

Joseph L. Kirschvink, Ph.D., FRIN

Nico & Marilyn Van Wingen Professor of Geobiology, Caltech
Co-PI, Earth-Life Science Institute, Tokyo Institute of Technology

Background:

Born 7/14/53 in Salt Lake City, raised in Phoenix, Arizona.
Spouse: Atsuko Kobayashi; two children (Jiseki & Koseki)
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Education:

B.S. 1975 (Biology, w/honors)	The California Institute of Technology
M.S. 1975 (Geology)	The California Institute of Technology
M.A. 1978 (Geology)	Princeton University
Ph.D. 1979 (Geology/Geobiology)	Princeton University

Fellowships and Awards:

National Science Foundation (NSF) Graduate Fellow, 9/75 - 8/78.
Harry H. Hess Fellow, Princeton University 1975-1976.
Thomas J. Watson Foundation Fellow, 1975-1976.
Phelps-Dodge Fellow, Princeton University, 9/78 - 6/79.
NSF National Needs Postdoctoral Fellow, 7/79 - 6/80.
NSF Presidential Young Investigator Award, 4/84 - 12/89.
Faculty of Engineering Fellowship, Kyushu University, 3/90-10/90.
Visiting Professor of Astrobiology, University of Buenos Aires, 6/00
Excellence in Teaching Award, Associated Students of Caltech, 6/00
Fellow, American Association for the Advancement of Science, 10/01
Carl Sagan Memorial Lecturer, AGU Biogeosciences 12/01
Visiting Professor, Tokyo University, (2002)
Richard P. Feynman Memorial Prize for Excellence in Teaching, 2/02
Fellow, American Geophysical Union, 2/03
Fellow, American Academy of Arts and Sciences, elected 5/03
Asteroid 27711 named "Kirschvink", 5/03.
Thomas Condon Memorial Lecturer, Oregon State Univ., 10/03
Noye Johnson Memorial Lecturer, Dartmouth, 5/05
Lustrum XII U.G.V. Lecturer, Utrecht 1/06
Crafoord Jubilee Invited Lecturer, Lund, Sweden 4/07
Larry Lyman Hooker Memorial Lecturer, McMaster University, 4/08
Visiting Professor, Kumamoto University, 6/09 & 3/10
ATLAS Symposium Keynote Speaker, University of Alberta, 3/10
Associate Fellow, Royal Institute of Navigation, 9/11
William Gilbert Award, American Geophysical Union, 9/11
Fellow, Japanese Geoscience Union (JpGU), 3/14
George P. Woollard Award, Geological Society of America, 5/14
Fellow, Royal Institute of Navigation [London, FRIN], elected 4/15
Fellow, Geological Society of America, 5/15

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Major Original Scientific Contributions:

Proposed, and discovered, the magnetite-based sensory organelles in migrating animals and developed the biophysical theory for it; Discovered Bacterial Magnetofossils & South-Seeking Magnetotactic Bacteria; Proposed and tested the 'Snowball Earth' Hypothesis for Precambrian Glaciations and recognized the association between the Paleoproterozoic event and the Great Oxygenation Event; Collected the first stratigraphically-constrained, pre-trilobite volcanic ash that yielded a reliable U/Pb date, shortening the Cambrian by ~ 80 million years; Co-discovered the Cambrian Carbon Cycles; Documented an episode of True Polar Wander as the trigger for The Cambrian Explosion, sea-level variations and the association large Carbon isotopic excursions; First proved the existence of an ancient magnetic dynamo on Mars; Proposed the Grand Unified Theory of Biomineralization; Conducted the first experimental paleomagnetic test of Panspermia on Martian rocks (with B.P. Weiss) supporting the Martian origin of terrestrial life.

Professional Associations and Memberships:

American Geophysical Union; Geological Society of America; European Geophysical Society; Japan Geophysical Society; Japanese Geological Union; American Association for the Advancement of Science (AAAS)
Editorial Boards, *Geology*, 1983-1985; *Earth & Planetary Science Letters* 1991- 2007
IUGS- IGCP: (former) Voting member, Subcommissions on Cambrian Stratigraphy, Precambrian/Cambrian, Cambrian/Ordovician Boundary Groups.
Ocean Drilling Program - COSODII Working group on the Evolution & Extinction of Oceanic Biota, 1987
National Institutes of Health (NIH) Reviewer's Reserve, 1993+
NASA Enceladus Flagship Study Science Definition Team, 2007.

