BIOGRAPHICAL SKETCH

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NAME	POSITION TITLE
Hugh S. Mason, Ph.D.	Associate Professor

EDUCATION *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(S)	FIELD OF STUDY
University of Texas, Austin, TX	B.S.	1976	Molecular Biology
University of Arizona, Tucson, AZ	Ph.D.	1986	Plant Physiology
Texas A&M University, College Station, TX	Postdoc	1986-92	Plant Molecular Biology

Positions:

1992-1995 Research Assistant Professor, Institute of Biosciences and Technology, Texas A&M University; Research related to expression of foreign genes in plants

1995-1999 Assistant Research Scientist, Boyce Thompson Institute for Plant Research; Recombinant expression of animal proteins in plants.

1997-present Adjunct Assistant Professor, Section of Plant Biology, Cornell University

1999-2002 Associate Research Scientist, Boyce Thompson Institute for Plant Research

2002-present Associate Professor, Biodesign Institute and School of Life Sciences, Arizona State University

Honors: Member American Society of Plant Physiologists
Member Editorial Board, BioMed Central

Selected peer-reviewed publications (in chronological order):

1. **Mason HS**, Lam DMK, Arntzen CJ (1992) Expression of hepatitis B surface antigen in transgenic plants. *Proc. Natl. Acad. Sci. USA* **89**:11745-11749.
2. **Mason HS**, DeWald DB, Mullet JE (1993) Identification of a methyl jasmonate responsive domain in the soybean *vspB* promoter. *Plant Cell* **5:**241-251.
3. Thanavala Y, Yang Y-F, Lyons P, **Mason HS**, Arntzen CJ. 1995. immunogenicity of transgenic plant-derived hepatitis B surface antigen. Proc. Natl. Acad. Sci. USA 92: 3358-3361.
4. Haq TA, **Mason HS**, Clements JD, Arntzen CJ (1995) Oral immunization with a recombinant bacterial antigen produced in transgenic plants. *Science* **268**:714-716.
5. **Mason HS**, Ball JM, Shi J-J, Jiang X, Estes MK, Arntzen CJ (1996) Expression of Norwalk virus capsid protein in transgenic tobacco and potato and its oral immunogenicity in mice. *Proc. Natl. Acad. Sci. USA* **93:**5335-5340.
6. **Mason HS**, Haq TA, Clements JD, Arntzen CJ (1998) Edible vaccine protects mice against E. coli heat-labile enterotoxin (LT): potatoes expressing a synthetic LT-B gene. *Vaccine* **16**:1336-1343.
7. **Mason HS**, Tacket CO, Richter LJ, Arntzen CJ (1998) Subunit vaccines produced and delivered in transgenic plants as "edible vaccines". *Res. Immunol.* **149**:71-74.
8. Tacket CO, **Mason HS**, Losonsky G, Clements JD, Levine MM, Arntzen CJ (1998) Immunogenicity in humans of a recombinant bacterial antigen delivered in transgenic potato. *Nature Medicine* **4**:607-609.
9. Wong SY, Ho KS, **Mason HS**, Arntzen CJ (1998) Edible vaccines. *Science & Medicine* **5:**36-45.
10. Tacket CO, **Mason HS**, Losonsky G, Estes MK, Levine MM, Arntzen CJ (2000) Human immune responses to a novel Norwalk virus vaccine delivered in transgenic potatoes. *J. Infect. Dis.* **182**: 302-305.
11. Dogan B, **Mason HS**, Richter L, Hunter JB, Shuler ML (2000) Process options in hepatitis B surface antigen extraction from transgenic potato. *Biotechnol. Progress* **16**:435-441.
12. Richter L, Thanavala Y, Arntzen CJ, **Mason HS** (2000) Production of hepatitis B surface antigen in transgenic plants for oral immunization. *Nature Biotechnol.* **18**:1167-1171.
13. Mor TS, Sternfeld M, Soreq H, Arntzen CJ, **Mason HS** (2001) Expression of recombinant human acetylcholinesterase in transgenic tomato plants. *Biotechnol. Bioeng.* **75:** 259-266.

14. Kong Q, Richter L, Yang Y-F, Arntzen CJ, **Mason HS**, Thanavala Y (2001) Oral immunization with hepatitis B surface antigen expressed in transgenic plants. *Proc. Natl. Acad. Sci. USA* **98:**11539-11544.

15. **Mason HS** (2002) Plant-based vaccines: Expression and oral immunogenicity. *In Vitro Cell. Devel. Biol. – Plant* **38**:237-240.

