Radu Popa

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SUMMARY M.S. Biology, PhD. Ecology, PhD. Microbiology, PostDoc Geomicrobiology. Work experience: Caltech, Jet Propulsion Laboratory, University of Southern California, Portland State University, River Road Research. Research arena: geomicrobiology, redox chemistry, astrobiology, biotechnologies. Techniques known: electrochemical analyses, ARISA-tRFLP, NanoSIMS, HPLC, GC, XRD, FTIR, BiADA simulations in Stella. One book about the origin of life, 2 lab manuals in Microbiology, 7 book chapters, 40+ peer reviewed articles. Research grants: NASA-Astrobiology, NASA Mars Curiosity, NSF, C-DEBI, Deep Carbon Observatory, Miller foundation. Teaching experience: Microbiology, Microbial Diversity, Origin of life, Geobiology. Participant Scientist in the Curiosity Mission on Mars.

CURRENT RESEARCH PROJECTS

- Recycling nutrients in bacteria-insect systems.
- Applications of natural melanin polyphenols.
- Multiplex analysis of chemical and redox interfaces.
- Dynamic simulations of evolving prebiotic automata.

EMPLOYMENT HISTORY

2013-present Adjunct Assistant Professor, University of Southern California (Los Angeles, CA)
2013-present Research director, River Road Research (Irwindale, CA).
2016-present Associate Researcher, Cercetator Onorific Asociat (University of Craiova, Romania)
2012-2013 Research consultant, University of Southern California (Los Angeles, CA).
2005–2012 Associated Professor, Portland State University (Portland, OR).
2002-2005 Research Assistant Professor, University of Southern California (Los Angeles, CA).
2000-2002 Post Doctoral Fellow, CalTech / Jet Propulsion Laboratory (Pasadena, CA).
1986-1999 Research scientist in two research institutes (Biology and Biospeleology), (Bucharest, Romania).

RESEARCH AWARDS

Research grants from RRR, research and development on recycling technologies, NASA Mars Curiosity mission, C-DEBI, Deep carbon observatory grant, Miller foundation for sustainability, CNCSIS Romania, DEQ-Oregon, NASA-Astrobiology grant, NSF.

PEER REVIEW ACTIVITIES

Applied and Environmental Microbiology, Astrobiology, Biological Reviews, Chirality, Environmental Forensics, Geobiology, International Journal of Astrobiology, Journal of Molecular Evolution, NASA Exobiology grants panel, NASA Postdoctoral Applications Program, National Geographic and Proc. Natl. Acad. Sci. USA.

BOOKS and BOOK CHAPTERS

2014 V.M. Cimpoiasu and R. Popa, Elimination of less-fit information variants during competition between low complexity dynamic systems, Physics AUC 130-151.

2014 R. Popa, Elusive Definition of Life: A Survey of Main Ideas, Chapter 15, In: Kolb V.M., Astrobiology: An Evolutionary Approach, pp:325-348. Ed: Taylor & Francis Group; Book catalog number: K19048 -,

2012 R. Popa and V.M. Cimpoiasu, Energy-driven evolution of prebiotic chiral order (Lessons from dynamic systems modeling), In: Seckbach J. (ed.), *Genesis –In the Beginning, Precursors of life, Chemical models and Early biological evolution*. Springer, Heidelberg, Germany, pp: 525-545.

2005 K.H. Nealson and R. Popa, Metabolic diversity in the microbial world: relevance to exobiology, In: Gadd G.M., K.T. Temple and H.M. Lapin-Scott (eds.), *Micro-organisms and Earth Systems, Advances in Geomicrobiology*, Cambridge University Press, pp.151-171.

2005 K.H. Nealson and R. Popa, Introduction and overview: What do we know for sure? Chapter 1. in Lüttge A. and R. Rye (eds.), *Quantitative Approaches Towards Biogeochemistry: Processes, Scaling, and Interfaces, American Journal of Science*, Yale University, New Haven, pp.1-21.

2004 R. Popa, Between necessity and probability: Searching for the definition and origin of life, Springer-Verlag, Heidelberg, Germany.

PEER-REVIEWED ARTICLES

2016 Smith A., M. Fisk, A. Thurber, G. Flores, O. Mason, R. Popa, F. Colwell, Deep crustal communities of the Juan de Fuca ridge are governed by mineralogy, *Geomicrobiol. J*., DOI:10.1080/01490451.2016.1155001.

2015 R Popa and V.M. Cimpoiasu, Prebiotic competition between information variants with low error catastrophe risks, *Entropy*, 17:5274-5287.