Employment:

U.S. Geological Survey (W.A.E.), 6/72 - 12/81.
Research Associate, Princeton University, 7/79 - 10/80.
Research Fellow, Princeton University, 11/80 - 6/81.
Assistant Professor of Geobiology, Caltech, 7/81 - 6/87
Associate Professor of Geobiology, Caltech, 7/87 - 5/92
Professor of Geobiology, Caltech, 6/92 - 6/04
Nico & Marilyn van Wingen Professor of Geobiology, Caltech 7/04+
External PI, Earth-Life Science Institute, Tokyo Institute of Technology, 2012+

PhD Theses Supervised or Co-supervised by J. Kirschvink:

Walker, Michael M., 1983. "Studies of magnetic sensitivity in the Yellowfin Tuna, *Thunnus albacares*, (U. Hawaii @ Manoa, Dept. of Zoology), 263 p.
Meisling, Kristen E., 1983. "Neotectonics of the north frontal fault system of the San Bernardino Mountains, southern California: Cajon Pass to Lucerne Valley", Caltech PhD Thesis, 394p.

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- Weldon, Ray J. II, 1985. "The Late Cenozoic Geology of Cajon Pass; Implications for tectonics and sedimentation along the San Andreas Fault", Caltech PhD Thesis, 381pp.
- Chang, S-B. Robin., 1988. "Bacterial Magnetite in sedimentary deposits and its geophysical and paleoecological implications", Caltech PhD Thesis, 266pp.
- Salyards, Stephen L., 1988. "Dating and characterizing late Holocene earthquakes using paleomagnetism", Caltech PhD Thesis, 217pp.
- McNeill, D.F., 1989. "Magnetostratigraphic dating and magnetization of Cenozoic platform carbonates from the Bahamas.", (University of Miami, RSMAS), 210pp.
- Wei Liu, 1990. "Paleomagnetism of Miocene Sedimentary Rocks in the Transverse Ranges: Implications for tectonic history", Caltech PhD Thesis, 148pp.
- Ripperdan, Robert L., 1990. "Magnetostratigraphic Investigations of the lower Paleozoic period boundaries, and associated paleogeographic implications", Caltech PhD Thesis, 171pp.
- Holt, J.H., 1997. "I. Detailed records of geomagnetic field behavior from Death Valley and Hawaii II. An age constraint on Gulf of California rifting from Santa Rosalia, Baja California, Caltech PhD Thesis, 180 pp.
- Evans, D.A., 1998. I. "Neoproterozoic-Paleozoic supercontinental tectonics and true polar wander, II. Temporal and spatial distributions of Proterozoic glaciations". Caltech PhD Thesis, 326 pp.
- Weiss, B.P., 2003. Martian Paleomagnetism with SQUID Microscope. Caltech PhD Thesis, 76 pp. [Winner of the 2003 Milton and Francis Clauser Doctoral Prize for the Caltech thesis that does the most to 'Expand Human Thought and Endeavor'.]
- Kopp, R. E., 2007. The identification and interpretation of microbial geobiomagnetism. Caltech PhD Thesis, 190 pp.
- Nash, C.Z., 2008. Mechanisms and Evolution of Magnetotactic Bacteria. Caltech PhD Thesis, 150 pp.
- Dixon, Alana, 2011. Sensing magnetic fields from cradle to grave? Biogenic magnetite in zebrafish across the lifespan. Caltech PhD Thesis.
- Slotznick, Sarah P., 2016. Coupling Textural, Magnetic, and Modeling Techniques to understand Precambrian Paleoenvironments. Caltech PhD thesis, 285 pp.

Non-Caltech Masters Theses Supervised or Co-supervised by J. Kirschvink:

- White, Rene E., 1987. "Paleomagnetism of the Tulare formation from cores and surface exposures, West-Central and Southwestern San Joaquin Valley, California." (California State University, Long Beach), 272pp.

Refereed Publications:

(many of these are available on-line at <http://www.gps.caltech.edu/users/jkirschvink/index.html> - publications ; also see https://scholar.google.com/citations?hl=en&user=f8BGdpgAAAAJ&view_op=list_works)
Google Scholar Indices as of 7/2015: h-Index 68, i10-Index 156; Citations > 19,800.