16. Smith ML, Keegan ME, **Mason HS**, Shuler ML (2002) Factors important in the extraction, stability and in vitro assembly of the hepatitis B surface antigen derived from recombinant plant systems. *Biotechnol. Prog.* **18**(3):538-550.

17. **Mason HS**, Warzecha H, Mor TS, Arntzen CJ (2002) Edible plant vaccines: applications for prophylactic and therapeutic molecular medicine. *Trends Mol. Med.***8**:324-329.

18. Chikwamba R, Cunnick J, Hathaway D, McMurray J, **Mason HS**, Wang K (2002). A functional antigen in a practical crop: Maize synthesized LT-B protects mice against *Escherichia coli* heat labile enterotoxin (LT) and cholera toxin (CT). *Transgenic Research* **11**:479-493.

19. Mor TS, Moon Y-S, Palmer KE, **Mason HS** (2003) Geminivirus vectors for high level expression of foreign proteins in plant cells. *Biotechnol. Bioeng*. **81**: 430-437.

20. Sojikul P, Buehner N, **Mason HS** (2003) A plant signal peptide-hepatitis B surface antigen fusion protein with enhanced stability and immunogenicity expressed in plant cells. *Proc. Natl. Acad. Sci. USA* **100**:2209-2214.

21. Walmsley AM, Kirk DD, **Mason HS** (2003) Passive immunization of mice pups through oral immunization of dams with a plant-derived vaccine. *Immunol. Lett.* **86**:71-76.

22. Warzecha H, Lane C, Tryggvesson A, Rybicki E, Williamson A, Clements JD, **Mason HS,** Rose RC (2003) Oral immunogenicity of human papillomavirus-like particles expressed in potato. *J. Virol.* **77**:8702-8711.

23. Smith ML, Richter L,. Arntzen CJ, Shuler ML, **Mason HS** (2003) Structural characterization of plant-derived hepatitis B surface antigen employed in oral immunization studies. *Vaccine* **21**:4011-4021.

24. Chikwamba RK, Scott MP, Mejia LB, **Mason HS**, Wang K (2003) Localization of a bacterial protein in starch granules of transgenic maize kernels. *Proc. Natl. Acad. Sci. USA* **100**:11127-11132.

25. Judge NA, **Mason HS**, O'Brien AD (2004) Plant cell-based intimin vaccine given orally to mice primed with intimin reduces time of *Escherichia coli* O157:H7 shedding in feces. *Infect. Immun.* **72**:168-175.

26. Huang Z, **Mason HS** (2004) Conformational analysis of hepatitis B surface antigen fusions in an *Agrobacterium*-mediated transient expression system. *Plant Biotechnol. J.*, **2**:241-249.

27. Thanavala Y, Mahoney M, Pal S, Scott A, Richter L, Natarajan N, Goodwin P, Arntzen CJ, Mason HS (2005) Immunogenicity in humans of an edible vaccine for hepatitis B. *Proc. Natl. Acad. Sci. USA* **102**:3378-3382.

28. Huang Z, Elkin G, Maloney BJ, Beuhner N, Arntzen CJ, Thanavala Y, **Mason HS** (2005) Virus-like particle expression and assembly in plants: hepatitis B and Norwalk viruses. *Vaccine* **23**:1851-1858.

29. Maloney BJ, Takeda N, Suzaki Y, Ami Y, Li TC, T Miyamura, Arntzen CJ, **Mason HS** (2005) Challenges in creating a vaccine to prevent hepatitis E. *Vaccine* **23**:1870-1874.

30. Zhang X, **Mason HS** (2006) Bean yellow dwarf virus replicons for high-level transgene expression in transgenic plants and cell cultures. *Biotechnol. Bioeng*. **93**(2):271-279.

31. Huang Z, Santi L, LePore K, Kilbourne J, Arntzen CJ, **Mason** HS (2006) Rapid, high-level production of hepatitis B core antigen in plant leaf and its immunogenicity in mice. *Vaccine* **24**(14):2506-2513.

32. Santi L, Giritch A, Roy C, Marillonnet S, Klimyuk V, Gleba Y, Webb R, Arntzen C, **Mason** H (2006) Protection conferred by recombinant *Yersinia pestis* antigens produced by a rapid and highly scalable plant expression system. *Proc. Natl. Acad. Sci. USA* **103**(4):861-866.

33. Alvarez ML, Pinyerd HL, Crisantes JD, Rigano MM, Pinkhasov J, Walmsley AM, Mason HS, Cardineau, GA (2006) Plant-made subunit vaccine against pneumonic and bubonic plague is orally immunogenic in mice. *Vaccine* **24**(14): 2477-2490.

