pollen allergen Cor a 1 isoforms 5, 6, 11 and 16 (Allergen   | 584968   | 160 |
| Cucumis melo                    | profilin [Cucumis melo].   | 31559374 | 131 |
| Cucumis melo                    | Pathogenesis-related protein (PR-1) (Allergen Cuc m 3).            | 46396595 | 41  |
| Cucumis melo var. cantalupensis | profilin [Cucumis melo var. reticulatus].                          | 57021110 | 131 |
| Cucumis melo                    | profilin [Cucumis melo].   | 58263793 | 131 |
| Cucumis melo                    | pre-pro-cucumisin [Cucumis melo].                                  | 807698   | 731 |
| Daucus carota                   | pathogenesis-related protein.                                      | 1335877  | 168 |
| Daucus carota                   | cr16 [Daucus carota].  | 1663522  | 154 |
| Daucus carota                   | major allergen isoform Dau c 1.0201 [Daucus carota].               | 18652047 | 154 |

|                                |   |           |     |
|--------------------------------|---|-----------|-----|
| Daucus carota                  | minor allergen Dau c 4 profilin [Daucus carota].                | 18652049  | 134 |
| Daucus carota                  | pathogenesis-related protein-like protein 1 [Daucus carota].    | 19912791  | 154 |
| Daucus carota                  | major allergen [Daucus carota].                                 | 2154732   | 154 |
| Daucus carota                  | major allergen [Daucus carota].                                 | 2154734   | 154 |
| Daucus carota                  | major allergen Dau c 1/1 [Daucus carota].                       | 2154736   | 154 |
| Fagopyrum tataricum            | BW10KD allergen protein [Fagopyrum tataricum].                  | 144228127 | 133 |
| Fagopyrum esculentum           | BW8KD allergen protein [Fagopyrum esculentum].                  | 17907758  | 133 |
| Fagopyrum tataricum            | allergenic protein [Fagopyrum tataricum].                       | 22353013  | 195 |
| Fagopyrum esculentum           | legumin-like protein [Fagopyrum esculentum].                    | 2317670   | 565 |
| Fagopyrum esculentum           | legumin-like protein [Fagopyrum esculentum].                    | 2317674   | 504 |
| Fagopyrum esculentum           | major allergenic storage protein [Fagopyrum esculentum].        | 4895075   | 538 |
| Fagopyrum esculentum           | BW 16kDa allergen [Fagopyrum esculentum].                       | 61970231  | 127 |
| Fagopyrum gracilipes           | 22kDa storage protein [Fagopyrum gracilipes].                   | 6979766   | 191 |
| Fagopyrum esculentum           | 16 kDa allergen [Fagopyrum esculentum].                         | 83416591  | 149 |
| Fragaria x ananassa            | Allergen Fra a 1.   | 60389902  | 100 |
| Fragaria x ananassa            | Fra a 1-A allergen [Fragaria x ananassa].                       | 88082485  | 160 |
| Fragaria x ananassa            | Major strawberry allergen Fra a 1-B [Fragaria x ananassa].      | 90185682  | 160 |
| Fragaria x ananassa            | Major strawberry allergen Fra a 1-D [Fragaria x ananassa].      | 90185684  | 160 |
| Fragaria x ananassa            | Major strawberry allergen Fra a 1-C [Fragaria x ananassa].      | 90185688  | 159 |
| Fragaria x ananassa            | Major strawberry allergen Fra a 1-E [Fragaria x ananassa].      | 90185692  | 160 |
| Glycine max                    | 34 kDa maturing seed vacuolar thiol protease precursor [Glycine | 1199563   | 379 |
| Glycine max                    | allergen Gly m Bd 28K [Glycine max].                            | 12697782  | 473 |
| Glycine max                    | P34 probable thiol protease precursor.                          | 129353    | 379 |
| Glycine max                    | hull allergen Gly m 2 - soybean (fragment).                     | 1362049   | 20  |
| Glycine max                    | beta-conglycinin-alpha subunit.                                 | 169927    | 218 |