1. 1978a Kirschvink, J.L., "The Precambrian-Cambrian boundary problem: Magnetostratigraphy of the Amadeus Basin, Central Australia," *Geological Magazine* 115, 139-150.

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2. 1978b Kirschvink, J.L., "The Precambrian-Cambrian boundary problem: Paleomagnetic directions from the Amadeus Basin, Central Australia," *Earth & Planetary Science Letters* 40, 91-100.
3. 1978c Gould, J.L., Kirschvink, J.L., and Deffeyes, K.S., "Bees have magnetic remanence," *Science* 201, 1026-1028.
4. 1979a Kirschvink, J.L. and Lowenstam, H.A., "Mineralization and magnetization of chiton teeth: Paleomagnetic, sedimentologic, and biologic implications of organic magnetite," *Earth & Planetary Science Letters* 44, 193-204.
5. 1979b Walcott, C., Gould, J.L., and Kirschvink, J.L., "Pigeons have magnets," *Science* 205, 1027-1029.
6. 1979c Kirschvink, J.L., Ph.D. Thesis, Princeton University: I. *A paleomagnetic approach to the Precambrian-Cambrian boundary problem.* II. *Biogenic magnetite: its role in the magnetization of sediments and as the basis of magnetic field detection in animals.* Xerox University Microfilms International (May 1979).
7. 1980a Gould, J.L., Kirschvink, J.L., Deffeyes, K.S., and Brines, M.L., "Orientation of demagnetized bees," *J. Exp. Biol.* 86, 1-9.
8. 1980b Kirschvink, J.L., "The least-squares line and plane and the analysis of paleomagnetic data: examples from Siberia and Morocco," *Geoph. J. Royal Astr. Soc.* 62, 699-718.
9. 1980c Kirschvink, J.L., "South-seeking magnetic bacteria," *J. Exp. Biol.* 86, 345-347.
10. 1981a Kirschvink, J.L. and Gould, J.L., "Biogenic magnetite as a basis for magnetic field sensitivity in animals," *Bio Systems* 13, 181-201.
11. 1981b Kirschvink, J.L., "How sensitive should a rock magnetometer be for use in paleomagnetism?" in: H. Weinstock and W.C. Overton (eds.), *SQUID Applications to Geophysics*. The Society of Exploration Geophysicists, Tulsa, Oklahoma, 111-114.
12. 1981c Kirschvink, J.L., "Ferromagnetic crystals (magnetite?) in human tissue," *J. Exp. Biol.* 92, 333-335.
13. 1981d Kirschvink, J.L., "The horizontal magnetic dance of the honey bee is compatible with a single-domain ferromagnetic magnetoreceptor," *Bio Systems* 14, 193-203.
14. 1981e Kirschvink, J.L., "Biogenic Magnetite (Fe₃O₄): A ferrimagnetic mineral in bacteria, animals, and man," in: *Ferrites*, H. Watanabe, S. Iida and M. Sugimoto (eds.), 135-138.
15. 1982a Kirschvink, J.L., Tabrah, F., and Batkin, S., "Ferromagnetism in two mouse tumours," *J. Exp. Biol.* 101, 321-326.

