

CURRICULUM VITÆ

Alejandro J. Vila

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Education

1. Analytical Chemist, UCA, 1984.
2. Licenciata in Chemistry (with Honors), UCA, 1986.
3. Ph. D., University of Rosario (UNR), 1990 (*Summa cum laudæ*).

Present Positions

1. Associate Professor, Biophysics Section, Department of Biological Chemistry, UNR, 1999-.
2. Principal Researcher, CONICET (National Research Council - Argentina), 2006.
3. International Research Scholar, Howard Hughes Medical Institute (2002-2006 and 2007-2011).
4. Head of the Biomolecular NMR Facility, Rosario.

Research Group Composition

Two postdocs, seven PhD students, two undergraduates.

Teaching Experience and Previous Positions

1. Teaching Assistant, Inorganic Section, Dept.Physical Chemistry, UNR, 1986-1991.
2. Assistant Professor, Biophysics Section, Dept.Biological Chemistry, FCByF, UNR, 1993-1999.
3. Visiting Researcher, Beckman Institute, California Institute of Technology, 1996.
4. Visiting Professor, University of Valencia (Spain), 1998.
5. Visiting Professor, SISSA (Trieste, Italy), 2000.
6. Visiting Professor, University of Florence (Italy), 2008.

Honors and Awards

- Eduardo de Robertis Award for Young Researchers, Federal Secretary of Science and Technology (Argentina, 1994).
- Ernesto E. Galloni Award in Experimental Physical Chemistry, National Academy of Sciences (Argentina, 1995). This Award is given every year to an outstanding scientist under the age of 35 in the field of chemistry, physics or mathematics.
- Ranwell Caputto Award in Chemistry, National Academy of Sciences (Argentina, 2000). This Award is given yearly to an outstanding researcher in Chemistry under 40 years.
- Rafael Labriola Award, Argentinean Chemical Society, 2004. This Award is given every 3 years to an outstanding researcher in Chemistry under 45 years.
- International Research Scholar, Howard Hughes Medical Institute, USA, Selected for two periods (2002-2006 and 2007-2011).
- José Gómez Ibáñez Lecturer, Department of Chemistry, Wesleyan University, 2008.

Involvement in Scientific Journals (member of boards)

Member of Editorial Advisory Boards: *Journal of Biological Inorganic Chemistry*, 1998-2001, *European Journal of Inorganic Chemistry*, (2000-2006); *Journal of Inorganic Biochemistry*, 2003-2010, *Accounts of Chemical Research*, 2006-2011.

Actual Grant Support from HHMI (USA), NIH (USA) and ANPCyT (Argentina).

Professional Activities and Services to the Community (selected)

- Chairman of the XXXIII Meeting of the Argentinean Biophysical Society, 2006.
- Council Member, Institute of Molecular and Cell Biology, IBR.
- Member of the International Organizing Committee, First Latin American Protein Society Meeting, Angra dos Reis, Brasil, 2004.
- Council Member, Argentinean Biophysical Society, 1997-present.
- *Ad hoc* member of study sections, CONICET.
- External reviewer, NSF, FAPESP.
- Reviewer of articles: *Proc.Natl.Acad.Sci.USA*, *Journal of the American Chemical Society*, *Angewandte Chemie*, *Chemical Society Reviews*, *Journal of Proteome Research*, *Biochemistry*, *Biochemical Journal*, *Protein Science*, *Analytical Biochemistry*, *PROTEINS: Structure, Function, and Bioinformatics*, *FEBS Letters*, *Inorganic Chemistry*, *Biochimica et Biophysica Acta*, *Inorganica Chimica Acta*, *European Journal of Inorganic Chemistry*, *Journal of Inorganic Biochemistry*, *Journal of Biological Inorganic Chemistry*, *Bioinorganic Chemistry and Applications*.

