

CIENCIA, RELIGIÓN, DESARROLLO

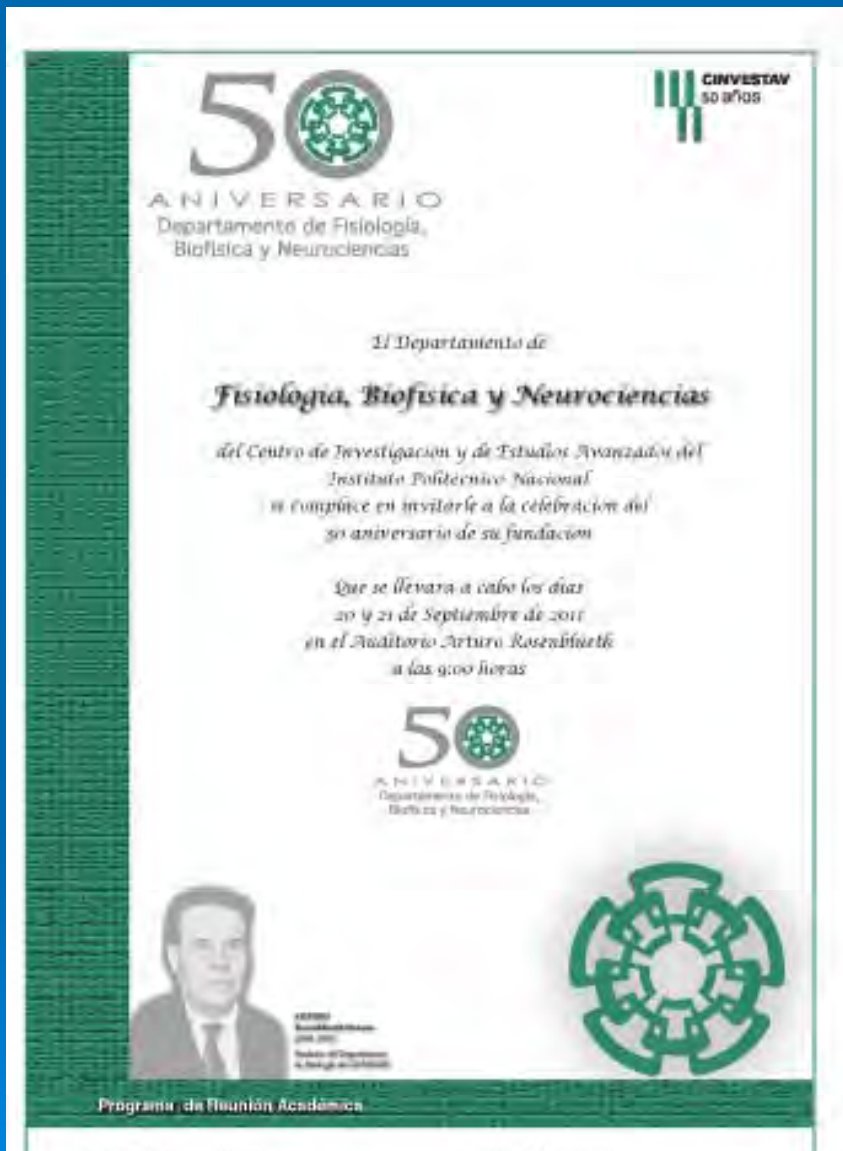
El debate llega al Cinvestav

Eugenio Frixione

Sección de Metodología
y Teoría de la Ciencia

CINVESTAV





20 septiembre 2011, 10:45 am

“El Departamento de Fisiología: celebraciones, agradecimientos, alabanzas, papelones y consejos”

Dr. Marcelino Cerejido

Profesor Emérito

Departamento de Fisiología, Biofísica y Neurociencias

(Escena equivalente tomada de conferencia en el Auditorio de la Secretaría Académica, 27 de abril, 2012)

Fragmento 2 min



CONFERENCIA

Dios y la ciencia...
Un encuentro inevitable.



INVITADO.



Dr. Sergio H. Díaz M.
sergioh.diaz.martinez@hotmail.com

**Auditorio Arturo Rosenblueth
CINVESTAV, Zacatenco.
México, D. F.**

Miércoles 26 de Octubre.

A partir de las 11:30 am.

ENTRADA LIBRE.

Online en vivo por:
<http://www.cinvestav.mx/Comunidad/Eventos/Transmisionenvivo.aspx>

Retransmisión en:
diosesamor.listen2myradio.com
diosesamor.listen2mymusic.com
diosesamor.radiostream321.com
diosesamor.listen2myshow.com
diosesamor.radio12345.com
diosesamor.Radiostream123.com

26 octubre 2011, 11:30 am

**“Dios y la ciencia . . . Un
encuentro inevitable”**

**Dr. Sergio H. Díaz M.
Instituto Nacional de Astrofísica,
Óptica y Electrónica**

Fragmento 3 min

Fallas de
origen



Alternativas

“El tercer mundo no sólo carece de ciencia, tampoco tiene una cultura compatible con la ciencia. . . . ¿Por qué estoy diciendo que México no tiene una cultura compatible con la ciencia? Porque [luego del éxito en el tratamiento médico practicado a Salvador Cabañas] se jugaron partidos, se hicieron misas, y no sé qué, para agradecerle a la Virgen. . . . Entonces yo digo que esto lo tomo como que México no sólo no tiene ciencia, porque no . . . desarrolló estos aparatos ni estos conocimientos, sino además se lo atribuye al poder de una Virgen.”