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16. 1982b Kirschvink, J.L., "Birds, bees and magnetism: A new look at the old problem of magnetoreception" (review article), *Trends in Neurosciences* V.5, 160-167.
 17. 1982c Kirschvink, J.L., "Paleomagnetic evidence for fossil biogenic magnetite in western Crete," *Earth & Planetary Science Letters* 59, 388-392.
 18. 1982d Walker, M.M., Dizon, A.E., and Kirschvink, J.L., "Geomagnetic field detection by Yellowfin Tuna (*Thunnus albacares*)," *Oceans* 82, IEEE Press, New York, 755-758.
 19. 1983a Kirschvink, J.L., "Biogenic ferrimagnetism: a new biomagnetism," ch. 14 in: *Biomagnetism: An Interdisciplinary Approach*. (S. Williamson et al., eds.), Plenum Press, NY, 501-532.
 20. 1983b Kirschvink, J.L., "Biomagnetic geomagnetism," *Rev. Geoph. Space Phys.* 21, 672-675.
 21. 1984a Walker, M.M., Kirschvink, J.L., Chang, S-B.R., and Dizon, A.E., "A candidate magnetic sense organ in the Yellowfin Tuna *Thunnus albacares*," *Science* 224, 751-753.
 22. 1984b Kirschvink, J.L. and A. Yu. Rozanov, "Magnetostratigraphy of Lower Cambrian strata from the Siberian Platform: A paleomagnetic pole and a preliminary polarity time scale," *Geol. Mag.* 121, 189-203.
 23. 1984c Kirschvink, J.L., and Chang, S-B.R., "Ultra fine-grained magnetite in deep-sea sediments: possible bacterial magnetofossils," *Geology* 12, 559-562.
 24. 1984d Rossman, G.R. and Kirschvink, J.L., "Magnetic properties of gem-quality synthetic diamonds," *Gems & Gemology* 20, 163-166.
 25. 1985 Kirschvink, J.L., Jones, D.S., and McFadden, B.J. (eds.), *Magnetite Biomineralization and Magnetoreception in Organisms: A New Biomagnetism* Topics in Geobiology V. 5, Plenum Press, New York (30 chapters, 685 pp.).
 26. 1985a Chang, S-B.R., and Kirschvink, J.L., "Possible Biogenic Magnetite Fossils from the Miocene Marine Clay of Crete," in: Kirschvink, Jones, and McFadden (eds.), *ibid*, 647-669.
 27. 1985b Lowenstam, H.A., and Kirschvink, J.L., "Iron Biomineralization - A Geobiological Perspective," in Kirschvink, Jones, and McFadden (eds.), *ibid*, 3-15.
 28. 1985c Walker, M.M., Kirschvink, J.L., and Dizon, A.E., "Magnetoreception and Magnetite Biomineralization in Fish," in: Kirschvink, Jones and McFadden (eds.), *ibid*, 417-437.
 29. 1985d Kirschvink, J.L., and Walker, M.M., "Particle-Size Considerations for Magnetite-Based Magnetoreceptors," in: Kirschvink, Jones and McFadden (eds.), *ibid*, 243-254.
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30. 1985e Walker, M.M., Kirschvink, J.L., Perry, A.S., and Dizon, A.E., "Methods and Techniques for the Detection, Extraction, and Characterization of Biogenic Magnetite," in: Kirschvink, Jones, and McFadden (eds.), *ibid*, 154-166.
31. 1985f Kirschvink, J.L., Peterson, K.A., Chwe, M.M., Filmer, P., and Roder, B., "An Attempt to Duplicate the Spinning Chair Experiment," in: Kirschvink, Jones, and McFadden (eds.), *ibid*, 605-608.
32. 1985g Kirschvink, J.L., "A Cautionary Note About Magnetoreception in Dowsers," in: Kirschvink, Jones, and McFadden (eds.), *ibid*, 609-610.
33. 1985h Kirschvink, J.L., Walker, M.M., Chang, S-B.R., Dizon, A.E., and Peterson, K.A., "Chains of single-domain magnetite particles in Chinook Salmon (*Oncorhynchus tshawytscha*)," *J. Comp. Physiol.* 157, 375-381.
34. 1986a Kovalik, J.M. and Kirschvink, J.L., "New SQUID-based constraints on the abundance of magnetic monopoles trapped in matter: an investigation of deeply-buried rocks." *Phys. Rev. A.*33, 1183-1187.
35. 1986b Kirschvink, J.L., Dizon, A.E., and Westphal, J.A., "Evidence from strandings for geomagnetic sensitivity in Cetaceans." *J. Exptl. Biol.* 120, 1-24.
36. 1986c Magaritz, M., Holser, W.T., and Kirschvink, J.L., "Carbon-isotope events across the Precambrian-Cambrian boundary on the Siberian Platform," *Nature* 320, 258-259.
