Curriculum Vitae

Vic Norris
Emeritus Professor
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Education
1967-70 B.A. Psychology, University of Manchester
1978-80 B.A. Biology and Mathematics, Open University
1981-83 D.E.A. Microbiology, Université de Paris XI
1983-86 Ph.D Biochemistry, Université Paris VII

Employment
1970-74 Teacher of English and Maths in Latin America and Africa
1974-77 Computer engineer with *I.C.L.*, Letchworth, UK
1977-80 Maths lecturer at *North Herts College*, UK
1980-81 Programmer at the *Gaz de France*, Paris
1981-83 Research technician in the *Institut de Microbiologie*, Orsay
1983-86 Ph.D on DNA replication in *E. coli*, *Institut Jacques Monod*, Paris
1986-90 Postdoc, Dept. of Genetics, *Leicester University*
1990-93 Research fellow, *Leicester University*
1993-96 Research fellow in Dept. of Microbiology & Immunology
Director of Laboratory of Theoretical Biology, *Leicester University*
1996-99 Visiting Professor of Integrative Biology, *University of Rouen*
2000-16 Professor of Integrative Biology, EA 4312, *University of Rouen*
2016- Emeritus Professor, *University of Rouen*

Past and Present Responsibilites
Director of the Theoretical Biology Unit (part of *Laboratory of Microbiology Signals and Microenvironment* EA 4312), former director of the Macromolecular Assemblies, Modelling and Imaging group (in *Micro-Environnement et Renouvellement Cellulaire Intégrés* EA 3829), former deputy director of the *Epigenomics Project* (Genopole®) which brought together a couple of hundred scientists from across the disciplines, member of the scientific committee for a previous Systems Biology collaboration between the *CNRS* and the *Max Planck* (GDRE513), member of the *French Society for Theoretical Biology*, member of the scientific board of the *Fondation Fourmentin-Guilbert*, member of the *Group de Travail 'ADN'* at the French *Academie des Technologies*, member of the editorial boards of *F1000 Reports*, *BMC Systems Biology*, *Life* and *Recent Patents on anti-Infective Drug Discovery*, member of three former *European Networks of Excellence* (including *Nanobeams*, the bacterial cell cycle and the bacterial nucleoid), member of the *Faculty of a 1000*, member of the *Institut des Systèmes Complexes en Normandie*, and the *ISC-PIF*, member of Dycoec (GDR 2984), founder of a charity in the UK, *The Cell Cycle Research Trust*, reviewer for the *Wellcome Trust*, the *Leverhulme Trust*, *NIH*, *NSF*, the *Israel National Science Foundation* and for the French scientific community as well as for a score of journals.

Scientific Prizes
Winner with Annabelle Merieau of *Le challenge Elie Wollman 2009*, an international competition organised by the Pasteur Institute.

Research Interests
How do cells choose a few coherent, reproducible phenotypes out of the hyper-astronomal number apparently available to them? Is there a range of such phenotypes within a population and, if so, how is this range generated? What happens when hundreds of cells, each represented by a neural network that learns, are rewarded by growing and dividing in virtual turbidostat? Trying to answer such questions as a theoretical biologist with integrative tendencies, has led me to develop new biological concepts such as competitive coherence, the DNA strand-based, semi-conservative nature of phenotypes, and organisation at the level of hyperstructures. My collaborators and I use these concepts to tackle other, related questions about the control and the function of the cell cycle, the marriage between metabolism and signalling, and the origins of life. We use a variety of approaches from mathematics, physical chemistry and programming, complemented by experiments based on *Secondary Ion Mass Spectrometry*. Spin-offs of our hypotheses include new techniques for bacterial and viral therapies, for studying phenotypic diversity at the level of single cells, for analysing individual DNA molecules and the molecules that associate with them, for biology-based computing, and perhaps even for a 'PCR of

proteins'. Most recently, I have been simulating a growing and dividing population of 'bacteria' in a turbidostat in order to explore the consequences of (1) basing initiation of DNA on sensing the intensity of hyperstructure activity and (2) basing cell growth on the asymmetric segregation of hyperstructures. My ultimate dream is to bring together this virtual turbidostat with machine learning by modelling bacteria as competitive coherence networks. In many of my activities, I try to act as a 'catalyst' within and across the disciplines and this has led me to collaborate with a couple of hundred scientists over the years.

Patents

1/ Norris, V., C. Ripoll, G. Legent, A. Delaune, and G. Misevic, *Method for biomolecule detection and quantification at the cell single level using secondary ion mass spectrometry*, US 61/035,803, 2008: USA
2/ Norris, V., C. Ripoll, G. Legent, G. Misevic, and A. Delaune, *Improved method for a highly sensitive detection and quantification of biomolecules using secondary ion mass spectrometry (SIMS) and related technologies*, EP09305855.0, 2009: Europe.

plus 4 *enveloppes Soleau* plus 2 start-ups

Selected Publications

First author or corresponding author in around 200 publications (100+ in PubMed).