Dr. Marcelino Cerejido

“ . . . Newton, lo que encontraba en la Biblia lo ponía como hipótesis de investigación y luego iba a la ciencia, sufría el fuego de la experimentación, y llegaba a grandes descubrimientos. Así que, si quieres ser un gran científico, lee tu Biblia.”

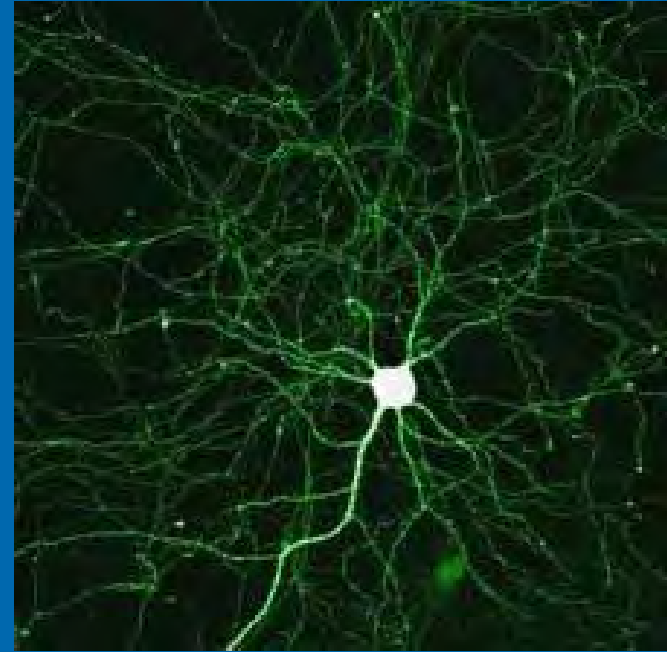
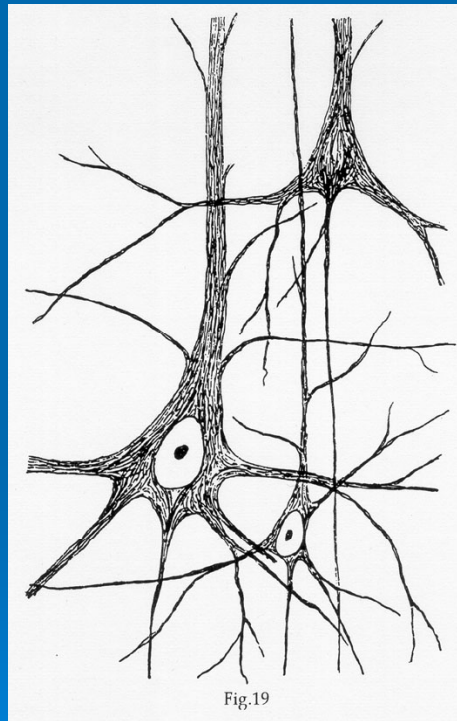
Dr. Sergio H. Díaz

CIENCIA, RELIGIÓN, DESARROLLO

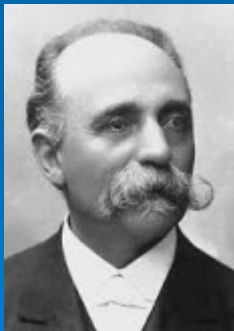
- I. Ciencia y religión (neurociencias)
- II. Religión y desarrollo científico
(historia de la ciencia)



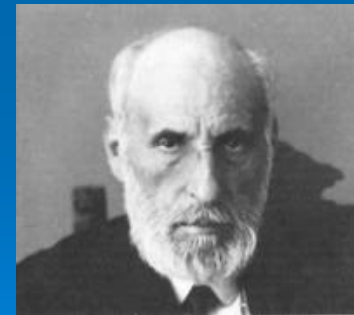
Sistema nervioso y neuronas



Golgi

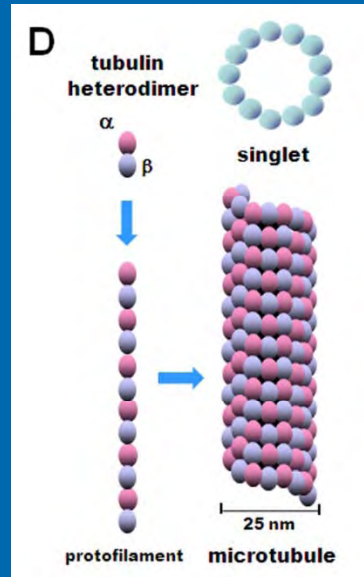
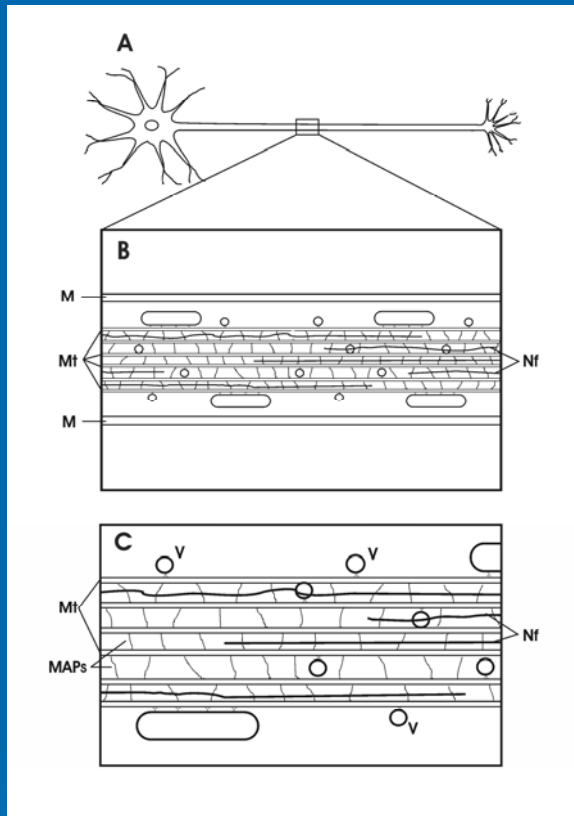


