

James Lake  
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#### SUMMARY OF EVOLUTIONARY WORK

Lake's fundamental evolutionary discoveries, such as the New-Animal-Phylogeny for which he received the 2011 Darwin-Wallace Medal, combine a deep understanding of biology with transformative genomic analyses. He is breaking new ground rooting the tree of life, reconstructing the eukaryotic rings of life, and providing genomic evidence for ancient prokaryotic endosymbioses.

#### CURRICULUM VITAE

Major Awards: Darwin-Wallace Medal, Linnean Society, London (2011); Plenary Speaker 7<sup>th</sup> Okazaki Biology Conference and COST Meeting on Symbioses (2010); KITP Visiting Fellow UCSB (2010), Darwin's 2009 Birthday Speaker: Soc. Gen. Micro., Edinburgh, and Smithsonian Museum, D.C.; Japan (JSPS) Invitation Fellow (2008); UCLA Deans' Lecturer (2007); Fellow of American Academy of Microbiology (elected 2005); Fellow Linnean Society, London (elected 1999); Darwin's Birthday Lecturer, Linnean Society and Natural History Museum (1998); Fellow AAAS (elected 1991); Overseas Fellow Churchill College, Cambridge University (elected 1983, lifetime appointment); EMBO Lectureship (1977); Irma T. Hirsch Research Award (1973/1976); Burton Award for ribosome structural studies, EMSA (1975).

Born August 10, 1941, Kearney, Nebraska. Undergraduate degree: B.A., University of Colorado, 1963. Graduate degree: Ph.D., University Wisconsin, 1967. Postdoctoral fellow: MIT, 1967-68; Harvard Medical School, 1968 -1970. Professional Positions: Assistant Professor, Rockefeller U., 1970-1973; Associate Professor, NYU Medical School, 1973-1976, Professor of Molecular Biology in MCD Biology, UCLA, 1976-; Distinguished Professor MCD Biology, UCLA, 1996-; Distinguished Professor Human Genetics, UCLA, 2002 -.

## ACCOMPLISHMENTS IN EVOLUTION

Lake is breaking new ground in the emerging field of Evolutionary Genomics. In 2011 he was awarded the Darwin-Wallace Medal of the Linnean Society of London, for discovering the New-Animal-Phylogeny. In a series of papers, Lake and cross-disciplinary collaborators redefined the bilateral animals, discovered the Lophotrochozoa, and demonstrated that all molting animals comprise a new clade, the Ecdysozoa. Today this phylogeny prominently provides the framework for multicellular animal evolution in biology textbooks.

Lake enthusiastically continues to make major discoveries regarding fundamental evolutionary processes. His lab discovered the informational and operational gene classes, proposed the complexity hypothesis, and quantified the effects of environments on gene transfer.

Lake deduced a new root of life, and showed that the eukaryotic cell was formed by the fusion of the genomes of two disparate prokaryotes forming the Ring of Life.

In 2009 Lake detected an endosymbiosis between an ancient clostridium and an actinobacterium that produced the double membrane, Gram negative prokaryotes. These organism profoundly altered evolution by providing eukaryotic organelles and by generating Earth's oxygen atmosphere.

Lake nurtures the growth of evolutionary biology as Co-chair of the NASA Astrobiology Phylogenomics focus group and as a founding editorial board member of *Genome Biology and Evolution*.

## A FEW RECENT, SIGNIFICANT PUBLICATIONS IN EVOLUTION

**2009 J. A. Lake. Evidence for an early prokaryotic endosymbiosis. *Nature*, 460, 967-971.**

2009. J. A. Lake, R. G. Skophammer, C. W. Herbold, and J. A. Servin. Genome beginnings: Rooting the tree of life. *Phil. Trans. Roy. Soc., Section B*. 364, 2177-2186.

2007 J. A. Lake. Disappearing act: the bizarre absence of certain gene classes in eukaryotes is key to understanding their evolution and complex links with prokaryotes. *Nature*, 446, 983.

2004 M. C. Rivera and J. A. Lake. The ring of life provides evidence for a genome fusion origin of eukaryotes. *Nature*, 431, 152-155.

2003 R. Jain, M. C. Rivera, J. E. Moore, and J. A. Lake. Horizontal gene transfer accelerates genome innovation and evolution, *Molecular Biology and Evolution*, 20, 1598-1602.

1999 R. Jain, M. C. Rivera and J. A. Lake. Horizontal gene transfer and genome evolution: The complexity hypothesis. *Proc. Natl. Acad. Sci., USA*, 96: 3801-3806.

1998 M. C. Rivera, R. Jain, J. E. Moore, A. Simonson, and J. A. Lake. Genomic evidence for two functionally distinct gene classes. *Proc. Natl. Acad. Sci. USA*, 95: 6239-6244.

1997 A. Aguinaldo, J. M. Turbeville, L. S. Linford, M. C. Rivera, J. R. Garey, R. A. Raff and J. A. Lake. Evidence for a clade of nematodes, arthropods, and other molting animals. *Nature*, 389: 489-493.

1995 K. M. Halanych, J. Bacheller, S. Liva, A. A. Aguinaldo, D. M. Hillis and J. A. Lake. 18S rDNA evidence that the lophophorates are protostome animals. *Science*, 267: 1641-1643.

1994 J. A. Lake. Reconstructing evolutionary trees from DNA and protein sequences: Paralineal distances (LogDet). *Proc. Natl. Acad. Sci. USA*, 91, 1455-1459.

1994 D. A. Maslov, H. A. Avila, J. A. Lake, L. Simpson. Evolution of RNA Editing in kinetoplastid protozoa. *Nature*, 368: 345-348.

1990 Lake, J.A. Origin of the Metazoa. *Proc. Nat. Acad. Sci. USA*, **87**, 763-766.