| Glycine max                    | beta-conglycinin storage protein [Glycine max].                 | 169929    | 639 |
| Glycine max                    | glycinin.   | 169969    | 516 |
| Glycine max                    | glycinin precursor.   | 169971    | 240 |
| Glycine max                    | unnamed protein product [Glycine max].                          | 18536     | 605 |
| Glycine max                    | unnamed protein product [Glycine max].                          | 18609     | 485 |
| Glycine max                    | unnamed protein product [Glycine max].                          | 18615     | 495 |
| Glycine max                    | glycinin subunit G1 [Glycine max].                              | 18635     | 495 |
| Glycine max                    | glycinin subunit G2 [Glycine max].                              | 18637     | 485 |
| Glycine max                    | glycinin subunit G3 [Glycine max].                              | 18639     | 481 |
| Glycine max                    | glycinin [Glycine max].   | 18641     | 562 |
| Glycine max                    | unnamed protein product [Glycine max].                          | 18744     | 158 |
| Glycine max                    | trypsin inhibitor subtype A [Glycine max].                      | 18770     | 217 |
| Glycine max                    | trypsin inhibitor subtype B [Glycine max].                      | 18772     | 217 |
| Glycine max                    | CG4 beta-conglycinin [Glycine max].                             | 256427    | 439 |
| Glycine max                    | Kunitz trypsin inhibitor; KTi [Glycine max].                    | 256429    | 216 |
| Glycine max                    | Kunitz trypsin inhibitor KTi1 [Glycine max].                    | 256635    | 203 |
| Glycine max                    | Kunitz trypsin inhibitor KTi2 [Glycine max].                    | 256636    | 204 |
| Glycine max                    | profilin [Glycine max].   | 3021373   | 131 |
| Glycine max                    | Bd 30K [Glycine max].   | 3097321   | 379 |
| Glycine max                    | Profilin-1 (GmPRO1) (Allergen Gly m 3.0101).                    | 3914435   | 131 |
| Glycine max                    | Kunitz trypsin inhibitor [Glycine max].                         | 510515    | 208 |
| Glycine max                    | unnamed protein product [Glycine max].                          | 732706    | 562 |
| Glycine soja                   | Gy5 [Glycine soja].   | 736002    | 517 |
| Glycine max                    | hydrophobic seed protein precursor-like [Glycine max].          | 76782247  | 134 |
| Glycine max                    | hydrophobic seed protein precursor [Glycine max].               | 76782249  | 119 |
| Glycine soja                   | A5A4B3 subunit [Glycine soja].                                  | 806556    | 563 |
| Glycine max                    | Major Gly 50 kDa allergen.                                      | 85681057  | 17  |
| Glycine max                    | Gly m IA allergen, HPS=hydrophobic seed protein {N-terminal}    | 999355    | 42  |
| Helianthus annuus              | pre-pro-seed albumin [Helianthus annuus].                       | 18821     | 141 |
| Helianthus annuus              | profilin [Helianthus annuus].                                   | 3581965   | 133 |
| Hordeum vulgare                | trypsin inhibitor cme precursor [Hordeum vulgare].              | 1405736   | 144 |
| Hordeum vulgare                | amylase/protease inhibitor.                                     | 167077    | 117 |
| Hordeum vulgare subsp. vulgare | alpha-amylase inhibitor [Hordeum vulgare subsp. vulgare].       | 18955     | 144 |
| Hordeum vulgare subsp. vulgare | CMe [Hordeum vulgare subsp. vulgare].                           | 19009     | 148 |
| Hordeum vulgare                | LTP 1 [Hordeum vulgare].  | 19039     | 134 |
