#  **Stéphane L. BENOIT, PhD**

**Home**   **Work**

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**OBJECTIVE *i***

To apply my skills and knowledge in microbiology, biochemistry and molecular biology to educate people and make a difference in the life of people and animals in the United States and around the world.

**EDUCATION AND PROFESSIONAL EXPERIENCE**

July 2018-Present **Senior Research Scientist,** University of Georgia **(**PI: Dr. Robert J. **Maier**).

* Role of nickel, urease and hydrogenase maturation (*H. pylori* and *H. hepaticus*)
* Role of H2 on *Salmonella* Thyphimurium, *Klebsiella pneumoniae* and *Campylobacter concisus* growth and virulence.
* Oxidative stress resistance through methionine (sulfoxide) recycling (*H. pylori*)
* Iron-sulfur clusters maturation(*H. pylori*)-collaboration with Dr. Mike **Johnson** (UGA chemistry)
* Metal chelation as alternative to antibiotics (*H. pylori*, MDR *Salmonella,* MDR *Klebsiella*)
* Use of CORM products as a new class of antimicrobials-collaboration with Dr. Binghe **Wang** (GSU).
* Metal compounds *as* alternative to antibiotics (*E. coli*, MDR *Salmonella*, MDR *Klebsiella*)-collaboration with Dr. Yiping **Zhao** (UGA Physics department)
* Development of genetic tools for the emerging pathogen *C. concisus*

2012-2018: Associate Research Scientist, University of Georgia (PI: Dr. Robert J. **Maier**).

2005-2012: Assistant Research Scientist, University of Georgia (PI: Dr. Robert J. **Maier**).

2003-2004: R&D team leader, BioMérieux, Marcy L’Etoile, France.

 Diagnostic tests for cytomegaloviruses.

2001-2003: Post-doctoral associate, University of Georgia (PI: Dr. Robert J. **Maier**).

1999-2001: Post-doctoral associate, University of Georgia (PI: Dr. Frank C**.** **Gherardini**).

Metal utilization and metal-dependent regulation in *Treponema* *pallidum*

(syphilis). Oxidative stress in *Borrelia burgdorferi* (Lyme disease).

1995-1999: Ph.D. Biochemistry and Microbiology, INSA Lyon, France (PI: Dr. Marie-Andrée **Mandrand-Berthelot)**. Thesis: the aerobic formate dehydrogenase of *Escherichia coli*: physiological role, topological study and transcriptional analysis of the *fdoGHI* operon.

 Professional profile, as published online by the Journal of Biological Chemistry:

 **http://www.jbc.org/content/291/45/23366/suppl/DCAuthor\_profile**

## TEACHING EXPERIENCE AND MENTORING

## Fall 2014 Instructor for undergraduate course UGA MIBO3500, 27.5 hours (22 lectures), 185 students.

## Spring 2012 Instructor for undergraduate course UGA MIBO3000 (*Introductory Microbiology for* *non-Biology majors*); 37 hours (30 lectures), 93 students. Coordinator for MIBO3000L (lab).

2005-2018 Mentoring of 9 undergraduate and 8 graduate (PhD or MS) students, UGA.

## PUBLICATIONS IN PEER-REVIEWED JOURNALS

## <https://www.ncbi.nlm.nih.gov/myncbi/browse/collection/47324979/?sort=date&direction=descending>

Ranked from last (most recent) to first:

35- Schmalstig AA, **Benoit** **SL**, Misra SK, Sharp JS, Maier RJ.

A non-catalytic antioxidant role for *Helicobacter pylori* urease. *Journal of Bacteriology*, **2018**, June.

**34**- **Benoit SL**, Holland, A. A., Johnson, M. K., Maier RJ.

Iron-sulfur protein maturation in *Helicobacter pylori*: identifying a Nfu-type cluster carrier protein

and its iron-sulfur protein targets. Molecular Microbiology, **2018**,Vol. 108, p. 379-396.

**33-** De La Cruz LKC, **Benoit SL**, Pan Z, Yu B, Maier RJ, Ji X, Wang B.

Click, Release, and Fluoresce: A Chemical Strategy for a Cascade Prodrug System for Codelivery of Carbon Monoxide, a Drug Payload, and a Fluorescent Reporter. Organic Letters. **2018**, Vol. 20, p. 897-900.

**32-** Blum FC, Hu, HQ, Servetas SL, **Benoit SL**, Maier RJ, Maroney MJ, Merrell, DS.

Structure-function analyses of metal-binding sites of HypA reveal residues important for hydrogenase maturation in *Helicobacter pylori*. PLOS One, August 15, **2017**.

**31**- **Benoit SL**, Maier RJ.

# Helicobacter catalase devoid of catalytic activity protects the bacterium against oxidative stress.

*The Journal of Biological Chemistry*, **2016,** Vol. 291, p. 23366-23373.