Scientific Publications in international peer-reviewed journals (since 2001)

74. V.A.Campos-Bermudez, A.J.Costa-Filho and A.J.Vila “Metal-dependent Inhibition of Glyoxalase II Suggests a Regulatory Mechanism of Action”, submitted.
73. L.A.Abriata, G.N.Ledesma, R.Pierattelli and A.J.Vila “Electronic Structure of the Ground and Excited States of the Cu_A Site by NMR Spectroscopy” *J.Am.Chem.Soc.*, **131**, 1939-1946. (2009)
72. P.E.Tomatis, S.M.Fabiane, F.Simona, P.Carloni, B.J.Sutton and **A.J.Vila**, “Adaptive protein evolution grants organismal fitness by improving catalysis and flexibility”, *Proc.Natl.Acad.Sci.USA*, **105**, 20605-20610 (2008).
71. L.A.Abriata, A.Cassina, V.Tórtora, M.Marín, J.Souza, L.Castro, **A.J.Vila**, R.Radi “Nitration of Solvent-Exposed Tyrosine(s) on Cytochrome *c* Triggers Heme Iron-Methionine-80 Bond Disruption: Nuclear Magnetic Resonance and Optical Spectroscopy Studies”, *J.Biol.Chem.*, **284**, 17-26 (2009).
Highlighted in the cover.
70. F.Quiñones-Falconi, M.Galicia-Velasco, P.Marchiaro, V.Ballerini, M.Mussi, **A.J.Vila**, A.M.Viale, K. Bermejo-Morales, A.S.Limansky “Emergence of *Pseudomonas aeruginosa* Strains Producing Metallo- β -lactamases of the IMP-15 and VIM-2 types in Mexico”, *Clin.Infect.Dis.*, in press (2008).
69. M.F.Tioni, L.I.Llarrull, A.A.Poeylout-Palena, M.A.Martí, M.Saggu, G.R.Periyannan, E.G.Mata, B.Bennett, D.H.Murgida and **A.J.Vila** “Trapping and Characterization of a Reaction Intermediate in Imipenem Hydrolysis by *B. cereus* Metallo- β -lactamase”, *J.Am.Chem.Soc.*, **130**, 15852-15863 (2008).
68. L.I.Llarrull, M.F.Tioni and **A.J.Vila** “Metal Content and Localization during Turnover in *B.cereus* Metallo- β -Lactamase”, *J.Am.Chem.Soc.*, **130**, 15842-15851 (2008).
67. L.A.Abriata, L.Banci, I.Bertini, S.Ciofi-Baffoni, P.Gkazonis, G.A.Spyroulias, **A.J.Vila**, S.Wang “Mechanism of Cu_A assembly”, *Nature Chem.Biol.*, **4**, 599-601 (2008).
66. L.A.Abriata, L.J.González, L.I. Llarrull, P.E.Tomatis, W.K.Myers, A.L.Costello, D.L. Tierney and **A.J.Vila**, “Engineered mononuclear variants in *Bacillus cereus* Metallo-beta-lactamase BcII are inactive”, *Biochemistry*, **47**, 8590-9 (2008).
65. P.Marchiaro, P.E.Tomatis, M.A.Mussi, F.Pasteran, A.M.Viale, A.S.Limansky and **A.J.Vila** “Biochemical characterization of metallo- β -lactamase VIM-11 from a *Pseudomonas aeruginosa* clinical strain”, *Antimicrob.Agents Chemother.*, **52**, 2250-2 (2008).
64. P.Marchiaro, V.Ballerini, T.Spalding, G.Cera, M.A.Mussi, J.Morán-Barrio, **A.J.Vila**, A.M.Viale and A.S.Limansky “A convenient microbiological assay employing cell-free extracts for the rapid characterization of Gram-negative carbapenemase producers”, *J.Antimicrob.Chemother.*, **62**, 336-344 (2008).