37. 1986d Stolz, J.F., Chang, S-B.R., and Kirschvink, J.L., "Magnetotactic bacteria and single-domain magnetite in hemipelagic sediments". *Nature* 321, 849-851.
38. 1986e Parrish, J.T., Ziegler, A.M., Scotese, C.R., Humphreville, R.G., and Kirschvink, J.L., "Early Cambrian Paleogeography, Paleoceanography, and Phosphorites," in: J.H. Shergold and P.J. Cook (eds.), *Phosphate deposits of the World: Proterozoic and Cambrian Phosphorites*, Cambridge University Press, 280-294.
39. 1986f Walker M.M., Bitterman, M.E., and Kirschvink J.L., "Experimental and correlational studies of responses to magnetic field stimuli by different species," in: Maret, G., Boccara, N., and Kiepenheuer, J. (eds.), *Biophysical Effects of Steady Magnetic Fields*, Springer-Verlag (New York), 194-205.
40. 1986g Kirschvink, J.L., and Walker, M.M., "Biogenic magnetite in higher organisms and the current status of the hypothesis of ferrimagnetic magnetoreception," in: Maret, G., Boccara, N., and Kiepenheuer, J. (eds.), *Biophysical Effects of Steady Magnetic Fields*, Springer-Verlag (New York), 180-188.
41. 1986h Walker M.M., Kirschvink J.L., and Kobayashi-Kirschvink A. "A mathematical model for magnetic navigation," in: Maret, G., Boccara, N., and Kiepenheuer, J. (eds.), *Biophysical Effects of Steady Magnetic Fields*, Springer-Verlag (New York), 297-211.
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42. 1986i Kobayashi-Kirschvink, A.K. and Kirschvink, J.L., "Electrostatic enhancement of industrial drying processes," *Ind. Engin. Chem. Proc. Design & Develop.* 25, 1027-1030.
 43. 1987a Chang S-B.R., Allen C.R., and Kirschvink J.L., "Magnetic Stratigraphy and a test for block rotation of sedimentary rocks within the San Andreas Fault Zone, Mecca Hills, Southeastern California," *Quaternary Res.* 27, 30-40.
 44. 1987b Chang, S-B.R., Kirschvink, J.L., and Stolz, J.F., "Biogenic magnetite as a primary remanence carrier in limestone," *Phys. Earth & Planetary Interiors* 46: 289-303.
 45. 1988a McNeill D.F., Ginsburg R.N., Chang S-B.R., & Kirschvink J.L., "Magnetostratigraphic dating of shallow-water carbonates from San Salvador, the Bahamas." *Geology* 16:8-12.
 46. 1988b Mann S., Sparks N.H.C., Walker M.M., & Kirschvink J.L., "Ultrastructure, morphology and organization of biogenic magnetite from sockeye salmon, *Oncorhynchus nerka*: Implications for magnetoreception." *J. Exptl. Biology.* 140:35-49.
 47. 1988c Walker M.M., Quinn T.P., Kirschvink J.L., & Groot T., "Production of single-domain magnetite throughout life by sockeye salmon, *Oncorhynchus nerka*." *J. Exptl. Biol.*" 140: 51-63.
 48. 1988d Liu W., Kirschvink J.L. & Weldon R.E. "Paleomagnetism of sedimentary rocks from and near the DOSECC Cajon Pass well, Southern California. *Geophysical Research Letters* 15:1065-1068.
 49. 1989a Chang, S-B.R. & J.L. Kirschvink, "Magnetofossils, the magnetization of sediments, and the evolution of magnetite biomineralization". *Annual Reviews of Earth & Planetary Sciences* 17: 169-195.
 50. 1989b Vali H. & Kirschvink J.L., "Magnetofossil Dissolution in a Paleomagnetically Unstable Deep-Sea Sediment". *Nature* 339:, 203-206.
 51. 1989c Filmer P.E. & Kirschvink, J.L. "A Paleomagnetic constraint on the late Cretaceous paleoposition of Northwestern Baja California, Mexico. *J. Geophys. Res.* 94:7332-7342.
 52. 1989d Stolz J.F., S-B.R. Chang, and J.L. Kirschvink. Biogenic magnetite in stromatolites. I. Occurrence in modern sedimentary environments. *Precambrian Research* 43: 295-304.
 53. 1989e S-B.R. Chang, Stolz J.F., J.L. Kirschvink, and S.M. Awramik. Biogenic magnetite in stromatolites. II. Occurrence in ancient sedimentary environments. *Precambrian Research* 43: 305-315.
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54. 1989f Kirschvink, J.L., "Magnetite biomineralization and geomagnetic sensitivity in higher animals: An update and recommendations for future study." *Bioelectromagnetics 10*: 239-259.
