CURRICULUM VITAE

1. PERSONAL INFORMATION

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2. PROFESSIONAL SUMMARY

I am a scientist with a transdisciplinary background in microbiology and nanotechnology with a record of accomplishments in biomedical research. My career is dedicated to exploring the therapeutic potential of nanomaterials and prebiotics with antimicrobial properties, aiming to develop innovative solutions to combat emerging and drug-resistant strains. My research portfolio includes designing novel antimicrobial nanomaterials and studying the antagonistic interactions of probiotic bacteria against various pathogens.

During my postdoctoral tenures at UConn Health and The UTSA, I honed my skills in microbiology, pathogenesis, nanocharacterization, and biofilm research. I have made significant contributions to the field, with numerous publications and a patent application for my research on antimicrobial nanomaterials. My scientific leadership and achievements have been recognized by prestigious organizations such as the NSF's Accelerate/I-CORPS programs.

Beyond academia, I have engaged in science communication, public outreach, and education, serving as a science communication coordinator and adjunct professor. I also champion Diversity, Equality, and inclusion initiatives. I am passionate about bridging the gap between scientific advancements and their societal impact. My long-term aspiration is to develop cutting-edge solutions to combat emerging and multidrug-resistant pathogens, contributing to global efforts in combating infectious diseases.

As a scientist with a strong transdisciplinary foundation in microbiology and nanotechnology, I bring a unique perspective and skill set to tackle the challenges at the interface of nanomaterials and microorganisms. My dedication to advancing the field, coupled with my passion for collaborative working, scientific communication, and mentoring, positions me to contribute significantly to developing novel medical solutions.

3. EDUCATION

Doctor of Sciences degree, Material Physics focused in Bionanotechnology.
National Autonomous University of Mexico (UNAM) and Center of Scientific Research and Higher Education of Ensenada (CICESE). Ensenada, Mexico; December 2017.
My research focused on the interactions between antimicrobial nanomaterials, microbial pathogens, antibiotics, and environmental factors for designing better treatments to combat infectious diseases.

- Leadership: Science communication coordinator (International Network of Bionanotechnology), thesis director (Bachelor of Sciences students), CICESE's Science Summer program (instructor), col-led a collaboration with physicians to design novel nanotechnology-based treatments for topical infections
- Publications: Four research articles on nanomedicine, two articles on nano-education, and two book chapters (nanoeducation and radio communication for science outreach).
- Scholarships: Doctor of Science degree program (Mexican Council of Science -CONACYT), Travel Award for a lab rotation at the UTSA's Department of Physics and Astronomy (2015, 2016), Science podcast creation (CONACYT)

- Awards: best doctoral dissertation of the year (2017), CICESE's most cited research article of the year from a doctoral thesis (2020 and 2022).

Master of Sciences degree, Life Sciences focused in Microbiology.
Center of Scientific Research and Higher Education of Ensenada. Ensenada, Mexico; September 2013.
My research focused on the antifungal effects of antimicrobial nanomaterials against Candida species for assessing its therapeutic potential to combat fungal infections.

- Leadership: Class president (2012), col-led a collaboration with veterinarians to design novel nanotechnology-based treatments against infectious diseases.
- Publications: one research article (first author, nanomedicine), one book (co-author, bionanotechnology, science communication).
- Scholarships: Master of Science Degree program (CONACYT)
- Awards: Baja California State's Youth Leadership Awards in the field of Sciences (2012), CICESE's most cited research article of the year from a Master's thesis (2017 and 2021).

Bachelor of Sciences degree, Biology.
Baja California State University (UABC); Ensenada, Mexico; July 2011

- Leadership: Class president (2010), President of the School of Sciences Alumni Association (2010), State Chief of the presidents at the UABC Ensenada Alumni Association (2011),
- Scholarships: Research assistant, Mexican National Committee for the Biodiversity, Mexico (2011),
- Awards: Rotary International's Rotaract Club Youth Leadership Awards (2011).