34. Saldaña S, Guadarrama FE, de Jesus Olivera Flores T, Arias N, López S, Arias C, Ruiz R, Mason H, Mor T, Richter L, Arntzen CJ, Gómez-Lim MA (2006) Production of rotavirus-like particles in tomato (*Lycopersicon esculentum* L.) fruit by expression of capsid proteins VP2 and VP6 and immunological studies. *Viral Immunol.* **19**: *in press.*

35. Zhang X, Buehner NA, Hutson AM, Estes MK, Mason HS (2006) Tomato is a highly effective vehicle for expression and oral immunization with Norwalk virus capsid protein. *Plant Biotechnology Journal* **4:** 419–432.

ONGOING RESEARCH

1 U19 AI062150 (Mason) 07/06/04 - 08/31/05 10%
NIH $247,605
Project 2. Plant-made microbicides and mucosal vaccines for STIs
The major goal of this project is to design and produce mucosal vaccines in plant expression systems for sexually transmitted viral diseases (human papillomavirus, hepatitis B surface antigen, herpes simplex virus, human immunodeficiency virus), and to test these vaccines in pre-clinical animal trials.

1 U19 AI066332-01 (Arntzen & Mason, co-PIs) 8/1/05 to 7/31/10 10%
NIH $700,000
Plant-derived vaccines against hepatitis C
The goal of this project is to develop plant-based systems for robust expression of candidate vaccine antigens of hepatitis C virus. Antigens will be expressed in plants, qualified by a battery of assays, and tested for immunogenicity in animals.

AI-061253-01 (Arntzen, PI; Mason, co-PI) 3/1/05 to 2/28/10 5%
NIH $345,000
Development of a vaccine for ebola virus in plant system
The goal of this project is to develop novel Ebola virus antigen fusion proteins for expression in plant systems. A monoclonal antibody against Ebola virus glycoprotein will be fused to the glycoprotein to create recombinant immune complexes upon assembly. Antigens will be purified and tested in animals for immune responses.

(Takeda, PI; Mason, co-PI) 8/31/05 to 8/30/06 5%
Japan Human Sciences Foundation $68,000
(Boyce Thompson Inst.)
Small round structured virus capsid protein expression in plants
This project aims to develop a plant-derived vaccine for small round structured viruses, using co-expression of capsid proteins of multiple subtypes in potato and tomato and characterization of virus-like particle formation.

R01 AI042836-04 (Thanavala, PI; Mason, co-PI) 1/1/03-12/31/08 5%
NIH $60,856
Hepatitis B Subunit Oral Vaccine in Transgenic Plants
This project aims to improve expression and mucosal targeting of hepatitis B surface antigen in plant systems for oral vaccine delivery. Further, tracking of fusion proteins in the gut mucosal and immune system will be performed.

(O'Brien, PI; Mason, co-PI) 7/01/03-6/30/08 5%
NIH 5R01AI20148-22 $40,134

Plant Expressed Antigens of Shigatoxin-Producing E. coli

This project focuses on expression in plant cells of candidate vaccine antigens from Shiga toxin-producing *E. coli*, including Shiga-like toxin I subunits and intimin surface protein, and formulation of the plant material for oral delivery.

1 R43 GM076747-01 (Mason, PI) 6/1/06 – 5/31/08 5%
NIH (RXOA Biosciences) $17,463
HIV Protein Microbicides from a Novel Maize System
This project will create a developmentally regulated geminiviral gene amplification system for maize, with recombinant protein accumulating in the seeds. The model protein expressed will be anti-HIV polypeptides including cyanovirin.

PENDING PROPOSALS

(Slater, PI; Mason co-PI) 6/1/06 – 5/31/09 5%
NSF (Fastlane #0605043) $123,685
Targeted Mutagenesis in Meiotic Plant Cells
This project will use a meiosis-regulated geminiviral gene amplification system to amplify target DNA sequences to very high copy in meiotic plant cells, for the purpose of increasing efficiency of site-specific recombination events.

(Arntzen, PI; Mason, co-PI) 9/1/06 – 8/31/09 5%
Dept. of Defense $900,000
Novel Adjuvant Formulations for Subunit, Needle-Free Vaccines to Protect Against Aerosolized Biothreat Agents
This project will develop multivalent vaccines for anthrax and plague using plant expression systems. One aim will use a novel plant virus surface antigen display system, and another will focus on expression and purification of polyproteins containing multiple different antigens.

(Mor, PI; Mason, co-PI 9/15/06 – 9/14/11 5%
NIH $428,133
Rapid and Large Scale Plant-based of Catalytic Nerve Agent Bioscavengers
This project will develop plant systems for the production of human cholinesterase enzymes for use in treatment of exposure to organophosphate nerve agents.