63. L.I.Llarrull, M.F.Tioni, J.Kowalski, B.Bennett and **A.J.Vila** “Evidence for a dinuclear active site in the metallo-beta-lactamase BcII with substoichiometric Co(II): a new mechanism for Co(II) uptake”, *J.Biol.Chem.*, **282**, 30586 - 30595 (2007).
62. J.M.González, F.J.Medrano, A.L.Costello, D.L.Tierney and **A.J.Vila** “The Zn₂ Position in Metallo-β-Lactamases is Critical for Activity: A study on Chimeric Metal Sites on a Conserved Protein Scaffold”, *J.Mol.Biol.*, **373**, 1141–1156 (2007).
61. G.N.Ledesma, D.H.Murgida, H.K.Ly, H.Wackerbarth, J.Ulstrup, A.J.Costa-Filho and **A.J.Vila** “The Met axial ligand determines the redox potential in CuA Sites”, *J.Am.Chem.Soc.*, **129**, 11884-11885 (2007).
60. V.A.Campos-Bermudez, N.R.Leite, R.Krog, A.J.Costa-Filho, F.C.Soncini, G.Oliva and **A.J.Vila** “Biochemical and Structural Characterization of Salmonella typhimurium glyoxalase II: New insights in metal ion selectivity”, *Biochemistry*, **46**, 11069-11079 (2007).
59. F.Simona, A. Magistrato, M.Vera, G. Garau, **A.J. Vila** and P.Carloni “Protonation state and substrate binding to B2 metallo-b-lactamase CphA from *Aeromonas hydrophila*”, *Proteins*, **69**, 595-605 (2007).
58. A.A.Poeylout–Palena, P.E.Tomatis, A.I.Karsisiotis, C.Damblon, E.G.Mata and **A.J.Vila** “A Minimalistic Approach to Identify Substrate Binding Features in B1 Metallo–β–Lactamases”, *Bioorg.Med.Chem.Lett.*, **17**, 5171–5174 (2007).
57. J.Morán-Barrio, J.M.González, M.N. Lisa, A.L.Costello, M.Dal Peraro, P.Carloni, B. Bennett, D.L.Tierney, A.S. Limansky, A.M.Viale and **A.J.Vila** “The Metallo-b-lactamase GOB is a mono-Zn(II) enzyme with a novel active site”, *J.Biol.Chem.*, **282**, 18286-93 (2007). **Highlighted in the cover.**
56. L.I.Llarrull, S.M.Fabiane, J.M.Kowalski, B.Bennett, B.J.Sutton and **A.J.Vila** “Asp120 locates Zn₂ for optimal Metallo-b-Lactamase Activity”, *J. Biol.Chem.*, **282**, 18276-18285 (2007). **Highlighted in the cover.**
55. M. Dal Peraro, **A.J.Vila**, P.Carloni and M. L.Klein “Role of zinc content on the catalytic efficiency of B1 metallo-β-lactamases”, *J.Am.Chem.Soc.*, **129**, 2808-2816 (2007).
54. M. W. Crowder, J. Spencer and **A.J.Vila**, “Metallo-b-lactamases: Novel Weaponry for Antibiotic Resistance in Bacteria”, *Acc. Chem.Res*, **39**, 721-728 (2006).
53. G. E. Schujman, M.Guerin, A.Buschiazco, F.Schaeffer, L.I.Llarrull, **A.J.Vila**, P.M.Alzari and D.de Mendoza “Structural basis of lipid biosynthesis regulation in Gram-positive bacteria”, *EMBO J.*, **25**, 4074-83 (2006).
52. G.Battistuzzi, M.Bellei, A.Leonardi, R.Pierattelli, A.De Candia, **A.J.Vila** and M.Sola “Reduction Thermodynamics of the T1 Cu-site in plant and fungal laccases”, *J. Biol.Inorg.Chem.*, **10**, 867-73 (2005).
51. P.Marchiaro, M.A.Mussi, V.Ballerini, F.Pasterán, A.M.Viale, **A.J.Vila**, and A.S. Limansky “Sensitive EDTA-Based Microbiological Assays for the Detection of Metallo-β-lactamases in Non-Fermentative Gram-Negative Bacteria”, *J. Clin.Microb.*, **43**, 5648-52 (2005).
50. P.E.Tomatis, R.M. Rasia, L.Segovia and **A.J.Vila** “Mimicking natural evolution in metallo-β-lactamases through second-shell ligand mutations”, *Proc.Natl.Acad.Sci.USA*, **102**, 13761-13766 (2005). **Highlighted in the cover.**
49. A.M.Davies, R.M.Rasia, **A.J.Vila**, B.J. Sutton and S.M.Fabiane “Effect of pH on the active site of an Arg121Cys mutant of the metallo-β-lactamase from *Bacillus cereus*: Implications for the enzyme mechanism”, *Biochemistry*, **44**, 4841-4849 (2005).
48. M.Dal Peraro, L.I.Llarrull, U.Rothlisberger, **A.J.Vila** and P.Carloni “Water-assisted reaction mechanism of monozinc b-lactamases”, *J.Am.Chem.Soc.*, **126**, 12661-12668 (2004).
47. R.M. Rasia and **A.J.Vila**, “Structural determinants of substrate binding to *Bacillus cereus* metallo-b-lactamase”, *J.Biol.Chem.*, **279**, 26046–26051 (2004).
46. M.Dal Peraro, **A.J.Vila**, and P. Carloni “Substrate Binding to Mononuclear Metallo-b-lactamase from *Bacillus cereus*”, *Proteins*, **54**, 412-423 (2004).
45. C.O.Fernández and **A.J.Vila** “Paramagnetic NMR of Electron Transfer Copper Proteins”, in “Paramagnetic Resonance of Metallobiomolecules” (J.Telser, editor), ACS Symposium Series, American Chemical Society, pp. 287-303 (2003).