4. KEY SKILLS

4.1. Transferable skills

- Written and Oral communication: I have published scientific and non-scientific texts (at least 25 academic articles and books, and more than 10 works in newspaper notes), and imparted conferences for non-scientist, industry representatives, and politicians about science, technology, art, and communication (>50).
- Collaboration: I have generated and maintained successful collaborative work with diverse, international teams across different scientific disciplines, arts, and the industry.
- Leadership and Team working: I can work well with diverse groups of people and I have led diverse projects. I create supportive and collaborative environments.
- Project and time management: I am very organized and goal-oriented.
- Mentorship: I gained mentorship skills during my professor and instructor positions.
- Motivation: I am highly motivated. I continuously look at how to perform best in all aspects of my life and accept challenges and new opportunities to learn and improve.
- Adaptability and Resilience: I have worked in different countries, institutions, and positions with diverse people. I embrace change and have the flexibility to adapt fast to diverse circumstances.
- Creativity and Problem-solving: the diversity of my experiences throughout my career has boosted my creativity and ability to approach problems from different angles and perspectives to solve them.
- Analytical and critical thinking: My strong and transdisciplinary foundations provided me with solid analytical and critical skills to understand a problem, ask relevant questions, and find optimal solutions.
- Intellectual curiosity: I crave constantly acquiring new knowledge. My background in sciences, art, and communication encourages me to assess the different and best possibilities in any situation.

4.2. Research and Technical skills

- Microbiology techniques: Experience with industrially and medically relevant bacteria, fungi, and algae. My skills include isolation, culturing, microbiological/molecular identification, and metabolic/genomic characterization. Experience in research and testing of antimicrobial compounds.
- Nanotechnology techniques: design, characterization (i.e., Electron Microscopy, X-Ray Diffraction, UV-Vis, Zeta-sizer), and synthesizing metallic and non-metallic nanomaterials. Experience with assessing the potential toxicity and properties of pharmaceutical, veterinary, and agricultural interests.
- Bioinformatics: bacterial genome assembly (SPADES), annotation (Prokka), and assess their potential to produce metabolites of industrial or pharmaceutical interest.
- Animal work (murine models): design and perform infection research, obtain and process biological samples (histology, PCR, CFUs).
- Cell culture work: on human epithelial cell lines for toxicity and microbial infection.
- Statistical analysis: I am proficient in using diverse statistical analysis software: GraphPad Prism, Origin, and R.
- Computer skills: I am proficient using diverse computer software. Some examples are Office (Word, PowerPoint, and Excel), Adobe (Acrobat, Photoshop and Audition), Imaging (ImageJ, Zeiss Zen, Imaris package), programming (R and python), Citation management (Mendeley).

5. PROFESSIONAL EXPERIENCE

Postdoctoral Fellow. University of Connecticut Health Center
Farmington, Connecticut, USA. November 2020 - Current

- **Research**: Research on the interactions between oral probiotics and pathogenic members of the oral microbiome for targeting novel therapeutic approaches to prevent and treat oral infections. My work reported that prebiotic- and probiotic-based diets attenuate *Candida* oral infections, and open the door to novel therapeutic approaches to combat oral diseases. Collaborating with other labs, I led Whole Genome Sequencing studies on two oral bacteria relevant to oral health. I co-designed a new model for Candida oral infections in murine models. My work resulted in four published articles and one book chapter as the first author and one article as a co-author. I also wrote and submitted an NIH K99/R00 grant proposal.
- **Technology Development and Innovation**: I designed innovative nanotechnology-based formulations for disinfecting applications as part of the NSF-funded Innovation Corps program via MIT's I-corps and UConn's Accelerate program. I got funding to develop a prototype and assess the commercial viability of the product, finding interested parties in my technology.
- **Collaborative research**: I co-led our lab collaborations with other research groups and a private company for solving research questions on clinical microbiology, improving drug-delivery methods to combat infections, and characterizing the antimicrobial potential of novel materials.

- Relevant skills: murine models, cell culture, bioinformatics (microbial metagenomics), microbiology techniques (molecular characterization), leadership, resilience, grantsmanship, project/time management, and mentorship. Leadership: Postdoctoral Association President, postdoc representative in diversity committees. Awards: NSF's Innovation Corps (via MIT & UConn), phases 1 and 2. Associate for the Intersections Science Fellows Symposium 2023.

Postdoctoral Fellow. The University of Texas at San Antonio and The South Texas Center for Emerging Infectious Diseases (Texas, USA)
San Antonio, Texas, USA; November 2018 – October 2020

- **Research**: I researched antimicrobial nanomaterials, improving the synthesis methods for silver and bismuth nanoparticles, and tested their antimicrobial properties against emerging and multidrug-resistant

pathogens. As the co-Principal Investigator, I proposed and submitted my research postdoctoral project. I published six research articles (all as the first author, two as the corresponding).