| Hordeum vulgare                | Alpha-amylase inhibitor BMAI-1 precursor (Allergen Hor v 1)     | 2506771   | 146 |
| Hordeum vulgare subsp. vulgare | BDAI-1; Barley dimeric alpha-amylase inhibitor [Hordeum vulgare | 3367714   | 152 |
| Hordeum vulgare subsp. vulgare | CMa, component of tetrameric alpha-amylase inhibitor [Hordeum   | 439275    | 145 |

|                   |  |          |     |
|-------------------|--|----------|-----|
| Hordeum vulgare   | Alpha-amylase/trypsin inhibitor CMB precursor                      | 585290   | 149 |
| Juglans regia     | albumin seed storage protein precursor [Juglans regia].            | 1794252  | 139 |
| Juglans nigra     | 2S albumin seed storage protein [Juglans nigra].                   | 31321942 | 161 |
| Juglans nigra     | vicilin seed storage protein [Juglans nigra].                      | 31321944 | 481 |
| Juglans regia     | seed storage protein [Juglans regia].                              | 56788031 | 507 |
| Juglans regia     | vicilin-like protein precursor [Juglans regia].                    | 6580762  | 593 |
| Lens culinaris    | allergen Len c 1.0101 [Lens culinaris].                            | 29539109 | 418 |
| Lens culinaris    | allergen Len c 1.0102 [Lens culinaris].                            | 29539111 | 415 |
| Litchi chinensis  | profilin [Litchi chinensis].                                       | 15809696 | 131 |
| Litchi chinensis  | profilin [Litchi chinensis].                                       | 83317152 | 131 |
| Malus x domestica | major allergen {N-terminal} [apples, Golden Delicious, Peptide     | 1174276  | 37  |
| Malus x domestica | major allergen Mal d 1 [Malus x domestica].                        | 1313966  | 159 |
| Malus x domestica | major allergen Mal d 1 [Malus x domestica].                        | 1313968  | 160 |
| Malus x domestica | major allergen Mal d1 [Malus x domestica].                         | 1313970  | 160 |
| Malus x domestica | major allergen Mal d1 [Malus x domestica].                         | 1313972  | 160 |
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## Nematodes and Worms

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| Anisakis simplex      | Major allergen Ani s 1 precursor (Excretory gland allergen Ans1)    | 47605452  | 194  |
| Anisakis simplex      | troponin-like protein [Anisakis simplex].                           | 6065738   | 161  |
| Anisakis simplex      | paramyosin [Anisakis simplex].                                      | 8117843   | 869  |
| Anisakis simplex      | paramyosin isoform [Anisakis simplex].                              | 8453086   | 473  |
| Ascaris lumbricoides  | ABA-1 allergen [Ascaris lumbricoides].                              | 2735096   | 134  |
| Ascaris lumbricoides  | ABA-1 allergen [Ascaris lumbricoides].                              | 2735098   | 134  |
| Ascaris lumbricoides  | ABA-1 allergen [Ascaris lumbricoides].                              | 2735102   | 133  |
| Ascaris lumbricoides  | ABA-1 allergen [Ascaris lumbricoides].                              | 2735106   | 133  |
| Ascaris lumbricoides  | ABA-1 allergen [Ascaris lumbricoides].                              | 2735108   | 267  |
| Ascaris lumbricoides  | ABA-1 allergen [Ascaris lumbricoides].                              | 2735110   | 267  |
| Ascaris lumbricoides  | ABA-1 allergen [Ascaris lumbricoides].                              | 2735112   | 267  |
| Ascaris lumbricoides  | ABA-1 allergen [Ascaris lumbricoides].                              | 2735114   | 134  |
| Ascaris lumbricoides  | ABA-1 allergen [Ascaris lumbricoides].                              | 2735118   | 134  |
| Ascaris suum          | major allergen ABA-1=TBA-1 allergen homolog {N-terminal} [Ascaris   | 299550    | 68   |
| Ascaris suum          | Polyprotein ABA-1 precursor (Body fluid allergen 1) (Allergen Asc s | 77416849  | 1365 |