Cajal

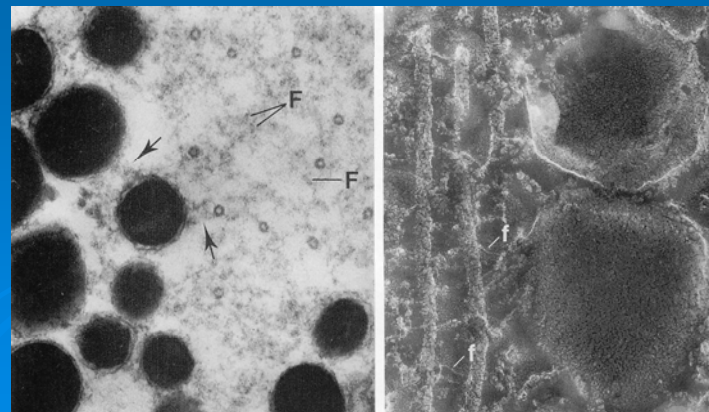
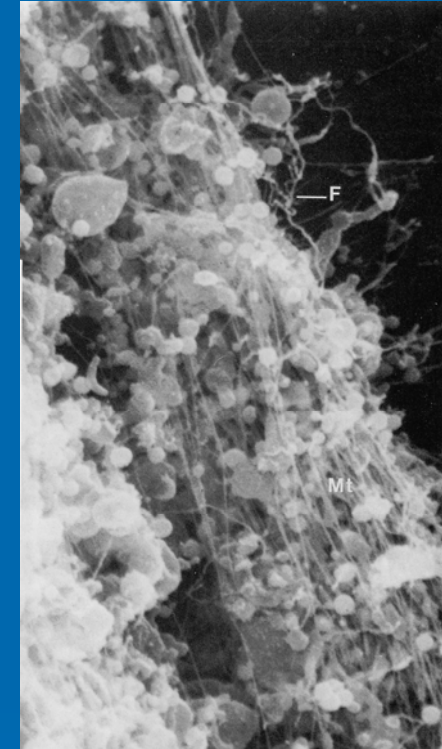


Frixione (2009) Cajal's second great battle for the neuron doctrine: the nature and function of neurofibrils. *Brain Research Reviews* 59: 393-409

El citoesqueleto neuronal



Frixione. E., Hernández, M. (2011)
 The Cytoskeleton. In: *Comprehensive Biotechnology*, Elsevier.



Frixione. E. (1983)
 Firm structural associations of migratory pigment granules with microtubules in crayfish retinula cells. *J. Cell Biology* 96: 1258 – 1265.

El citoesqueleto neuronal

Evolución de conceptos

Frixione, E. (2000) Recurring views on the structure and function of the cytoskeleton: a 300 year epic (Review). *Cell Motility and the Cytoskeleton* 46: 73-94.

Frixione, E. (2000) *De motu proprio. Una historia de la fisiología del movimiento*. México: Siglo XXI Editores.

Frixione, E. (2003) Sigmund Freud's contribution to the history of the neuronal cytoskeleton. *J. History of the Neurosciences* 12: 12-24.

Frixione, E. (2004) Fibres (Théorie des). En: *Dictionnaire de la Pensée Médicale* (D. Lecourt, dir.) Paris: Presses Universitaires de France.

Frixione, E. (2006) The cytoskeleton of nerve cells in historical perspective. Neuroscience History, International Brain Research Organization - Science Issues. http://www.ibro.info/Pub/Pub_Main_Display.asp?LC_Docs_ID=3147

Frixione, E. (2009) Cajal's second great battle for the neuron doctrine: the nature and function of neurofibrils. *Brain Research Reviews* 59: 393-409.