- **Technology development**: I designed a novel protocol for synthesizing antimicrobial bismuth nanoparticles. With the UTSA, we submitted the patent application (UTSA-P0114US-P1).
- **Collaborations**: I led the studies on the effect of novel compounds on the ultrastructure of the microbial cell. I co-authored two research articles.

- Relevant skills: bacterial and fungal biofilm research, advanced nanocharacterization (EDX, XRD, TEM), microbial metabolic characterization, leadership, resilience, grantsmanship, project/time management, and mentorship. Awards: postdoctoral fellowship funding by the Mexican Council of Sciences (CONACYT) and The UTSA; invited postdoc speaker for the 2019 San Antonio Military Health and Universities Research Forum.

Consultant. BioBaja. Cluster of Bioeconomy (Tijuana, Mexico).
Mexico; 2017-2018
I led a transdisciplinary team for developing and reviewing project proposals for private industries in the biotechnology field. Relevant skills: leadership and project management, resilience, grantsmanship, and mentorship.

Field scientist. Mexican Oil Secretary (PEMEX), Department of Energy of Mexico (SENER)
Mexico; 2015-2018
I oversaw the oceanic microbiology lab on different research cruises, as part of a large nationwide multi-institutional project led by different universities and the Mexican Department of Energy. I supervised and conducted studies for hydrocarbonoclastic bacteria discovery. Relevant skills: leadership and project management, adaptability, innovation, grantsmanship, team management, and mentorship.

Science Communication Coordinator. International Network of Bionanotechnology (BIONN), National Council of Science and Technology of Mexico (CONACYT).
Mexico; 2014-2017
I coordinated media communication and science outreach for the International Network of Bionanotechnology, particularly interviews with local and national media, publishing science communication materials, and organizing conferences, workshops, and other activities for diverse publics. I led a team of graduate and undergrad students with a background in science and communication. Relevant skills: leadership, communication, and team management.

Adjunct Professor.

- Unifront College University. Ensenada, Mexico; February – October 2018. General Biology and Introduction to Chemistry courses for undergraduate students.
- Institute of Technology of Ensenada (Mexico). May – November 2017. Introduction to Chemistry course for undergraduate students.
- The National University of Mexico (UNAM). Mexico, 2014-2016. Biological Systems course for undergraduate students. I directed two Bachelor of Sciences theses on antimicrobial nanomaterials and nanotoxicity and co-directed the thesis of a technical university degree.

Skills: written and oral communication, adaptability, innovation, project/time management, team management, and mentorship.

Other professional activities

- Editor, MDPI. Guest Editor of Antibiotic's Special Issue "Antimicrobial and Antibiofilm activity of Nanomaterials: From Bacteria to Yeast." 2022

- Editor, Frontiers. Review Editor in "Infectious Agents and Diseases," and "Biomedical Nanotechnology." Guest Associate Editor in "Nanofabrication." 2022
- Advisor, REDi, Network for Actions and Innovations to Combat COVID-19, Mexico, 2020
- Research Assistant. Laboratory of Invertebrates, School of Sciences, University of Baja California. Ensenada, Mexico, 2010. Field and bench work
- Research Assistant. Department of Catalysis, UNAM's Center of Nanosciences and Nanotechnology. Ensenada, Mexico, 2009-2010

6. PUBLICATIONS AND PRESENTATIONS:

I have published more than 25 peer-reviewed articles and book chapters, and science communication books most of them as the first author. My work has more than 900 citations, h-index 14, and i10-index 15 (Google Scholar metrics). I have presented talks and posters in more than 50 spaces, including academic conferences, mass media (radio, TV, and newspapers), forums, etc.

Patents:

Patent application entitled "Synthesis of Antimicrobial PVP-coated Bismuth Nanoparticles." Novel synthesis method for antimicrobial activity bismuth nanoparticles against multidrug-resistant bacteria and fungi. Filed on April 2021 (U.S. Patent Application 63/176,086).