| Schistosoma japonicum | 22.6 kDa tegumental antigen [Schistosoma japonicum].                | 2739154   | 191  |
| Schistosoma japonicum | hypothetical protein, putative Profilin/allergen [Schistosoma       | 29841461  | 129  |

#### Other Contact Allergens

| Species                                | Comments  | GI #      | AA  |
|--|---|-----------|-----|
| Equus caballus                         | Latherin precursor (Dander allergen Equ c 4/Equ c 5).               | 152031631 | 228 |
| Equus caballus                         | Dander allergen Equ c 2.0101.                                       | 3121755   | 29  |
| Equus caballus                         | Dander allergen Equ c 2.0102.                                       | 3121756   | 19  |
| Equus caballus                         | Major allergen Equ c 1 precursor.                                   | 3121758   | 187 |
| Equus caballus                         | preproalbumin [Equus caballus].                                     | 399672    | 607 |
| Hevea brasiliensis                     | IgE-binding protein MnSOD [Hevea brasiliensis].                     | 10862818  | 205 |
| Hevea brasiliensis                     | Chain A, Latex Profilin Hevb8.                                      | 11513601  | 131 |
| Hevea brasiliensis                     | beta-1,3-glucanase.   | 1184668   | 374 |
| Hevea brasiliensis                     | Pro-hevein precursor (Major hevein) [Contains: Hevein (Allergen Hev | 123062    | 204 |
| Hevea brasiliensis                     | beta-1,3-glucanase [Hevea brasiliensis].                            | 124294783 | 374 |
| Hevea brasiliensis                     | beta-1,3-glucanase [Hevea brasiliensis].                            | 124294785 | 374 |
| Hevea brasiliensis                     | beta-1,3-glucanase [Hevea brasiliensis].                            | 124365249 | 374 |
| Hevea brasiliensis                     | beta-1,3-glucanase [Hevea brasiliensis].                            | 124365251 | 374 |
| Hevea brasiliensis                     | beta-1,3-glucanase [Hevea brasiliensis].                            | 124365253 | 374 |
| Hevea brasiliensis                     | Rubber elongation factor protein (REF) (Allergen Hev b 1).          | 132270    | 138 |
| Hevea brasiliensis                     | Profilin-6 (Pollen allergen Hev b 8.0204).                          | 14423856  | 131 |
| Hevea brasiliensis                     | Profilin-5 (Pollen allergen Hev b 8.0203).                          | 14423858  | 131 |
| Hevea brasiliensis                     | Profilin-4 (Pollen allergen Hev b 8.0202).                          | 14423859  | 131 |
| Hevea brasiliensis                     | Profilin-3 (Pollen allergen Hev b 8.0201).                          | 14423860  | 131 |
| Hevea brasiliensis                     | Profilin-2 (Pollen allergen Hev b 8.0102).                          | 14423868  | 131 |
| Hevea brasiliensis                     | Small rubber particle protein (SRPP) (22 kDa rubber particle        | 14423933  | 204 |
| Hevea brasiliensis                     | putative class I chitinase [Hevea brasiliensis].                    | 14575525  | 295 |
| Hevea brasiliensis                     | latex allergen.   | 1480457   | 151 |
| Hevea brasiliensis                     | latex patatin homolog [Hevea brasiliensis].                         | 1916805   | 388 |
| Hevea brasiliensis                     | lipid transfer precursor protein [Hevea brasiliensis].              | 20135538  | 116 |
| Hevea brasiliensis subsp. brasiliensis | class I chitinase [Hevea brasiliensis subsp. brasiliensis].         | 27526732  | 295 |
| Hevea brasiliensis                     | prohevein [Hevea brasiliensis].                                     | 2832430   | 187 |
| Hevea brasiliensis                     | latex allergen [Hevea brasiliensis].                                | 3087805   | 388 |