El citoesqueleto neuronal – novedad de fin de siglo



Sir Roger Penrose
Mathematical Institute
University of Oxford



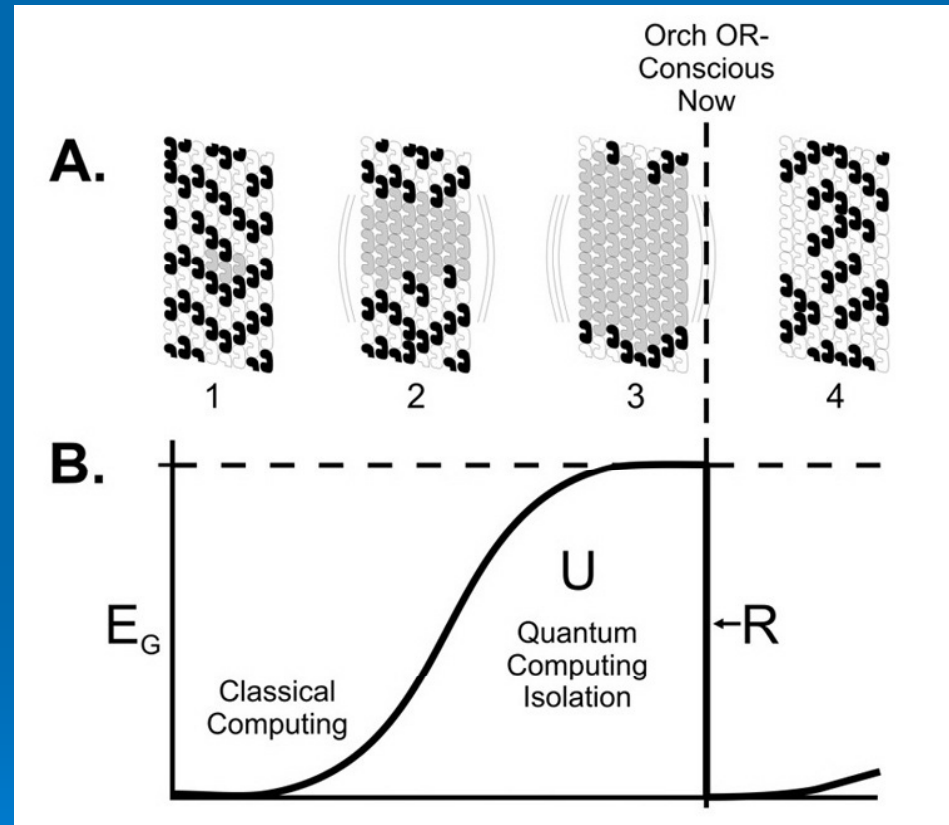
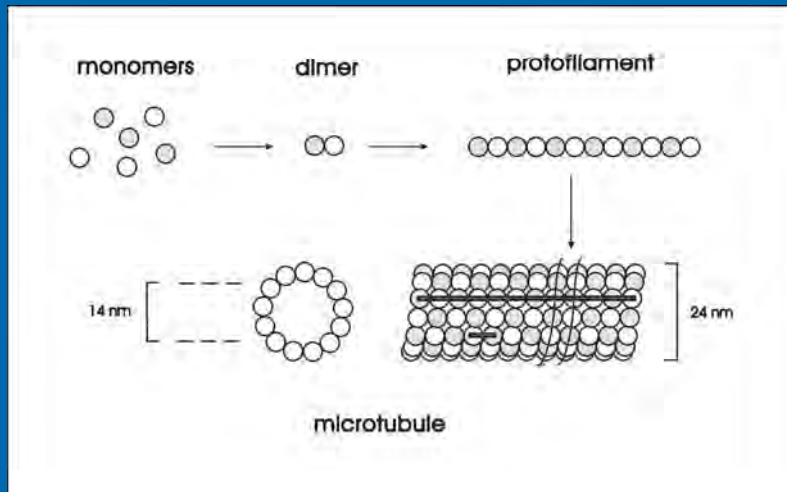
Dr. Stuart Hameroff
Center for Consciousness Studies
University of Arizona

Penrose, R. (1994a) *Shadows of the Mind. A search for the missing science of consciousness.* Oxford: Oxford University Press

Hameroff, S.R. (1994) Quantum coherence in microtubules: A neural basis for emergent consciousness? *J. Consciousness Studies* 1: 91-108.

Penrose, R. (1994b) Mechanisms, microtubules and the mind. *Journal of Consciousness Studies* 1: 241-249.

Penrose-Hameroff "Orch OR" model of consciousness



Penrose and Hameroff, 2011

Reacciones y contra-reacciones

- Grush, R., Churchland, P.S. (1995) Gaps in Penrose's toilings, *Journal of Consciousness Studies* 2: 10-29.
- Penrose, R., Hameroff, S. (1995) What 'gaps'? Reply to Grush and Churchland. *Journal of Consciousness Studies* 2: 98-111.
- Tegmark, M. (2000a) The importance of quantum decoherence in brain processes. *Physical Review E* 61: 4194-4206.
- Tegmark, M. (2000b) Why the brain is probably not a quantum computer. *Information Sciences* 128: 155-179.
- Hagan, S., Hameroff, S., Tuszynski, J. (2002) Quantum computation in brain microtubules: decoherence and biological feasibility. *Physical Reviews E* 65: 061901.
- Litt, A., Eliasmith, C., Kroon, F., Weinstein, S., Thagard, P. (2006) Is the brain a quantum computer? *Cognitive Science* 20: 1-11.
- Hameroff, S. (2007) The brain is both neurocomputer and quantum computer. *Cognitive Science* 31: 1035-1045.
- McKemmish, L., Reimers, J., McKenzie, R., Mark, A., Hush, N. (2009) Penrose-Hameroff orchestrated objective-reduction proposal for human consciousness is not biologically feasible. *Physical Review E* 80, 021912.

Presencia creciente del modelo Penrose-Hameroff

Hameroff, S. (1998) Quantum computation in brain microtubules: The Penrose-Hameroff “Orch OR” model of consciousness. *Philosophical Transactions Royal Society London* 356: 1869-1896.

Hameroff, S. (2001) Consciousness, the brain, and spacetime geometry. *Annals New York Academy of Sciences* 929: 74-104.

Penrose, R. (2001) Consciousness, the brain, and spacetime geometry: an addendum. Some new developments on the Orch OR model of consciousness. *Annals New York Academy of Sciences* 929: 105-110.

Llinás, R., Ribary, U., Contreras, D., Pedroarena, C. (1998) The neuronal basis of consciousness. *Philosophical Transactions Royal Society London* 353: 1841-1849.