Selected as paper of the week (top 1% of all JBC published papers)

**30**- Wang G, Romero-GalloJ, **Benoit SL**, Piazuelo MB, Dominguez RL, Morgan DR, Peek RM, Maier RJ.

Hydrogen metabolism in *Helicobacter pylori* plays a role in gastric carcinogenesis through facilitating CagA translocation. *mBio*, August 16, **2016**.

**29**- Kuhns LG, **Benoit SL**, BayyareddyK, Johnson D, Orlando R, Evans A, Waldrop G, Maier RJ.

Carbon fixation driven by molecular hydrogen results in chemolithoautotrophic-enhanced growth of *Helicobacter pylori*. *Journal of Bacteriology*, **2016,** Vol. 198, p.1423-1428.

**28**- Lamichhane-Khadka R, Miller-Parks, EF, **Benoit SL**, Maier RJ.

Host hydrogen rather than that produced by the pathogen is important for *Salmonella enterica* serovar Typhimurium virulence. *Infection and Immunity*, **2015**, Vol. 83, 311-316.

**27**- **Benoit SL**, Maier RJ.

 Twin-arginine translocation system in *H. pylori*: TatC, but not TatB, is essential for viability.

 *mBio*, January 21, **2014**.

**26**- Lamichhane-Khadka R, **Benoit SL,** Maier S, Maier RJ.

A link between gut community metabolism and pathogenesis: molecular hydrogen-stimulated glucarate catabolism aids *Salmonella* virulence. *Open Biology*, **2013**, Dec.4.

## 25- Benoit SL, Bayyareddy K, Mahawar M, Sharp JS, Maier RJ.

Alkyl hydroperoxide reductase repair by *Helicobacter pylori* methionine sulfoxide reductase. *Journal of Bacteriology*, **2013**, Vol.195, p.5396-5401.

## 24- Gilbreath JJ, Pich OQ, Benoit SL, Besold AN, Cha JH, Maier RJ, Michel SL, Maynard EL, Merrell DS.

##  Random and site-specific mutagenesis of the *Helicobacter pylori* uptake regulator provides

##  insight into Fur structure-function relationships. *Molecular Microbiology*, 2013, Vol.89, p.304-323.

## 23- Benoit SL, Miller E, Maier RJ.

 *Helicobacter pylori* stores Ni to aid its host colonization. *Infection and Immunity*, **2013**, Vol. 81, p. 580-584

## 22- Benoit SL, Seshadri S, Lamichhane-Khadka R, Maier RJ.

 *Helicobacter hepaticus* NikR controls urease and hydrogenase activities *via* the NikABDE and HH0418 putative nickel import proteins. *Microbiology*, **2013**, Vol. 159, p.136-146.

**21-** Kuhns LG, Mahawar M, Sharp JS, **Benoit SL**,Maier RJ.

Role of *Helicobacter pylori* methionine sulfoxide reductase in urease maturation. *Biochemical Journal* **2013**, Vol. 450, p. 141-148.

**20- Benoit SL**, McMurry JL, Hill SA, Maier RJ.

*Helicobacter pylori* hydrogenase accessory protein HypA and urease accessory protein UreG compete with each other for UreE recognition. *BBA gen. subjects*, **2012**, Vol.1820, p.1519-1525.

**19- Benoit SL**,Maier RJ.

Mua (HP0868) is a nickel-binding protein that modulates urease activity in *Helicobacter pylori*. *mBio*. April 19, **2011**.

**18-** Carpenter BM, Gancz H, **Benoit SL**, Evans S, Olsen C, Michel SL, Maier RJ, Merrell DS.

Mutagenesis of conserved amino acids of *Helicobacter pylori* Fur reveals residues important for function. *Journal of Bacteriology*, **2010**, Vol. 192, p. 5037-5052.

**17-** Shi R, Munger C, Assinas A, **Benoit SL**, Miller E, Matte A, Maier RJ, Cygler M.

Crystal Structures of Apo and Metal-Bound Forms of the UreE Protein from *Helicobacter pylori*; Role of multiple metal binding sites. *Biochemistry*, **2010**, Vol. 49, p. 7080-7088.

**16-** Brahmachary P, Wang G, **Benoit SL**, Weinberg MV, Maier RJ, Hoover TR.

The human gastric pathogen *Helicobacter pylori* has a potential acetone carboxylase that enhances its ability to colonize mice. *BMC Microbiology*, **2008**; Jan 23, p. 8-14.

**15- Benoit SL**, Zbell AL, Maier RJ.

Nickel enzyme maturation in *Helicobacter hepaticus*: roles of accessory proteins in hydrogenase and urease activities. *Microbiology*, **2007**, Vol. 153, p. 3748-3756.