1. **Norris** V, Raine D: A fission-fusion origin for life. *Orig Life Evol Biosph* 1998, 28: 523-537
2. **Norris** V, Onoda T, Pollaert H, Grehan G: The mechanical origins of life. *BioSystems* 1999, 49: 71-78.
3. **Norris** V: Poly-(R)-3-hydroxybutyrate and the pioneering work of Rosetta Natoli Reusch. *Cell Mol Biol* 2005, 51: 629-634.
4. Raine D, **Norris** V: Lipid domain interfaces as prebiotic catalysts of peptide bond formation. *J Theoret Biol* 2007, 246: 176-185.
5. Hunding A, Kepes F, Lancet D, Minsky A, **Norris** V, Raine D, Sriram K, Root-Bernstein R: Compositional complementarity and prebiotic ecology in the origin of life. *BioEssays* 2006, 28: 399-412.
6. Oursel D, Loutelier-Bourhis C, Orange N, Chevalier S, **Norris**, V, Lange CM: Lipid composition of membranes of *Escherichia coli* by LC/MS/MS using negative electrospray ionization. *Rapid Comm Mass Spectrometry* 2007, 21: 1721-1728.
7. **Norris** V, Hunding A, Kepes F, Lancet D, Minsky A, Raine D, Root-Bernstein R, Sriram K: The first units of life were not simple cells. *Orig Life Evol Biosph* 2007, 37: 429-432.
8. **Norris** V, den Blaauwen T, Doi RH, Harshey R, Janniere L, Jimenez-Sanchez A, Jin DJ, Levin PA, Mileykovskaya E, Minsky A, Misevic G, Ripoll C, Saier jnr M, Skarstad K, Thellier M: Towards a hyperstructure taxonomy. *Annual Review of Microbiology* 2007, 61:309-329.
9. Oursel D, Loutelier-Bourhis C, Orange N, Chevalier S, **Norris** V, Lange CM: Identification and relative quantification of fatty acids in *Escherichia coli* membranes by gas chromatography/mass spectrometry. *Rapid Comm Mass Spectrometry* 2007, 21: 3229-3233.
10. **Norris** V, Root-Bernstein R: The eukaryotic cell originated in the integration and redistribution of hyperstructures from communities of prokaryotic cells based on molecular complementarity. *In. J Mol Sci* 2009, 10: 2611-2632.
11. **Norris** V, Delaune A: QUESTION 1: contingency versus determinism. *Orig Life Evol Biosph* 2010, 40: 365-370.
12. **Norris** V, Grondin Y: QUESTION 8: is life an emergent property? *Orig Life Evol Biosph* 2010, 40:386-391.
13. **Norris** V, Grondin Y: DNA movies and panspermia. *Life* 2011, 1:9-18.
14. **Norris** V, Grondin Y: Making bacteriophage DNA into a movie for panspermia. *J Cosmology* 2011, 16:7158-7176.
15. **Norris** V, Amar P: Chromosome Replication in *Escherichia coli*: Life on the Scales. *Life* 2012, 2(4):286-312.
16. **Norris** V, Loutelier-Bourhis C, Thierry A: How did metabolism and genetic replication get married? *Orig Life Evol Biosph* 2012, 42:487-495.
17. **Norris** V: Why do bacteria divide? *Frontiers in Microbiology* 2015, 6:322.
18. **Norris** V: What Properties of Life Are Universal? Substance-Free, Scale-free Life. *Orig Life Evol Biosph* 2015, 44:363-367.
19. **Norris** V, Reusch RN, Igarashi K, Root-Bernstein R: Molecular complementarity between simple, universal molecules and ions limited phenotype space in the precursors of cells. *Biol Direct* 2015, 10:28.
20. **Norris** V, Norris L, Wong W-K: The positive feedback advantages of combining buying and investing. *Theor Economics Letters* 2015, 5: 659-669.
21. **Norris** V, Mileykovskaya E, Matsumoto K: Extending the transertion hypothesis. *Biochem Anal Biochem* 2015, 4:4.
22. **Norris** V, Verrier C, Feuilloley M: Hybolites revisited. *Rec Patents Antiinfect Drug Discov* 2016, 11:16-31.
23. **Norris** V, Kepes F, Amar P, Koch I, Janniere L: Hypothesis: Local variations in the speed of individual DNA replication forks determine the phenotype of daughter cells. *Med Res Archives* 2017, 5:1-18.

24. **Norris** V, Krylov SN, Agarwal PK, White GJ: Synthetic, switchable enzymes. *J Mol Microbiol Biotech* 2017, 27:117-127.
25. Gangwe Nana G, Ripoll C, Cabin-Flaman A, Gibouin D, Delaune A, Janniere L, Grancher G, Chagny G, Loutelier-Bourhis C, Lentzen E, Grysan P, Audinot J-N, **Norris** V: Division-based, growth rate diversity in bacteria. *Frontiers in Microbiology* 2018, 9:849.
26. Nouri H, Monnier A-F, Fossum-Raunehaug S, Maciag-Dorszynska M, Cabin-Flaman A, Kepes F, Wegrzyn G, Szalewska-Palasz A, **Norris** V, Skarstad K, Janniere L: Multiple links connect central carbon metabolism to DNA replication initiation and elongation in Bacillus subtilis. *DNA Research* 2018, 25: 641-653.
27. Demongeot J, **Norris** V: Emergence of a "Cyclosome" in a Primitive Network Capable of Building "Infinite" Proteins. *Life* 2019, 9.
28. **Norris** V: Successive Paradigm Shifts in the Bacterial Cell Cycle and Related Subjects. *Life* 2019, 9.
29. **Norris** V: Does the Semiconservative Nature of DNA Replication Facilitate Coherent Phenotypic Diversity? *J Bacteriol* 2019, 201.