44. R.M. Rasia and **A.J.Vila** "Mechanistic study of the hydrolysis of nitrocefin mediated by B.cereus metallo-b-lactamase" *Arkivoc*, X, 507-516 (2003). Volumen conmemorativo dedicado al Prof. E.A.Rúveda.
43. M.Dal Peraro, **A.J.Vila**, and P. Carloni "Protonation State of Asp120 in the Binuclear Active Site of the Metallo-b-lactamase from Bacteroides fragilis", *Inorg.Chem.*, **42**, 4245-4257 (2003).
42. R.M. Rasia, M.Ceolín and **A. J.Vila**, "Grafting a new metal ligand in the cocatalytic site of B.cereus metallo-b-lactamase: structural flexibility without loss of activity", *Protein Science*, **12**, 1538-1546 (2003).
41. C.O.Fernández, T. Niizeki, T. Kohzuma and **A.J.Vila** "Metal-ligand interactions in perturbed blue copper sites: A Paramagnetic 1H NMR Study of Co(II)-pseudoazurin", *J.Biol.Inorg.Chem.*, **8**, 75-82 (2003).
40. L. Banci, R. Pierattelli and **A.J.Vila** "NMR of Copper Proteins", *Adv. Protein Chem.* (E. Gralla & J.S.Valentine, editores), **60**, 397-449 (2002).
39. A.R.Díaz; M.C.Mansilla, **A.J.Vila** and D. de Mendoza "Membrane topology of the acyl-lipid desaturase from Bacillus subtilis", *J.Biol.Chem.*, **277**, 48099-48016 (2002).
38. A.Donaire, B.Jiménez, C.O.Fernández, R.Pierattelli, T.Niizeki, J.M.Moratal, J.F.Hall, T.Kohzuma, S.S.Hasnain, and **A.J.Vila** "Metal-ligand interplay in blue copper proteins studied by 1H NMR spectroscopy: Cu(II)-pseudoazurin and rusticyanin", *J. Am. Chem. Soc.*, **124**, 13698-13708 (2002).
37. M. Dal Peraro, **A.J.Vila**, and P. Carloni "Structural Determinants and H-Bond Network of Mononuclear Zinc-b-Lactamase Active Site", *J.Biol.Inorg.Chem.*, **7**, 704-712 (2002).
36. G. L. Estiú, R.M.Rasia, J.A.Cricco, **A.J.Vila** and M. E. Zerner "Is there a bridging ligand in metal-substituted b-lactamases?: A spectroscopic and theoretical answer", *Int.J.Quantum Chem.*, **88**, 118-132 (2002).
35. R.M. Rasia and **A.J.Vila**, "Exploring the role and the binding affinity of a second zinc equivalent in B.cereus metallo-b-lactamase", *Biochemistry*, **41**, 1853-1860 (2002).
34. **A.J.Vila** and C.O.Fernández "Copper in Electron-Transfer Proteins", en "Handbook of Metalloproteins" (A. Sigel, H. Sigel & I. Bertini, editores), Marcel Dekker, New York, pp 813-856 (2001).
33. I. Bertini, D.A. Bryant, S.Ciurli, A. Dikiy, C. O. Fernández, C. Luchinat, N. Safarov, **A.J.Vila** and J. Zhao "Backbone dynamics of plastocyanin in both oxidation states. Solution structure of the reduced form and comparison with the oxidized state", *J. Biol.Chem.*, **276**, 47217-47226 (2001).
32. C. O. Fernández, J. A. Cricco, C. E. Slutter, J.H.Richards, H.B.Gray and **A.J.Vila**, "Weak Axial Ligand Modulation of the Electronic Structure of CuA Sites: A Paramagnetic 1H NMR Study of Met160Gln CuA", *J.Am.Chem.Soc.*, **123**, 11678-11685 (2001).
31. I Bertini, S.Ciurli, A. Dikiy, C. O. Fernández, C. Luchinat, N. Safarov, S. Shumilin and **A.J.Vila** "The first solution structure of an oxidized paramagnetic copper(II) protein: The case of plastocyanin from the cyanobacterium Synechocystis sp. PCC 6803", *J. Am. Chem. Soc.*, **123**, 2405-2413 (2001).
30. I.Bertini, C.O.Fernandez, C.Luchinat, B.G.Karlsson, J.Leckner, B.Malmström, A.M. Nersissian, R.Pierattelli, E.Shipp, J.S.Valentine and **A.J.Vila** "Structural information through NMR hyperfine shifts in blue copper proteins" *J. Am. Chem. Soc.*, **122**, 3701-3707 (2000).