**14-** Zbell AL, **Benoit SL**, Maier RJ.

Differential expression of NiFe uptake-type hydrogenase genes in *Salmonella enterica* serovar Typhimurium. *Microbiology*, **2007**, Vol. 153, p. 3508-3516.

**13**-Seshadri S, **Benoit SL**,Maier RJ.

Roles of His-rich Hpn and Hpn-like proteins in *Helicobacter pylori* nickel physiology. *Journal of* *Bacteriology*, **2007**, Vol. 189, p. 4120-4126.

**12- Benoit SL,** Mehta N, Weinberg M, Maier C, Maier RJ.

Interaction between the *Helicobacter pylori* accessory proteins HypA and UreE is needed for urease maturation. *Microbiology*, **2007**, Vol. 153, p. 1474-1482.

**11-** Maier RJ, **Benoit SL**,Seshadri S.

Nickel-binding and accessory proteins facilitating Ni-enzyme maturation in *Helicobacter pylori*. *Biometals*, **2007**, Vol. 20, p. 655-664.

**10-** **Benoit SL,** Mehta NS, Mysore J, Maier RJ.

*In vitro* and *in vivo* characterization of alkyl hydroperoxide reductase mutant strains of *Helicobacter* *hepaticus*. *Biochimica et Biophysica Acta*, **2007**, Vol.1770, p. 257-65.

**9-** Boylan JA, Hummel C, **Benoit S**, Garcia-Lara J, Treglown J, Crane III E, Gherardini FC.

*Borrelia burgdorferi bb0728* encodes a coenzyme A disulphide reductase whose function suggests a role in intracellular redox and the oxidative stress response. *Molecular Microbiology,* **2006**, Vol. 59, p. 475-86.

**8-** Mehta NS, **Benoit S**, Mysore J, Sousa RS, Maier RJ.

Hydrogenase mutants of *Helicobacter hepaticus* are deficient in amino acid uptake and in causing hepatic inflammation in A/J mice. *Infection and Immunity*, **2005**, Vol. 73, p. 5311-5318.

**7- Benoit S,** Mehta N, Wang G, Gatlin M, Maier RJ.

Requirement of *hydD*, *hydE*, *hypC* and *hypE* genes for hydrogenase activity in *Helicobacter pylori*. *Microbial Pathogenesis*, **2004**, Vol. 36, p. 153-157.

**6-** Wang G, Conover RC, **Benoit S**, Olczak AA, Olson JW, Johnson MK, Maier RJ.

Role of a bacterial organic hydroperoxide detoxification system in preventing catalase inactivation. *The Journal of Biological Chemistry*, **2004**, Vol. 279, p. 51908-51914.

**5-** Mehta N, **Benoit S**, Maier RJ.

Roles of conserved nucleotide-binding domains in accessory proteins, HypB and UreG, in the maturation of nickel-enzymes required for efficient *Helicobacter pylori* colonization. *Microbial Pathogenesis*, **2003**, Vol. 35, p. 229-234.

**4- Benoit S**, Maier RJ.

Dependence of *Helicobacter pylori* urease activity on the nickel-sequestering ability of the UreE accessory protein. *Journal of Bacteriology*, **2003**, Vol. 185, p. 4787-4795.

**3- Benoit S**, Posey JE, Chenoweth MR, Gherardini FC.

*Treponema pallidum* 3-phosphoglycerate mutase is a heat-labile enzyme that may limit the maximum growth temperature for the spirochete. *J. of Bacteriology*, **2001**, Vol. 183, p.4702-4708.

**2- Benoit S**, Abaibo, H, Mandrand-Berthelot M-A.

Topological analysis of the aerobic membrane-bound formate dehydrogenase of *Escherichia coli*. *Journal of Bacteriology*, **1998**, Vol. 180, p.6625-6634.

**1-** Abaibou H, Pommier J, **Benoit S**, Giordano G, Mandrand-Berthelot M-A.

Expression and characterization of the *Escherichia coli fdo* locus and a possible physiological role for aerobic formate dehydrogenase. *Journal of Bacteriology*, **1995**, Vol. 177, p.7141-7149.

**BOOK CHAPTERS**

**2- Benoit SL,** Maier RJ.

Role of Nickel ions in biological systems. *In* Encyclopedia of metalloproteins, 2013, Kretsinger, R. H., Permakyov, E. A., Uversky, V. N. Springer. New York.

**1- Benoit SL,** Maier RJ.

Hydrogen and Nickel metabolism in *Helicobacter* species. *In* Incredible anaerobes: from physiology to genomics to fuel, 2008, Vol. 1125, p.242-251.Wiegel, J., Maier, R. J., Adams, M. W, Eds. Annals of the New York Academy of Sciences. New York.