Research articles:

1) **Vazquez-Munoz, R**., Thompson, A., Sobue, and Dongari-Bagtzoglou, A. A prebiotic diet modulates the oral microbiome composition and results in the attenuation of oropharyngeal candidiasis in mice. Spectrum, *in press* (Accepted on July 06, 2023).
2) **Vazquez-Munoz, R**., Russell, JT., Thompson, A., Zhou, Y., and Dongari-Bagtzoglou, A. (2023). Whole-Genome Sequencing of Lactobacillus johnsonii MT4, a Novel Strain Isolated from the Oral Cavity of C57BL/6 Mice. Microb.Res. Ann. 12. PMC10190266
3) **Vazquez-Munoz, R**., Thompson, A., Russell, JT., Sobue, T., Zhou, Y., and Dongari-Bagtzoglou, A. (2022). Insights from the *Lactobacillus johnsonii* genome suggest the production of metabolites with antibiofilm activity against the pathobiont *Candida albicans*. Front. Microbiol. 13. PMC8940163
4) Bertolini, M., **Vazquez Munoz, R**., Archambault, L., Shah, S., Souza, J. G. S., Costa, R. C., Thompson, A., Zhou, Y., Sobue, T., & Dongari-Bagtzoglou, A. (2021). Mucosal bacteria modulate C*andida albicans* virulence in oropharyngeal candidiasis. MBio, 12(4). PMC8406182
5) **Vazquez-Munoz, R**., and Dongari-Bagtzoglou, A. (2021). Anticandidal activities by *Lactobacillus* Species: An update on mechanisms of action. Front. Oral Health. 2, 47. PMC8757823
6) **Vazquez-Munoz, R**.; Arellano-Jimenez, M. J.; & Lopez-Ribot, J. (*2020*). Bismuth nanoparticles obtained by a facile synthesis method exhibit antimicrobial activity against *Staphylococcus aureus* and *Candida albicans*. BMC biomed eng 2, 11. PMC7558697
7) **Vazquez-Munoz, R**.; Bogdanchikova, N.; and Huerta-Saquero, A. (2020). Beyond the Nanomaterials Approach: Influence of culture conditions on the stability and antimicrobial activity of silver nanoparticles. ACS Omega ACS Omega 2020, 5, 44, 28441–28451. PMC7658933
8) **Vazquez-Munoz, R.**; Lopez, F.D.; Lopez-Ribot, J.L. (2020). Bismuth Nanoantibiotics Display Anticandidal Activity and Disrupt the Biofilm and Cell Morphology of the Emergent Pathogenic Yeast *Candida auris*. Antibiotics 9(8), 461. PMC7460268
9) **Vazquez-Munoz, R.;** Lopez-Ribot, J.L. (2020). Nanotechnology as an Alternative to Reduce the Spread of COVID-19. Challenges 2020, 11, 15. https://doi.org/10.3390/challe11020015
10) **Vazquez-Munoz, R.**; Lopez, F. D.; & Lopez-Ribot, J. L. (2020). Silver nanoantibiotics display strong antifungal activity against the emergent multidrug-resistant yeast *Candida auris* under both planktonic and biofilm growing conditions. Frontiers in Microbiology, 11, 1673. PMC7399222
11) **Vazquez-Munoz, R.**; Arellano-Jimenez, M. J., & Lopez-Ribot, J. L. (2020). Fast, facile synthesis method for BAL-mediated PVP-bismuth nanoparticles. MethodsX, 7, 100894. PMC7210455