Invited Conferences

He has been invited to give seminars in the following institutions: Department of Chemistry and Chemical Engineering, California Institute of Technology (Pasadena, USA); BIOMAC Research School, Leiden Institute of Chemistry (University of Leiden, Holanda); Departamento de Química Inorgánica, Universitat de València (España); International Centre for Theoretical Physics (Trieste, Italia); International School for Advanced Studies-SISSA (Trieste, Italia); Departamento de Bioquímica, Università di Roma "Tor Vergata"; Centro de Estudios Atómicos - Sección de Bioenergética (Saclay, Francia); Instituto Pasteur (París, Francia); Center of Magnetic Resonance & Department of Chemistry (Universidad de Firenze, Italia); Department of Chemistry y Department of Biochemistry and Microbiology (University of Sydney, Australia); Department of Chemistry and Biochemistry (University of California, Los Angeles, USA); Instituto de Biotecnología (Universidad Autónoma de México, Cuernavaca); Instituto de Química (Universidad Autónoma de México); Max Planck Institute for Biophysical Chemistry (Goettingen, Alemania); Department of Biochemistry, University of Frankfurt); Department of Chemistry (University of California, San Diego, USA); Department of

Chemistry (University of Rochester, USA); Department of Biophysics (Medical School, Johns Hopkins University, USA); Department of Chemistry and Biochemistry (University of Illinois at Urbana-Champaign, USA), Department of Chemistry (Northwestern University, USA), Max Planck Institute (Muelheim), Department of Chemistry (University of Miami at Ohio).

He has been invited speaker to many international meetings, including: XXXII International Conference on Coordination Chemistry, III Iberoamerican Congress of Biophysics, 4th European Conference on Bio-inorganic Chemistry, XXXIII International Conference on Coordination Chemistry, IX International Conference on Biological Inorganic Chemistry, XIX International Conference on Magnetic Resonance in Biological Systems, International Workshop on Spectroscopy for Biology, X International Conference on Biological Inorganic Chemistry, IX Workshop on Metallo- β -Lactamases, International Biophysics Congress, Buenos Aires, 2002, International Colloquia on NMR in Biology, Gordon Research Conference "Metals in Biology", 7th International Symposium on Applied Bioinorganic Chemistry, Workshop on Nuclear Magnetic Resonance in Biology, 2nd International Workshop on Spectroscopy for Biology, 36th International Conference on Coordination Chemistry, 1st Latin American Protein Society Meeting, 1st Iberoamerican NMR Meeting, 9th Workshop on beta-lactamases, XII International Conference on Biological Inorganic Chemistry, Conference for Drug Development for the Third World, 9th European Conference on Bio-inorganic Chemistry, 46th Annual Interscience Conference on Antimicrobial Agents and Chemotherapy, Symposium "The Biological Chemistry of Macromolecules"; International Symposium on Molecular Recognition Phenomena in Biopolymers; 6th International Conference of Biological Physics; V International Conference on Peroxynitrite and Reactive Nitrogen Species, 10th β -Lactamase Meeting, Eretria, Greece, Chinese Chemical Conference, China, 6th International Copper Meeting: Copper and Related Metals in Biology, Alghero, Sardinia, Italy.