**PRESENTATIONS AND SEMINARS**

**15. Benoit SL.**

NIF system and iron-sulfur clusters network in *Helicobacter pylori*. Oral presentation, 11th International Biometals Symposium, Ottawa, Canada, 2018.

**14- Benoit SL**,Holland, AA, Johnson, MK**,** Maier RJ.

The Nif system of *Helicobacter pylori*: identifying a Nfu-type carrier protein and its iron-sulfur targets. Poster, 117th ASM general meeting, New Orleans, LA, 2017.

**13- Benoit SL,** Maier RJ.

 The gastric pathogen *Helicobacter pylori* can store nickel to aid colonization of the host. Poster,

8th International Biometals Symposium, Brussels, Belgium, 2012.

**12- Benoit SL,** Maier RJ.

Mua (HP0868) is a nickel-binding protein that modulates urease activity in *Helicobacter pylori*

Poster, 111th ASM general meeting, New Orleans, LA, 2011.

**11- Benoit SL**.

The quest for nickel in *Helicobacter pylori*. Oral presentation, Microbiology Department Fall seminars, University of Georgia, Athens, GA, October 2010.

**10- Benoit SL,** Maier, RJ.

Link between hydrogen use and cholesterol metabolism in *Helicobacter pylori*. Poster,

9th International Hydrogenase Conference, Uppsala, Sweden, 2010.

**9-** Carpenter BM, Gancz H, **Benoit SL**, Evans S, Michel SL, Maier RJ, Merrell DS.

Analysis of Site Specific Amino Acid Mutations in the Ferric Uptake Regulator of *Helicobacter pylori*. Poster, 110th ASM general meeting, San Diego, CA, 2010.

**8- Benoit SL**,Maier RJ.

Construction and characterization of *Helicobacter pylori tatB* and *tatC* mutants: requirement for fully functional twin arginine translocation system for mouse colonization. Poster, 109th ASM general meeting, Philadelphia, PA, 2009.

**7-** Zbell A, **Benoit SL**, Maier RJ.

*Salmonella typhimurium* uptake-type hydrogenases are differentially expressed *in vivo*.

Poster, 8th International Hydrogenase Conference. Breckenridge, CO, 2007.

**6-** **Benoit SL,** Zbell A, Maier RJ.

Nickel supplementation cannot restore nickel-enzyme activities in *Helicobacter hepaticus* accessory protein disruption strains. Poster, 106th ASM general meeting, Orlando, FL, 2006.

**5-** Boylan J, **Benoit S,** Garcia-Lara J, Gherardini FC.

The regulation and functional characterization of B*orrelia burgdorferi* NADH oxidase Poster, 105th ASM general meeting, Atlanta, GA, 2005.

**4- Benoit S**, Maier RJ.

Dependence of *Helicobacter pylori* urease activity on the nickel-sequestering ability of the UreE accessory protein. Poster, 103rd ASM general meeting, Washington, DC, 2003.

**3- Benoit S**, Posey JE, Chenoweth MR, Gherardini FC.

Preliminary characterization of a temperature-sensitive glycolytic enzyme, 3-phosphoglycerate mutase (Gpm) from *Treponema pallidum*.Poster, 100th ASM general meeting, Los Angeles, CA, 2000.

**2- Benoit S,** Abaibou H, Mandrand-Berthelot M.A.

Modèle topologique de la formiate déshydrogénase membranaire aérobie chez *Escherichia coli*. Oral presentation, 25th meeting of the young researchers, Quebec, Canada, 1998.

**1- Benoit S**, Abaibou H, Mandrand-Berthelot M-A.

Membrane topology of the aerobic formate dehydrogenase of *Escherichia coli.* Poster, Anaerobic metabolism and electrons transfer systems meeting, Marseille, France, 1997.

## MEMBERSHIPS

American Society of Microbiology (since 2003).

International Biometals Society (since 2011).

## LANGUAGES AND CITIZENSHIP

English: fluent.

French: mother language.

American and French dual citizenship.

German and Spanish: basic knowledge.

## REFERENCES  *\_\_\_\_a*

## 1. *Robert J. MAIER, Ph.D* (Professor and Georgia Research Alliance Eminent Scholar, current employer)

#### Department of Microbiology, University of Georgia, 803, Biological Sciences Building,

Athens, Georgia, 30602, USA.

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## *2. Timothy R. HOOVER, Ph.D* (Professor and Department Head)

#### Department of Microbiology, University of Georgia, 548, Biological Sciences Building,

#### Athens, Georgia, 30602, USA.

Ph: 706 542 2675. Fax: 706 542 2674. E. mail: trhoover@uga.edu

**3.** *Stuart A.* ***THOMPSON***, *Ph.D.* (Professor)

Section of Infectious Diseases, Department of Medicine, Georgia Regents University

1461 Laney-Walker Blvd., Augusta, Georgia, 30912, USA.

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