12) Jagadesan, P.; Yu, Z.; Barboza-Ramos, I.; Lara, H.H.; **Vazquez-Munoz, R**.; López-Ribot, J.L.; Schanze, K.S. (2020) Light-Activated Antifungal Properties of Imidazolium-Functionalized Cationic Conjugated Polymers. Chem. Mater, acs.chemmater.0c02076, https://doi.org/10.1021/acs.chemmater.0c02076.
13) Phan, D.C.; **Vazquez-Munoz, R.**; Matta, A.; Kapoor, V. (2020). Short-term effects of Mn_2O_3 nanoparticles on physiological activities and gene expression of nitrifying bacteria under low and high dissolved oxygen conditions. Chemosphere 127775, PMID: 32738717
14) **Vazquez-Muñoz R.**; Meza-Villezcas A.; Fournier P.G.J., Soria-Castro E.; Juarez-Moreno K.; Gallego-Hernández A.L.; Bogdanchikova N.; Vazquez-Duhalt R.; Huerta-Saquero A. (2019). Enhancement of antibiotics antimicrobial activity due to the silver nanoparticles impact on the cell membrane. PLOS ONE, 14(11), e0224904. PMC6839893
15) **Vazquez-Muñoz, R.**; Arellano-Jimenez, M. J.; Lopez, F. D.; & Lopez-Ribot, J. L. (2019). Protocol optimization for a fast, simple, and economical chemical reduction synthesis of antimicrobial silver nanoparticles in non-specialized facilities. BMC Research Notes, 12(1), 773. PMC6882050
16) **Vazquez Muñoz, R.** & Huerta Saquero, A. (2018). Toxicidad de los nanomateriales de interés biomédico en los sistemas biológicos. Mundo Nano. Revista Interdisciplinaria En Nanociencia y Nanotecnología, 11(20), 65. https://doi.org/10.22201/ceiich.24485691e.2018.20.62715
17) **Vazquez-Muñoz, R**.; Borrego, B.; Juárez-Moreno, K.; García-García, M.; Mota Morales, J.; Bogdanchikova, N. & Huerta-Saquero, A. (2018). Silver Nanoparticles as Nanoantibiotics: A Comparative Analysis of their Toxicity on Biological Systems of Different Complexity. RECIT, 1(1), 8–11. https://doi.org/10.37636/recit.v11811
18) **Vazquez-Muñoz, R.**; Borrego, B.; Juárez-Moreno, K.; García-García, M.; Mota Morales, J.D.; Bogdanchikova, N. & Huerta-Saquero, A. (2017). Toxicity of silver nanoparticles in biological systems: Does the complexity of biological systems matter? Toxicology Letters, 276, 11–20. PMID: 28483428
19) **Vazquez-Muñoz, R.** & Takeuchi, N. (2017). Enseñanza de la nanotecnología en educación secundaria: teoría y práctica. MOMENTO - Revista de Física, 16(54), 38–50. https://doi.org/http://dx.doi.org/10.15446/mo
20) **Vazquez-Muñoz, R.**; & Takeuchi, N. (2017). Ag Nanoparticles to Eliminate Microorganisms in Wastewater: A Science Experiment in Junior High School. J. Nano Ed., 8(2), 114–118. https://doi.org/10.1166/jne.2016.1093
21) Bogdanchikova, N.; **Vazquez-Muñoz, R.**; Huerta-Saquero, A.; Pena-Jasso, A.; Aguilar-Uzcanga, G.; Picos-Díaz, P.L., Pestryakov, A.; Burmistrov, V.; Martynyuk, O.; Luna-Vázquez-Gómez, R. & Almanza, H. (2016). Silver nanoparticles composition for treatment of distemper in dogs. International Journal of Nanotechnology, 13(1/2/3), 227. https://doi.org/10.1504/IJNT.2016.074536
22) **Vazquez-Muñoz, R**. & Huerta-Saquero, A. (2015). Nanomateriales con actividad microbicida: una alternativa al uso de antibióticos. Mundo Nano. Revista Interdisciplinaria En Nanociencias y Nanotecnología, 7(13), 37–47. https://doi.org/10.22201/ceiich.24485691e.2014.13.48707
23) **Vazquez-Muñoz, R**.; Avalos-Borja, M. & Castro-Longoria, E. (2014). Ultrastructural Analysis of Candida albicans When Exposed to Silver Nanoparticles. PLoS ONE, 9(10), e108876. PMC4188582

Books and Book chapters:

1) **Vazquez-Muñoz R**. (2023). Chapter 1: “Overview and Summary of Infectious Disease and Challenges”, in the book “Smart Nanomaterials to Combat the Spread of Viral Infections: Advanced Strategies for the Prevention of Viral Infections.” Editors Raju Khan and Abubakar Sadique. Publisher: Elsevier Science, ISBN-13: 978-0323991483
2) **Vazquez-Muñoz R**. (2020). Chapter “La radio cientifica en Mexico: situacion actual”; p. 81; in the book “Ventanas a la divulgacion cientifica”, Ed. Universidad Autonoma de Baja California. Mexicali, Mexico.
3) **Vazquez-Muñoz R**.; & Takeuchi, N. (2014). Chapter 4, section 1.5 “La nanoescala en los seres vivos”. In the book “Guia Didatica para la enseñanza de la Nanotecnologia en Educacion Secundaria”. ISBN-13 978-84-15413-33-2, Spain.