2014 Veniman et al., (incl. R. Popa as member of the MSL Science team), Mineralogy of a Mudstone at Yellowknife Bay, Gale Crater, Mars, Science, 343(6169) 1243480, DOI: 10.1126/science.1243480.

2014 V.M. Cimpoiasu and R. Popa, Elimination of less-fit information variants during competition between low complexity dynamic systems, *Physics AUC*, 24:130151.

2013 R. Popa and V.M. Cimpoiasu, Analysis of Competition between Transformation Pathways in the Functioning of Biotic Abstract Dual Automata, *Astrobiology*, 13:454-464.

2012 R. Popa, A.R. Smith, R. Popa, J. Boone and M.R. Fisk, Olivine-respiring bacteria isolated from the rock-ice interface in a lava-tube cave, a Mars analogue environment, *Astrobiology*, 12:1-10.

2012 V.M, Cimpoiasu and R. Popa, Biotic Abstract Dual Automata (BiADA): A novel tool for studying the evolution of prebiotic order (and the origin of life), *Astrobiology*, 12:1123-1134.

2012 R. Popa, Merits and caveats of using a vocabulary approach to define life, Comments on Trifonov, 2011, *J. Biomol. Struct. Dyn*. 29:607-608.

2012 R. Popa, Astrobiology as a cultural phenomenon: The science of astrobiology: A personal view on learning to read the book of life by Julian Chela-Flores, book review, *Astrobiology*, 10:1015-1016.

2011 R. Popa and V.M. Cimpoiasu, FTIR analysis of ortho/para ratio in liquid water isotopomers. Implications for enantiodifferentiation in amino acids, *Phys. Ann. Univ. Craiova*., 21:11-18.

2011 V.M. Cimpoiaşu, R.I. Scorei and R. Popa, Natural $^{1}H^{1}H$ spins decoupling in water in the presence of ^{17}O, *Phys. Ann. Univ. Craiova*., 21:19-29.

2011 A.R. Smith, R. Popa, M. Fisk, M. Nielsen, C. G. Wheat, H. W. Jannasch, A. T. Fisher, K. Becker, S. M. Sievert and G. Flores, In situ enrichment of ocean crust microbes on igneous minerals and glasses using an osmotic flow-through device, *Geochem. Geophys. Geosyst.*, 12, Q06007.

2010 R. Popa, Necessity, futility and the possibility of defining life are all embedded in its origin as a punctuated-gradualism, *Orig. Life Evol. Biosph.*, 40:183-190.

2010 R. Popa, V.M. Cimpoiasu and R.I. Scorei, Consequences of expanding chirality to include spin isomery (The dilemma of broadening chirality into handedness), *Physics Ann. Univ. Craiova*., 20:64-72.

2010 V.M. Cimpoiaşu, R.I. Scorei and R. Popa, Enantiodifferent proton exchange in alanine and asparagine in the presence of $H_2{}^{17}O$, *J. Mol. Evol.*, 71:23-33.

2009 R. Popa, R. Popa, M.J. Marshall, H. Nguyen, B. Tebo and S. Brauer, Limitations and benefits of ARISA intra-genomic diversity fingerprinting, *J. Microbiol. Meth.*, 78:111-118.

2009 R. Popa, W. Fang, K.H. Nealson, V. Souza-Egipsy, T.S. Berquó, S.K. Banerjee, L.R. Penn, Effect of oxidative stress on the growth of magnetic particles in *Magnetospirillum magneticum*, *Int. Microbiol.*, 12:49-58.

2009 R. Popa, V.M. Cimpoiaşu and R.I. Scorei, Rooting prebiotic chirality in spinomeric chemistry? *Astrobiology*, 9:697-701.

2009 Finzi-Hart J., J. Pett-Ridge, P. Weber, R. Popa, S. Fallon, T. Gunderson, I. Hutcheon, K. Nealson and D. Capone, Fixation and fate of C and N in the cyanobacterium *Trichodesmium* using nanometer-scale secondary ion mass spectrometry, *Proc. Natl. Acad. Sci. USA*, 106:6345-6350.

2009 R. Popa, Book review, Amino acids and the asymmetry of life, U. Meierhenrich, *Astrobiology*, 9:696-696.

2007 R. Popa, P. Weber, J. Pett-Ridge, J. Finzi, S. Fallon, I.D. Hutcheon, K.H. Nealson and D.G. Capone, Carbon and nitrogen fixation and metabolite exchange in and between individual cells of *Anabaena oscillarioides*, *ISME J.*, 1:354-360.