| Hevea brasiliensis                     | ENSP-like protein [Hevea brasiliensis].                             | 30909057  | 391 |
| Hevea brasiliensis                     | profilin [Hevea brasiliensis].                                      | 3183706   | 131 |
| Hevea brasiliensis                     | beta-1,3-glucanase [Hevea brasiliensis].                            | 32765543  | 374 |
| Hevea brasiliensis                     | latex allergen [Hevea brasiliensis].                                | 3288200   | 388 |
| Hevea brasiliensis                     | superoxide dismutase (manganese).                                   | 348137    | 233 |

|                    |  |          |     |
|--------------------|--|----------|-----|
| Hevea brasiliensis | putative latex allergen hev b 7.02 [Hevea brasiliensis]. | 41581137 | 387 |
| Hevea brasiliensis | major latex allergen Hev b 4 [Hevea brasiliensis].       | 46410859 | 366 |
| Hevea brasiliensis | MnSOD [Hevea brasiliensis].                              | 5777414  | 205 |
| Hevea brasiliensis | latex protein allergen Hev b 7 [Hevea brasiliensis].     | 6707018  | 388 |
| Hevea brasiliensis | Chain A, Crystal Structure Of A Hev B 6.02 Isoallergen.  | 73535415 | 43  |
| Hevea brasiliensis | enolase, isoform 1 [Hevea brasiliensis].                 | 9581744  | 445 |
| Hevea brasiliensis | enolase, isoform 2 [Hevea brasiliensis].                 | 9581746  | 445 |
| Nicotiana tabacum  | villin 1 [Nicotiana tabacum].                            | 57283137 | 559 |
| Nicotiana tabacum  | villin 2 [Nicotiana tabacum].                            | 57283139 | 520 |

**Venoms**

| <b>Species</b>                 | <b>Comments</b>   | <b>GI #</b> | <b>AA</b> |
|--------------------------------|---|-------------|-----------|
| Aedes aegypti                  | D7 protein precursor (Allergen Aed a 2).                            | 118216      | 321       |
| Aedes aegypti                  | 30 kDa salivary gland allergen Aed a 3 [Aedes aegypti].             | 2114497     | 253       |
| Aedes aegypti                  | apyrase.  | 556272      | 562       |
| Aedes albopictus               | 30 kDa salivary gland allergen 30k-3 [Aedes albopictus].            | 56417504    | 271       |
| Aedes albopictus               | GE-rich salivary protein 30k-4 [Aedes albopictus].                  | 56417506    | 266       |
| Aedes aegypti                  | 30 kDa salivary gland allergen variant 2 [Aedes aegypti].           | 94468546    | 273       |
| Aedes aegypti                  | 30 kDa salivary gland allergen variant 3 [Aedes aegypti].           | 94468552    | 258       |
| Apis mellifera                 | Melittin precursor (Allergen Api m 3) (Api m III).                  | 126949      | 70        |
| Apis dorsata                   | Melittin.   | 126955      | 26        |
| Apis mellifera                 | Phospholipase A2 precursor (Phosphatidylcholine 2-acylhydrolase)    | 24418862    | 167       |
| Apis cerana cerana             | Phospholipase A2 (Phosphatidylcholine 2-acylhydrolase).             | 24638082    | 134       |
| Apis dorsata                   | Phospholipase A2 (Phosphatidylcholine 2-acylhydrolase).             | 47117012    | 134       |
| Apis mellifera                 | Hyaluronoglucosaminidase precursor (Hyaluronidase) (Hya) (Allergen  | 585279      | 382       |
| Apis mellifera                 | melittin, minor - honeybee.   | 69552       | 27        |
| Apis cerana                    | phospholipase A2 (EC 3.1.1.4), venom - Indian honeybee.             | 7435005     | 134       |
| Apis mellifera                 | allergen Api m 6 precursor [Apis mellifera].                        | 94400875    | 94        |
| Apis mellifera                 | allergen Api m 6 variant 1 [Apis mellifera].                        | 94400907    | 92        |