Discovery Channel

Fragmento 3 min



Tuc



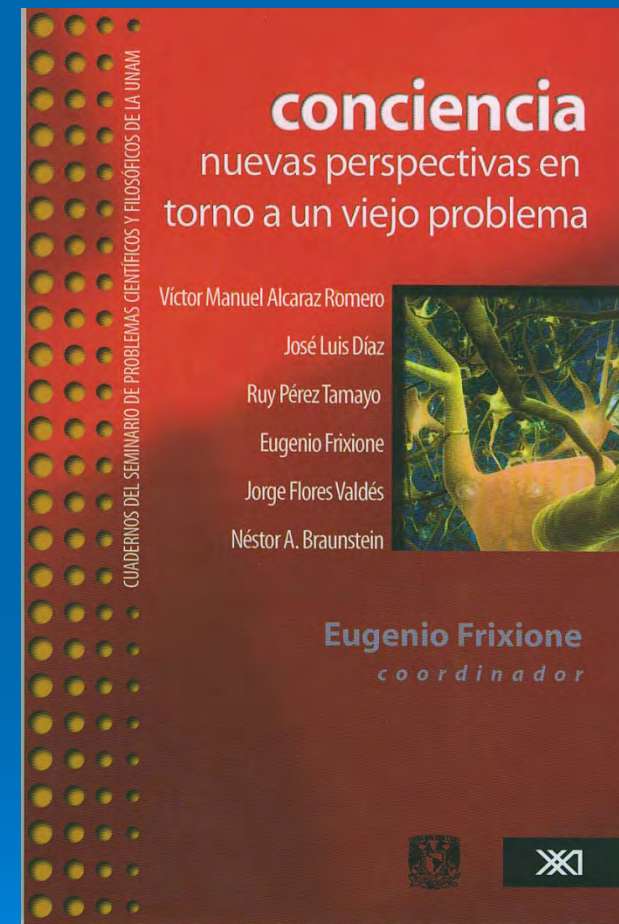
Revisiones del modelo Penrose-Hameroff

Frixione, E. (2000) Recurring views on the structure and function of the cytoskeleton: a 300 year epic (Review). *Cell Motility and the Cytoskeleton* 46: 73-94.

Frixione, E. (2007) Un modelo cuántico de la conciencia. En: Frixione, E. (coord.) *Conciencia – Nuevas perspectivas en torno a un viejo problema*. México: Universidad Nacional Autónoma de México – Siglo XXI Editores, pp. 81-95.

Flores Valdés, J. (2007) La conciencia según Penrose y Hameroff. En: *Ibid.* pp. 97-102.

Frixione, E. (2012) Consciousness and neuronal microtubules: the Penrose-Hameroff quantum model in retrospect. In: Smith and Whitaker (eds.) *Essays on the 'hard problem' in the history of neuroscience*. Springer (En prensa)



De la consciencia cuántica al budismo

Hameroff, S.R. (1998a) “Fundamentality”: is the conscious mind subtly linked to a basic level of the universe? *Trends in Cognitive Sciences* 2: 119-124.

Penrose, R., Hameroff, S. (2011) *Consciousness in the universe: neuroscience, quantum space-time geometry and Orch OR theory.*

http://www.leecharleskelley.com/images/Consciousness_in_the_Universe.pdf

“Some Buddhist writings quantify the frequency of conscious moments. [. . .] on this view, gamma synchrony [40 Hz], Buddhist 'moments of experience', [Alfred North] Whitehead 'occasions of experience', and our proposed Orch OR events might be viewed as corresponding tolerably well with one another.”

“All the Buddha’s [*sic*] and all sentient beings are nothing but One Mind, beside which nothing exists. This Mind, which is without beginning . . . is neither long nor short, big nor small, for it transcends all limits, measures, names, traces, and comparisons.”

Huang Po, Zen Master

Inaugural Speaker

The Neuroscience of Meditation

**Dalai Lama, Mind and Life Institute, Louisville, CO
Society for Neuroscience, 2005 Annual Meeting
Washington, D.C., Saturday, November 12, 4:15 PM - 5:15 PM**

The Dalai Lama has long been interested in science and has maintained an ongoing dialogue with leading neuroscientists for more than fifteen years. His talk is expected to bridge the cultural gap between neuroscientists and Buddhist practitioners by pointing to the methods of observation and verification that lie at the heart of both science and Buddhism.

He is expected to discuss the study of meditation, a practice of mental discipline that Western neuroscience has shown to change neural states in circuits that may be important for compassionate behavior and attentional and emotional regulation. The Dalai Lama will also discuss the importance of this neuroscience research in promoting brain health and mental well-being and its implications for fostering compassionate behavior in all human beings.

-Petición de cancelación de conferencia firmada por más de 1,000 miembros

-Editorial (2005), “Science and religion in harmony”, *Nature* 436: 889.

Trabajo experimental

Persinger, M. A. (1983) Religious and mystical experiences as artifacts of temporal-lobe function: a general hypothesis. *Perceptual and Motor Skills* 57: 1255-1262.

Saber, J. L., Rabin, J. (1997) The neural substrates of religious experience. *J. Neuropsychiatry and Clinical Neurosciences* 9: 498-510.

Persinger, M.A., Healey, F. H. B. (2002) Experimental facilitation of the sensed presence: possible intercalation between the hemispheres induced by complex magnetic fields. *J. Nervous and Mental Disease* 190: 533-541.