2006 D. Capone, R. Popa, B. Flood and K.H. Nealson, Follow the nitrogen, *Science*, 312:708-709.

2006 M.R. Fisk, R. Popa, O.U. Mason, M.C. Storrie-Lombardi, and E.P. Vincenzi, Iron-magnesium silicate bioweathering on Earth (and Mars?), *Astrobiology*, 6:48-68.

2006 H.C. Gao, A. Obraztova, N. Stewart, R. Popa, J.K. Fredrickson, J.M. Tiedje, K.H. Nealson, J.Z. Zhou, *Shewanella loihica sp nov.*, isolated from iron-rich microbial mats in the Pacific Ocean, *Int. J. Syst. Evol. Microbiol*., 56:1911-16. IF = 1.463 .

2005 S.K. Banerjee, R.L. Penn, T. Berquo, Y. Guyodo and R. Popa, Accurate multidisciplinary identification of nanophase iron minerals in simulated pedogenic environment, *Geochim. Cosmochim. Acta*, 69:A512-A512. IF = 4.235.

2005 R. Abboud, R. Popa, V. Souza-Egipsy, C.S. Giometti, S. Tollaksen, J.J. Mosher, R.H. Findlay and K.H. Nealson, Low temperature growth of *Shewanella oneidensis* MR-1. *Appl. Environ. Microbiol*. 71:811-816. IF = 3.801.

2005 E. Kus, R. Abboud, R. Popa, K. Nealson and F. Mansfeld, The concept of bacterial battery, *Corros. Sci.*, 47:1063-

1069. IF = 2.293.

2004 R. Popa and B.K. Kinkle, Isolation of *Thiomonas thermosulfatus* strain 51, a species capable of coupling biogenic pyritization with chemiosmotic energy transduction, *Geomicrobiol. J*., 21:193-206. IF = 1.495

2004 R. Popa, A. Badescu and B.K. Kinkle, Pyrite framboids as biomarkers for iron-sulfur systems, *Geomicrobiol. J*. 21:1-14. IF = 1.495.

2003 M.R. Fisk, M.C. Storrie-Lombardi, S. Douglas, G.D. McDonald, R. Popa and A.I. Tsapin, Evidence of biological activity in hawaiian subsurface basalts, *Geochem. Geophys. Geosys*, 4:1525-2027. IF = 2.979

2002 L. Cox, R. Popa, K.H. Nealson and D. Bazylinsky, Organization and elemental analysis of P-, S-, and Fe-rich inclusions in a population of freshwater magnetococci, *Geomicrobiol. J*., 19:387-406. IF = 1.495

2000 R. Popa and B.K. Kinkle, Discrimination among iron sulfide species formed in microbial cultures, *J. Microbiol. Meth.*, 42:167-174. IF = 2

1997 L. Vlasceanu, B.K. Kinkle and R. Popa, Characterization of *Thiobacillus thioparus* Strain LV43 and its distribution in a chemoautotrophically-based groundwater ecosystem, *Appl. Environ. Microbiol.*, 63:3123-27. IF = 3.801.

1997 R. Popa, A sequential scenario for the origin of biological chirality, *J. Mol. Evol*., 44:121-127. IF = 2.762

1995 S.M. Sarbu, C. Gheorghe, V. Popescu-Jarnea, L. Vlasceanu, R. Popa and C. Lascu, Stable isotope studies in Movile Cave, *Trav. Inst. Speol. "Emile Racovitza"*, 34:99-102.

1994 S.M. Sarbu, B.K. Kinkle, L. Vlasceanu, T.C. Kane and R. Popa, Microbiological characterization of a sulfide-rich groundwater ecosystem, *Geomicrobiol. J*., 12:175-182. IF = 1.495

1993 C. Lascu, S.M. Sarbu, R. Popa, L. Vlasceanu and S. Prodan, La grotte de Movile: Une faune hors du temps, *La Recherche*, 258:1092-1098.

1991 S.M. Sarbu and R. Popa, Trophic structure in an aquatic troglobytic community based upon chemoautotrophic carbon fixation, *Trav. Inst. Speol. "Emile Racovitza"*, 30:51-58.

1991 S.M. Sarbu, R. Popa and I. Goliat, Chemoautotrophic production in a thermomineral sulfurous cave, *Trav. Inst. Speol. "Emile Racovitza*", XXX, 59-61.