| Apis mellifera                 | icarapin variant 1 precursor [Apis mellifera].                      | 94471622    | 223       |
| Apis mellifera                 | icarapin variant 2 precursor [Apis mellifera].                      | 94471624    | 175       |
| Bombus terrestris              | Phospholipase A2 (Phosphatidylcholine 2-acylhydrolase) (Allergen    | 14423832    | 136       |
| Dolichovespula maculata        | Hyaluronoglucosaminidase (Hyaluronidase) (Allergen Dol m 2) (Dol m  | 1346322     | 331       |
| Dolichovespula maculata        | Venom allergen 5.01 precursor (Antigen 5 form 2) (Ag5-2) (Allergen  | 137395      | 227       |
| Dolichovespula maculata        | Phospholipase A1 2 (Allergen Dol m 1.02) (Dol m I).                 | 1709542     | 303       |
| Dolichovespula arenaria        | Venom allergen 5 (Antigen 5) (Ag5) (Allergen Dol a 5) (Dol a V).    | 465052      | 203       |
| Dolichovespula maculata        | Phospholipase A1 1 precursor (Allergen Dol m 1.01) (Dol m I).       | 548449      | 317       |
| Dolichovespula maculata        | Venom allergen 5.02 precursor (Antigen 5 form 3) (Ag5-3) (Allergen  | 549186      | 215       |
| Myrmecia pilosula              | major allergen Myr p II.  | 1587177     | 75        |
| Myrmecia pilosula              | Myr p I=allergenic polypeptide {N-terminal} [Myrmecia               | 1911819     | 112       |
| Myrmecia pilosula              | Pilosulin-2 precursor (Allergen Myr p 2) (Myr p II).                | 2498604     | 75        |
| Myrmecia pilosula              | Pilosulin-1 precursor (Major allergen Myr p 1) (Myr p I) [Contains: | 730091      | 112       |
| Polistes annularis             | Hyaluronoglucosaminidase precursor (Hyaluronidase) (Allergen Pol a  | 14423735    | 367       |
| Polistes annularis             | Phospholipase A1 (Allergen Pol a 1).                                | 14423833    | 301       |
| Polistes annularis             | allergen 5.   | 160780      | 209       |
| Polistes gallicus              | Venom allergen 5 (Antigen 5) (Ag5) (Allergen Pol g 5).              | 25091511    | 206       |
| Polistes dominulus             | venom serine protease precursor [Polistes dominulus].               | 30909091    | 277       |
| Polistes gallicus              | Phospholipase A1 (Allergen Pol g 1).                                | 41017429    | 42        |
| Polistes dominulus             | venom phospholipase A1 1 precursor [Polistes dominulus].            | 45510887    | 337       |
| Polistes dominulus             | venom phospholipase A1 2 precursor [Polistes dominulus].            | 45510889    | 316       |
| Polistes dominulus             | venom phospholipase A1 3 precursor [Polistes dominulus].            | 45510891    | 316       |
| Polistes dominulus             | venom phospholipase A1 4 precursor [Polistes dominulus].            | 45510893    | 316       |
| Polistes exclamans             | allergen Pol e 5 precursor [Polistes exclamans].                    | 51093375    | 226       |
| Polistes dominulus             | allergen Pol d 5 precursor [Polistes dominulus].                    | 51093377    | 227       |
| Polistes exclamans             | Venom allergen 5 (Antigen 5) (Ag5) (Allergen Pol e 5) (Pol e V).    | 549187      | 205       |
| Polistes fuscatus              | Venom allergen 5 (Antigen 5) (Ag5) (Allergen Pol f 5) (Pol f V).    | 549188      | 205       |
| Sarcoptes scabiei type hominis | glutathione S-transferase [Sarcoptes scabiei type hominis].         | 27462836    | 219       |
| Sarcoptes scabiei type hominis | glutathione transferase mu class Yv5004H11 [Sarcoptes scabiei type  | 60920770    | 219       |
| Solenopsis invicta             | Sol i 1=antigen {N-terminal} [Solenopsis invicta=imported fire      | 1336809     | 58        |
| Solenopsis invicta             | Sol i 1=antigen {N-terminal} [Solenopsis invicta=imported fire      | 1336811     | 25        |