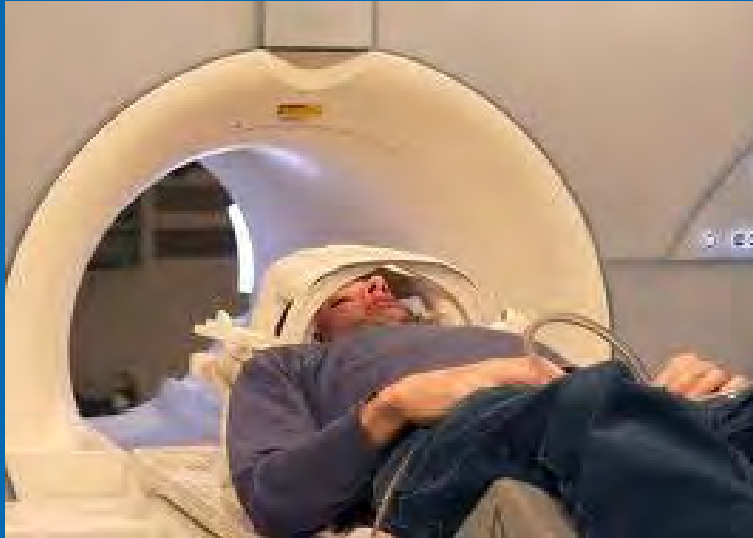
Granqvist, P., Fredrikson, M., Unge, P., Hagenfeldt, A., Valind, S., Larhammar, D., Larsson, M. (2005) Sensed presence and mystical experiences are predicted by suggestibility, not by the application of transcranial weak complex magnetic fields. *Neuroscience Letters* 379: 1–6.



“God helmet”
M. Persinger

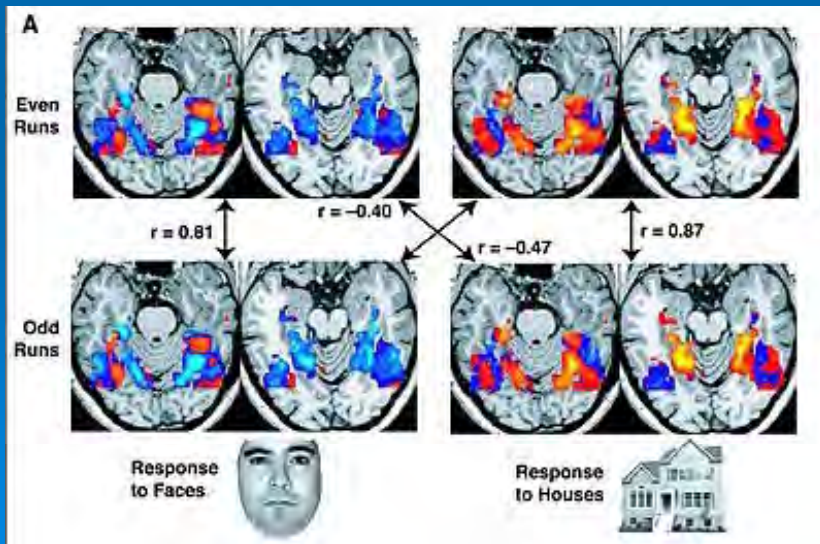


Datos de tomografía computarizada

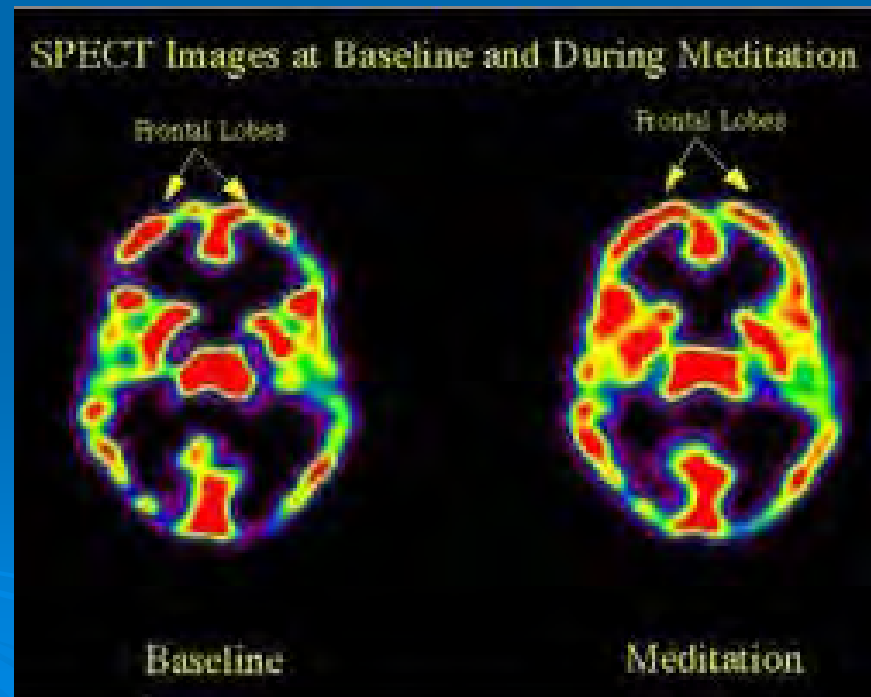


SPECT, PET, fMRI

Newberg, A., Alavi, A., Baime, M., Pourdehnad, M., Santanna, J., d'Aquili, E. (2001) The measurement of regional cerebral blood flow during the complex cognitive task of meditation: a preliminary SPECT study. *Psychiatry Research: Neuroimaging* 106: 113 - 122.