55. 1989g Stolz J.F., Chang S-B.R., and Kirschvink J.L., "The effect of magnetotactic bacteria on the magnetic properties of marine sediments." In: Crick R.E. (ed.), *Origin, evolution, and modern aspects of biomineralization in plants and animals*. Plenum press, New York, p. 497-506.
56. 1990a Aissaoui D.M., D.F. McNeill, and J.L. Kirschvink. Magnetostratigraphic dating of shallow-water carbonates from Mururoa atoll, French Polynesia: Implications for global eustasy. *Earth & Planetary Science Letters 97*: 102-112.
57. 1990b Kirschvink J.L. Geomagnetic sensitivity in cetaceans: an update with the U.S. live stranding records. In: J.A. Thomas and R. Kastelein (eds), *Sensory Abilities of Cetaceans*, Plenum Press, New York, pp. 639-649.
58. 1991a Vali H., and J.L. Kirschvink. Observations of Magnetosome Organization, Surface Structure, and Iron Biomineralization of Undescribed Magnetic Bacteria: Evolutionary Speculations. In: R.P. Frankel & R.P. Blakemore (eds), *Iron Biomineralization*, Plenum Press, New York, pp. 97-115.
59. 1991b Kirschvink, J.L. and Kobayashi-Kirschvink, A. "Is geomagnetic sensitivity real? Replication of the Walker-Bitterman conditioning experiment in honey bees. *American Zoologist v. 31(1)*: 169-185.
60. 1991c Kirschvink, J. L., Magaritz, M., Ripperdan, R.L., Zhurevlev. Y. Yu. and A.Yu. Rozanov, The Precambrian-Cambrian boundary: Magnetostratigraphy and Carbon Isotopes resolve correlation problems between Siberia, Morocco, and South China. *GSA Today*, v. 1(4), 69-91.
61. 1991d Pluhar, C.J. & J.L. Kirschvink. Magnetostratigraphy and clockwise rotation of the Plio-Plisistocene Mojave River Formation, Central Mojave Desert, California. *San Bernardino County Museum Association Quarterly v. 38(2)*, p. 31-42
62. 1991e Aissaoui, D.M., & J.L. Kirschvink, Atoll magnetostratigraphy - calibration of the Eustatic records. *Terra Nova 3(1)*: 35-40
63. 1991f Magaritz, M., Latham A., Kirschvink, J.L., Zhurevlev A. Yu., and Rozanov A. Yu. The Precambrian-Cambrian boundary problem: Carbon Isotope correlations for Vendian and Tommotian time between Siberia and Morocco, *Geology 19*:847-850.
64. 1991g Diaz-Ricci, J.C., Woodford B.J., Kirschvink J.L. & M.R. Hoffman. Alteration of the magnetic properties of *Aquaspirillum magnetotacticum* by a pulse magnetization technique. *Applied and Environmental Microbiology 57*: 3248-3254.
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65. 1992a Kirschvink J.L., "A Paleogeographic Model for Vendian and Cambrian Time". Chapter XII in: J.W. Schopf, C. Klein, & D. Des Maris (eds), *The Proterozoic Biosphere: A Multidisciplinary Study*. Cambridge University Press, pp 567-581.
66. 1992b Kirschvink J.L. "Late Proterozoic Low-Latitude Global Glaciation: The Snowball Earth". Section 2.3 in: J.W. Schopf, C. Klein, & D. Des Maris (eds), *The Proterozoic Biosphere: A Multidisciplinary Study*. Cambridge University Press, pp. 51-52.
67. 1992c Gomez, F., Hsieh, J., Holt, J., Murray, B., and J.L. Kirschvink, 1992. Outcrop geology of Plio-pleistocene strata of the confidence hills, southern Death Valley, California. *San Bernardino County Museum Association Quarterly* v. 39(2), p. 3-6
68. 1992d Pluhar, C.J., Holt, J.H., Kirschvink, J.L., Beratan K., and R.W. Adams. 1992. Magnetostratigraphy of plio-pleistocene lake sediments in the Confidence Hills of Southern Death Valley, California. *San Bernardino County Museum Association Quarterly* v. 39(2), p. 12-19.
69. 1992e Kirschvink J.L., "On the magnetostatic control of crystal orientation and iron Accumulation in Magnetosomes". *Automedica* 14:257-269.