Conference papers:

1) Cazares-Morales, A.; Cordero-Esquivel, B.; Huerta Saquero, A.; Soria-Castro E.; **Vazquez-Muñoz, R**.; (2019). Nanomaterials of Biomedical Interest: potential toxicity on microalgae. Tex. J. Micros. 50:1 p14.
2) **Vazquez-Muñoz, R**.; Borrego, B.; Juárez-Moreno, K.; García-García, M.; Mota Morales, J Bogdanchikova, N.; Huerta-Saquero, A. (2018). Silver Nanoparticles as Nanoantibiotics: A Comparative Analysis of their Toxicity on Biological Systems of Different Complexity. Rev. Ciencias Tec, 1, 8–11.
3) **Vazquez-Muñoz, R**.; Borrego, B.; Juárez-Moreno, K.O.; García-García, M.; Mota-Morales, J.; Bogdanchikova, N.; Huerta-Saquero, A. (2016). Toxicity of silver nanoparticles in biological systems: Does the complexity of biological systems matter? Toxicol. Lett., 259, S190–S191, doi:10.1016/j.toxlet.2016.07.455. (PP19.11)
4) **Vazquez-Muñoz, R.**; Bogdanchikova, N. & Huerta Saquero, A. (2016). Nano Antibiotics: An Alternative to Combat Emergent Infectious Diseases. Nanomedicine: Nanotechnology, Biology and Medicine, 12(3), 823–833. https://doi.org/10.4172/2324-8777.S4-001

7. CERTIFICATIONS AND PROFESSIONAL AFFILIATIONS

Certifications:

- Radio hosting and communication (2014). By Radio Media Communication.
- HIPAA Privacy Training (2020)
- Radiation Safety Training (2020)
- Blood-Borne Pathogens Training (2020, 2021, 2023)
- Security Awareness Training (2021, 2022)
- Compliance & Ethics Training (2021, 2022, 2023)
- Infection Prevention Training (2021, 2022)

Affiliations:

- National Nanotechnology Initiative, a U.S. Government R&D initiative. Member since 2022
- Association for Professionals in Infection Control and Epidemiology (APIC), US, Member, 2021-2022
- UConn Health's School of Medicine Diversity Council. Postdoc representative, since 2021
- Uconn Health's Graduate School Diversity, Equality, and Inclusion Committee. Postdoc representative, 2021-2023
- Postdoctoral Association Leadership Council, UConn Health, US. Member since 2021, President 2022-2023. Co-organized the Postdoctoral Research Day in 2021, 2022, and 2023.
- Microbiology Society, United Kingdom. Member since 2019
- American Society of Microbiology, US. Member since 2019
- National Postdoc Association, US. Member since 2018
- National Center for Faculty Development & Diversity, US. Member since 2018
- Passport to the Path of Scientific Knowledge, science education program, Mexican Academy of Sciences, Baja California, Mexico. Member, 2016-2020; State Program Coordinator (2016-2018)
- Research Consortium of the Gulf of Mexico (CIGOM), Department of Energy of Mexico. Member, 2015-2017
- Texas Society of Microscopy. Member since 2015
- Mexican Society for the Popularization of Science and Technology (SOMEDICYT). Member since 2014
- CONACYT's International Network of Bionanotechnology (BIONN). Member, 2010-2017
- Association of Professional Biologists of Ensenada, Mexico. Member, 2009-2015; President 2013-2014.

Volunteering affiliations:

- Diversity Taskforce, National Postdoc Association, US. 2022-2023
- West Harford's Farmers Market, 2022
- Volunteer Match online platform, 2019
- Clubes de Ciencia Mexico, instructor, 2017
- Summer of Sciences, instructor, 2014
- Rotary International's Thousand Smiles program, 2000-2002
- Ciencia Pumita, Association for nanotechnology education, UNAM, Mexico. Since 2010

8. LANGUAGES

- Spanish: native
- English: advanced

9. INTERESTS

- Community engagement
- Art and culture
- Writing and reading
- Learning languages
- Traveling
- Physical activity

REFERENCES

Available upon request