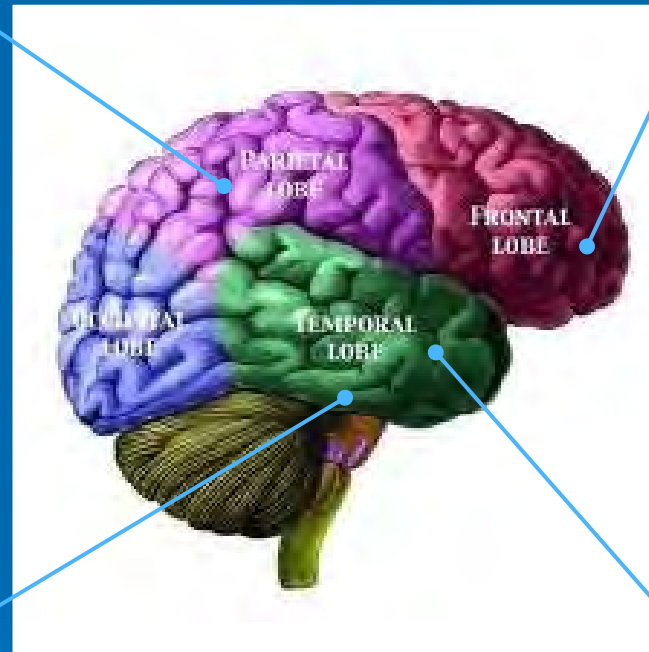
fMRI



Regiones del cerebro asociadas con experiencias místicas y religiosas

unión cósmica

concentración profunda



imágenes "sagradas"

recuerdos, emociones, alucinaciones,
estados alterados de consciencia
(sistema límbico, hipocampo, amígdala)

Neurofisiología cuántica y religión en el contexto cristiano

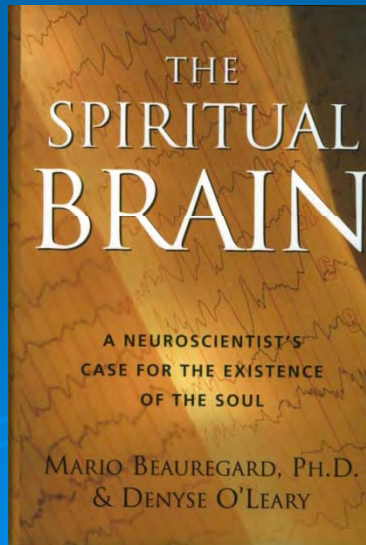
Schwartz, J.M., Stapp, H. P., Beauregard, M. (2005) Quantum physics in neuroscience and psychology: a neurophysical model of mind-brain interaction. *Philosophical Transactions Royal Society London* 360: 1309-1327.

”brain behavior that appears to be caused by mental effort is actually caused by mental effort; the causal efficacy of mental effort is no illusion.”

Beauregard, M., Paquette, V. (2006) Neural correlates of a mystical experience in Carmelite nuns. *Neuroscience Letters* 405: 186-190.

Beauregard, M., Paquette, V. (2008) EEG activity in Carmelite nuns during a mystical experience. *Neuroscience Letters* 444: 1-4.

2007



Algunos libros sobre religión y biología humana en los 10 últimos años

D'Aquili, E. G., Newberg, A. B. (2001) *Why God Won't Go Away: Brain science and the biology of belief*. New York: Ballantine.

Giovannoli, J. (2001) *The Biology of Belief: How our biology biases our beliefs and perceptions*. Rosetta Press.

Hamer, D. H. (2005) *The God Gene: How faith is hardwired into our genes*. Anchor.

Alper, M. (2006) *The "God" Part of the Brain. A scientific interpretation of human spirituality and God*. Naperville: Sourcebooks.

Beauregard, M., O'Leary, D. (2007) *The Spiritual Brain – A neuroscientist's case for the existence of the soul*. New York: HarperOne.

McNamara, P. (2009) *The Neuroscience of Religious Experience*. Cambridge University Press.

Goodwyn, E. D. (2012) *The Neurobiology of the Gods: How brain physiology shapes the recurrent imagery of myth and dreams*. Routledge.

Murphy, T. (2012) *Sacred Pathways: The Brain's Role in Religious and Mystic Experiences*. Amazon Digital.

Ejemplos de estudios sobre evolución biológico-cultural de la religión

Libros

Boyer, P. (2001) *Religion Explained. The evolutionary origins of religious thought.* New York: Basic Books.

Atran, S. (2002) *In Gods We Trust. The evolutionary landscape of religion.* New York: Oxford University Press.

Artículos en revistas especializadas

Ratcliffe, M. (2002) Evolution and belief: the missing question. *Stud. Hist. Phil. Biol. & Biomed. Sci.* 33C: 133-150.

Dixon, T. (2002) Scientific atheism as a faith tradition. *Stud. Hist. Phil. Biol. & Biomed. Sci.* 33C: 337-359.

Revistas académicas temáticas

Hefner, P. (June, 2012) A fuller concept of evolution — Big Bang to spirit. *Zygon* (Chicago, 1966- present) vol. 47 (In press)

Hutchinson, I. (MIT Professor; octubre 15, 2012, 5:30 pm) Scientism: how much faith should we put in science? *Faraday Lectures* (Cambridge UK, 2006-present)

Libros polémicos para público general

Harris, S. (2004) *The End of Faith: religion, terror, and the future of reason.* Norton

Onfray, M. (2005/2007-2008) *Atheist Manifesto. The case against Christianity, Judaism, and Islam.* New York: Arcade Publishing.

Dawkins, R. (2006) *The God Delusion.* Houghton Mifflin Harcourt.

Dennett, D. C. (2006) *Breaking the Spell: Religion as a Natural Phenomenon.* Viking

Harris, S. (2007) *Letter to a Christian Nation.* New York: Alfred A. Knopf.

Hitchens, C. (2007) *God Is Not Great: How religion poisons everything.* Twelve Books, Hachette Book Group.

Shermer, M. (2007) *Why Darwin Matters: The case against intelligent design.* Holt.

Stenger, V. J. (2007) *God: The Failed Hypothesis. How science shows that God does not exist.* Prometheus Books.

Berlinski, D. (2009) *The Devil's Delusion: Atheism and its scientific pretensions.* New Cork: Basic Books.