| Solenopsis invicta             | Sol i 1=antigen {N-terminal} [Solenopsis invicta=imported fire      | 1336812     | 26        |
| Solenopsis invicta             | Sol i 1=antigen {N-terminal} [Solenopsis invicta=imported fire      | 1336813     | 26        |

|                      |   |           |     |
|----------------------|---|-----------|-----|
| Solenopsis invicta   | Venom allergen 4 precursor (Venom allergen IV) (Allergen Sol i 4)   | 14424465  | 137 |
| Solenopsis invicta   | Venom allergen 3 precursor (Venom allergen III) (Allergen Sol i 3)  | 14424466  | 234 |
| Solenopsis invicta   | venom allergen Sol i 4.02 precursor [Solenopsis invicta].           | 4038411   | 137 |
| Solenopsis invicta   | allergen Sol i 1 precursor [Solenopsis invicta].                    | 51093373  | 346 |
| Solenopsis invicta   | Venom allergen 2 precursor (Venom allergen II) (Allergen Sol i 2)   | 549179    | 138 |
| Solenopsis richteri  | Venom allergen 2 (Venom allergen II) (Allergen Sol r 2) (Sol r II). | 6136162   | 119 |
| Solenopsis richteri  | Venom allergen 3 (Venom allergen III) (Allergen Sol r 3) (Sol r     | 6136163   | 211 |
| Solenopsis geminata  | venom allergen Sol g 4.01 precursor [Solenopsis geminata].          | 7638028   | 137 |
| Solenopsis geminata  | venom allergen Sol g 4.02 precursor [Solenopsis geminata].          | 7638030   | 137 |
| Triatoma protracta   | procalin [Triatoma protracta].                                      | 15426413  | 169 |
| Vespa crabro         | Venom allergen 5.01 (Antigen 5-1) (Ag5-1) (Allergen Vesp c 5.01)    | 549184    | 202 |
| Vespa crabro         | Venom allergen 5.02 (Antigen 5-2) (Ag5-2) (Allergen Vesp c 5.02)    | 549185    | 202 |
| Vespa mandarinia     | Venom allergen 5 (Antigen 5) (Ag5) (Allergen Vesp m 5).             | 6136165   | 202 |
| Vespula vulgaris     | Chain A, Ves V 5, An Allergen From Vespula Vulgaris Venom.          | 11514279  | 209 |
| Vespula germanica    | hyaluronidase [Vespula germanica].                                  | 116174180 | 331 |
| Vespula germanica    | hyaluronidase homologue [Vespula germanica].                        | 116174182 | 323 |
| Vespula vulgaris     | Hyaluronoglucosaminidase A (Hyaluronidase A) (Allergen Ves v 2a)    | 1346323   | 331 |
| Vespula vulgaris     | allergen 5.   | 162551    | 227 |
| Vespula maculifrons  | Phospholipase A1 (Allergen Ves m 1) (Ves m I).                      | 1709545   | 300 |
| Vespula vulgaris     | allergen 5; antigen 5 [Vespula vulgaris].                           | 4826574   | 204 |
| Vespula flavopilosa  | Venom allergen 5 (Antigen 5) (Ag5) (Allergen Ves f 5) (Ves f V).    | 549189    | 204 |
| Vespula germanica    | Venom allergen 5 (Antigen 5) (Ag5) (Allergen Ves g 5) (Ves g V).    | 549190    | 204 |
| Vespula maculifrons  | Venom allergen 5 (Antigen 5) (Ag5) (Allergen Ves m 5) (Ves m V).    | 549191    | 204 |
| Vespula pensylvanica | Venom allergen 5 (Antigen 5) (Ag5) (Allergen Ves p 5) (Ves p V).    | 549192    | 204 |
| Vespula squamosa     | Venom allergen 5 (Antigen 5) (Ag5) (Allergen Ves s 5) (Ves s V).    | 549193    | 205 |
| Vespula vidua        | Venom allergen 5 (Antigen 5) (Ag5) (Allergen Ves vi 5) (Ves vi V).  | 549194    | 206 |
| Vespula vulgaris     | hyaluronidase b [Vespula vulgaris].                                 | 62147665  | 340 |
| Vespula germanica    | Ves g 5 allergen precursor [Vespula germanica].                     | 74035841  | 204 |
| Vespula germanica    | Ves g 1 allergen precursor [Vespula germanica].                     | 74035843  | 300 |
| Vespula maculifrons  | venom allergen 5 [Vespula maculifrons].                             | 85681830  | 227 |
| Vespula vulgaris     | allergen and phospholipase A1.                                      | 897647    | 336 |

## **[CBI Cross Reference Number 2]**

Deleted Appendices 2-12

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