

ENDNOTES

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PART 1, SECTION 2: GENE INSERTION DISRUPTS THE DNA

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PART 4: FLAWS IN THE ARGUMENTS USED TO JUSTIFY GM CROPS

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CONCLUSION

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APPENDIX

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Notes to Human Health Assessment Table (page 228)

- (1) “The Cry1Ab protein was digested at a similar, if slightly faster, rate than the *E. coli*-derived Cry9C protein in simulated gastric fluid.” (Aventis CropScience 2000, “Cry9C Protein: The Digestibility of the Cry9C Protein by Simulated Gastric and Intestinal Fluids,” study submitted to the EPA by Aventis CropScience, p. 17). In another study, Noteborn¹ found that it took two hours to achieve > 90% degradation of Cry1Ab(5) in SGF (165 µg/ml SGF, pH = 2.0) Noteborn, p. 21, Annex 1 – Table 1, p. 31.
- (2) “Studying the Cry1Ab5 protein a relatively significant thermostability was observed which was comparable to that of the Lys mutant Cry9C protein.” Noteborn.²
- (3) “...the initial alignment between Cry1A(b) and vitellogenin located subsequences in which 9 to 11 amino acids were identical (82% similarity). Realignment indicated that these regions contained stretches of 11 biochemically similar and 12 evolutionarily similar amino acids (100% similarity over 11 or 12 amino acids.” “For example, the similarity between Cry1A(b) and vitellogenin might be sufficient to warrant additional evaluation.”³ The EPA apparently did not consider this study in its reassessment of Cry1Ab corn. The Agency states merely that companies did not submit structural comparisons: “Amino acid homology comparisons for Cry1Ab, Cry1Ac and Cry3A against the database of known allergenic and toxic proteins were not submitted.”⁴
- (4) Monsanto conducted this study under conditions that proved extremely favorable to rapid digestion of the Cry1Ab/Ac hybrid protein: pH = 1.2, 2 µg test protein / ml SGF. Experts now recommend testing with much higher concentrations of test protein at a milder (at least pH = 2.0).
- (5) “Inactive” here means “unable to kill insects” in bioassays, which provide little or no information about degradation of the protein into amino acids and small peptides, which is what should have been measured (e.g. by HPLC or SDS-PAGE)
- (6) “Cry1A(c) has the same sequence as Cry1A(b) in the region involved, and therefore produced the same alignments, but this was not considered an independent alignment because the proteins are closely related.”⁵
- (7) EPA fails to cite the pH value of SGF. If test conducted at pH = 1.2, it should be repeated at pH = 2.0. See note (4).
- (8) Many experts recommend a more stringent test than one based on 8 contiguous amino acids.
- (9) “No heat stability studies were available for Cry3A.”⁶
- (10) “First, the initial alignment between Cry3A and β-lactoglobulin located subsequences in which 7 of 10 amino acids matched exactly. Realignment with both the evolutionary and biochemical matrices indicated that the intercalary amino acids were similar, meaning that the alignment was 100% similar over 10 amino acids.”⁷ The EPA apparently did not consider this study in its reassessment of *Bt* crops, stating merely that “additional amino acid sequence homology” data are needed to “complete product database” for Cry3A NewLeaf potatoes.⁸

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 4. US EPA, “Biopesticides Registration Action Document: Revised Risks and Benefits Sections—*Bacillus thuringiensis* Plant-Pesticides.”
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Additional sources on *Bt*-toxin

Terje Traavik and Jack Heinemann include this excellent set of *Bt*-related citations in their *Genetic Engineering and Omitted Health Research: Still No Answers to Ageing Questions*, published by Third World Network in 2007.

Human and monkey cells exposed to *Bt*-toxins from the extra- or intra-cellular environment are killed or functionally disabled (Taybali and Seligy, 2000). Human cell exposure assays of *Bacillus thuringiensis* commercial insecticides: Production of *Bacillus cereus*-like cytolytic effects from outgrowth of spores. *Environ Health Perspect* online, 18 August 2000; Tsuda et al. (2003). Cytotoxic activity of *Bacillus thuringiensis* Cry proteins on mammalian cells transferred with cadherine-like Cry receptor gene of *Bombyx mori* (silkworm). *Biochem J* 369: 697–703;

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Moreno-Fierros et al. (2000). Intranasal, rectal and intraperitoneal immunization with protoxin Cry1Ac from *Bacillus thuringiensis* induces compartmentalized serum, intestinal, vaginal and pulmonary immune response in Balb/c mice. *Microbes and Infection* 2: 885–890; Moreno-Fierros et al. (2002). Slight influence of the estrous cycle stage on the mucosal and systemic specific antibody response induced after vaginal and intraperitoneal immunization with protoxin Cry1Ac from *Bacillus thuringiensis* in mice. *ELSEVIER Life Sciences* 71: 26672680).

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