Hawking, S. (2010) *The Grand Design.* Bantam.

Lennox, J. (2011) *God and Stephen Hawking — Whose design is it anyway?* Lion Books.

Libros conciliadores para público general

Gould, S. R. (2002) *Rocks of Ages. Science and religion in the fullness of life*. New York: Ballantine.

Horgan, J. (2003) *Rational Mysticism. Spirituality meets science in the search for enlightenment*. New York: Houghton Mifflin.

Polkinghorne, J. (2006) *Quantum Physics and Theology: An unexpected kinship*. Yale University Press.

Sagan, C., Druyan, A, ed. (2007) *The Varieties of Scientific Experience: A personal view of the search for God*. New York: Penguin Books.

Flew, A., Varghese, R. A. (2008) *There is ~~no~~ God*. New York: HarperOne.

Neuroteología

Andrew B. Newberg

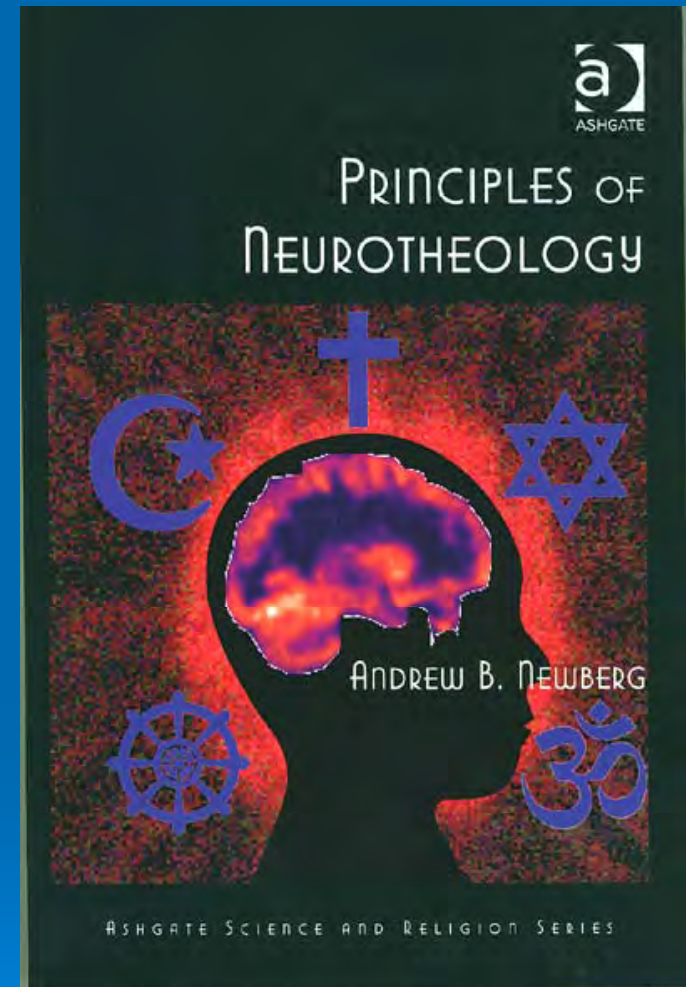
Director of Research

Myrna Brind Center for Integrative Medicine
Thomas Jefferson University Hospital and
Medical College

Newberg, A., Monti, D., Moss, A., Alavi, A. (2012) Positron emission tomography in neurological and psychiatric disorders. *Internat. J. Imaging Systems and Technology* 22: 2-17.

Newberg, A., Newberg, S. (2010) Psychology and neurobiology in a postmaterialist world. *Psychology of Religion and Spirituality* 2: 119-121.

Newberg, A. (2010) Methodological principles for research in neurotheology: Practical and philosophical implications. *Neuroquantology* 8: 531-545.



Ciencia – Religión: triple debate

Consciencia: clásica vs. cuántica

- Religión (*religare*) implica consciencia de realidad trascendental
- A: propiedad emergente de la complejidad del SNC (automatismo determinista)
- B: procesos cuánticos independientes (sujetos a intencionalidad)
- ¿Consciencia trascendental basada en física fundamental?

Experiencias místicas: endógenas vs. exógenas

- Espontáneas: epilepsia temporo-límbica (“personalidad de lóbulo temporal”)
- Inducibles: factores químicos (drogas), físicos (luminosos y sonoros; ¿magnéticos?), “mentales” (meditación, oración)
- Activación de diversas regiones cerebrales (no un “módulo divino”)
- Sin evidencia de influencias ajenas a propiedades del propio SNC

Teísmo vs. ateísmo

- Sin fundamento en las neurociencias
- Interminable batalla de “expertos”
- Fuente de prosperidad permanente en mercado editorial

Conclusiones

- Conducta religiosa tiene correlatos anatómico-funcionales en SNC
- Carácter intrínseco con obvias ventajas adaptativas
- Improbable que desaparezca
- Co-dependiente de contexto cultural

Lutz, A., Greischar, L., Rawlings, N., Ricard, M., Davidson, R. (2004) Long-term meditators self-induce high-amplitude gamma synchrony during mental practice. *Proceedings National Academy of Sciences USA* 101: 16369-16373.

Alma y espíritu

- Relaciones entre alma y espíritus
- Relaciones con el cuerpo físico
- Nervios como vías de comunicación
- Vehículo de la información
- Historia científica de >2,500 años



Vehículo de la información nerviosa

pneuma psychikon s. III a.C. — IV

spiritus animalis s. V — XVI

esprits animaux s. XVII — XVIII
animal spirits

Nervenströme,
Actionsströme s. XIX — XX

action potential s. XX — XXI