70. 1992f Kirschvink, J.L., Kuwajima T., Ueno, S., Kirschvink, S. J., Diaz-Ricci, J.C., Morales, A., Barwig, S., and Quinn K. (1992). "Discrimination of low-frequency magnetic fields by honeybees: Biophysics and experimental tests". In: *Sensory Transduction* (eds. D.P. Corey & S.D. Roper), pp. 225-240. Society of General Physiologists, 45th Annual Symposium, Rockefeller University Press, New York
71. 1992g Compston. W., Williams, W., Kirschvink J.L., Zhang Zichao & Ma Guogan. Zircon U-Pb ages for the Early Cambrian time scale. *J. Geol. Soc. London* 149: 171-184.
72. 1992h Kirschvink, J.L., "Constraints on biological effects of weak extremely low-frequency electromagnetic fields: comment". *Phys. Rev. A*. 46(4), 2178-2184.
73. 1992i Ripperdan, R.L., and Kirschvink, J.L., 1992. Paleomagnetic results from the Cambrian-Ordovician boundary section at Black Mountain, western Queensland, Australia. in: Webby, B.D. & J.R. Laurie, eds., Global Perspectives on Ordovician Geology, A.A. Balkema, Rotterdam, pp. 93-103.
74. 1992j Salyards, S.L., Sieh K.E., and J.L. Kirschvink. "Paleomagnetic measurement of non-brittle coseismic deformation across the San Andreas Fault at Pallett Creek", *J. Geophys. Res.*, 97:2457-2470.
75. 1992k Kirschvink, J.L., Kobayashi-Kirschvink, A., and Woodford, B.J. Magnetite biomineralization in the human brain. *Proceedings of the National Academy of Sciences*, 89(16): 7683-7687.
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76. 1992l Kirschvink J.L. Uniform magnetic fields and Double-wrapped coil systems: Improved techniques for the design of biomagnetic experiments. *Bioelectromagnetics* 13:401-411.
77. 1992m Diaz-Ricci J.C. and J.L. Kirschvink, "Magnetic domain state and coercivity predictions for biogenic greigite (Fe₃O₄): A comparison of theory with magnetosome observations." *J. Geophys. Res.* 97(B12): 17309-17315.
78. 1992n Walker, M.M., Kirschvink, J.L., Dizon, A.E. and Ahmed, G., "Evidence that fin whales respond to the geomagnetic field during migration," *J. Exptl. Biol.* 171: 67-78.
79. 1992o Kirschvink, J.L., Kobayashi-Kirschvink, A., Diaz-Ricci, J., & S.J. Kirschvink, "Magnetite in human tissues: A mechanism for the biological effects of weak ELF magnetic fields". *Bioelectromagnetics Supplement 1*:, 101-114.
80. 1993a McNeill, D.F., & J.L. Kirschvink. "Early dolomitization of platform carbonates and the preservation of magnetic polarity." *J. Geophys. Res.* 98(B5), 7977-7986.
81. 1993b Ripperdan, R.L., Magaritz, M., & J.L. Kirschvink, "Magnetic polarity and carbon isotope evidence for non-depositional events within the Cambrian-Ordovician boundary section near Dayangcha, Jilin Province, China. *Geological Magazine* 130:(4): 443-452.
82. 1993c J.L. Kirschvink, J. Diaz-Ricci, M.H. Nesson, and S. J. Kirschvink, "Magnetite-based Magnetoreceptors: Ultrastructural, Behavioral, and Biophysical Studies". Electric Power Research Institute (EPRI), Palo Alto, California, USA, technical report TR-102008.
83. 1995a Kobayashi, A.K., J.L. Kirschvink, & Nesson, M.H.,. "Ferromagnets & EMFs ". *Nature*, 374: 123-123.
84. 1995b Holt, J.W., & J.L. Kirschvink. "The Upper Olduvai Geomagnetic Reversal from Death Valley, California: A fold test of transitional Directions." *Earth & Planetary Sciences Letters* 133: 475-491.
85. 1995c Kirschvink, J.L. & Walker, M.M., "Magnetoreception in honeybees". *Science*, 269:1889-1889.
86. 1995d Kobayashi, A. & J.L. Kirschvink. "Magnetoreception and EMF Effects: Sensory perception of the geomagnetic field in Animals & Humans." *Advances in Chem.* 250: 367-394.
87. 1996a Kirschvink, J. L. "Microwave Absorption by Magnetite: A possible mechanism for coupling non-thermal levels of radiation to biological systems", *Bioelectromagnetics*, 17: 187-194
88. 1996b Holt, J.W., Kirschvink, J.L., & F. Garnier, "Geomagnetic field inclinations for the past 400 kyr from the 1 km core of the Hawaii Scientific Drilling Project", *J. Geophys. Res.* 101 (B5), 11,655-11,663.
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