

7. Literaturverzeichnis

- Aakalu,G., Smith,W.B., Nguyen,N., Jiang,C., and Schuman,E.M. (2001). Dynamic visualization of local protein synthesis in hippocampal neurons. *Neuron* 30, 489-502.
- Abel,T., Nguyen,P.V., Barad,M., Deuel,T.A., Kandel,E.R., and Bourtchouladze,R. (1997). Genetic demonstration of a role for PKA in the late phase of LTP and in hippocampus-based long-term memory. *Cell* 88, 615-626.
- Abel,T., Martin,K.C., Bartsch,D., and Kandel,E.R. (1998). Memory Suppressor Genes: Inhibitory Constraints on the Storage of Long-Term Memory. *Science* 279, 338-341.
- Adams,J.P. and Sweatt,J.D. (2002). Molecular psychology: roles for the ERK MAP kinase cascade in memory. *Annu. Rev. Pharmacol. Toxicol.* 42, 135-163.
- Aguzzi,A. and Polymenidou,M. (2004). Mammalian prion biology: one century of evolving concepts. *Cell* 116, 313-327.
- Ahn,K., Erlander,M., Leturcq,D., Peterson,P.A., Fruh,K., and Yang,Y. (1996). In Vivo Characterization of the Proteasome Regulator PA28. *J. Biol. Chem.* 271, 18237-18242.
- Ainger,K., Avossa,D., Morgan,F., Hill,S.J., Barry,C., Barbarese,E., and Carson,J.H. (1993). Transport and localization of exogenous myelin basic protein mRNA microinjected into oligodendrocytes. *J. Cell Biol.* 123, 431-441.
- Ainger,K., Avossa,D., Diana,A.S., Barry,C., Barbarese,E., and Carson,J.H. (1997). Transport and Localization Elements in Myelin Basic Protein mRNA. *J. Cell Biol.* 138, 1077-1087.
- Akert,K., Moor,H., Pfenninger,K., and Sandri,C. (1969). Contributions of new impregnation methods and freeze etching to the problems of synaptic fine structure. *Prog. Brain Res.* 31, 223-240.
- Altschul,S.F., Madden,T.L., Schaffer,A.A., Zhang,J., Zhang,Z., Miller,W., and Lipman,D.J. (1997). Gapped BLAST and PSI-BLAST: a new generation of protein database search programs. *Nucleic Acids Res.* 25, 3389-3402.
- Antar,L.N. and Bassell,G.J. (2003). Sunrise at the synapse: the FMRP mRNP shaping the synaptic interface. *Neuron* 37, 555-558.
- Antar,L.N., Afroz,R., Dichtenberg,J.B., Carroll,R.C., and Bassell,G.J. (2004). Metabotropic Glutamate Receptor Activation Regulates Fragile X Mental Retardation Protein and Fmr1 mRNA Localization Differentially in Dendrites and at Synapses. *J. Neurosci.* 24, 2648-2655.
- Arthur,J.S. and Cohen,P. (2000). MSK1 is required for CREB phosphorylation in response to mitogens in mouse embryonic stem cells. *FEBS Lett.* 482, 44-48.
- Asaki,C., Usuda,N., Nakazawa,A., Kametani,K., and Suzuki,T. (2003). Localization of translational components at the ultramicroscopic level at postsynaptic sites of the rat brain. *Brain Res.* 972, 168-176.
- Ashkenas,J. and Byers,P.H. (1997). The final stage of gene expression: chaperones and the regulation of protein fate. *Am. J. Hum. Genet.* 61, 267-272.
- Ashley,C.T., Jr., Wilkinson,K.D., Reines,D., and Warren,S.T. (1993). FMR1 protein: conserved RNP family domains and selective RNA binding. *Science* 262, 563-566.
- Bagni,C., Mannucci,L., Dotti,C.G., and Amaldi,F. (2000). Chemical stimulation of synaptosomes modulates alpha -Ca²⁺/calmodulin-dependent protein kinase II mRNA association to polysomes. *J. Neurosci.* 20, RC76.
- Bailey,C.H., Bartsch,D., and Kandel,E.R. (1996). Toward a molecular definition of long-term memory storage. *PNAS* 93, 13445-13452.

- Baliga,B.S., Pronczuk,A.W., and Munro,H.N. (1969). Mechanism of cycloheximide inhibition of protein synthesis in a cell-free system prepared from rat liver. *J. Biol. Chem.* *244*, 4480-4489.
- Balschun,D., Wolfer,D.P., Gass,P., Mantamadiotis,T., Welzl,H., Schutz,G., Frey,J.U., and Lipp,H.P. (2003). Does cAMP response element-binding protein have a pivotal role in hippocampal synaptic plasticity and hippocampus-dependent memory? *J. Neurosci.* *23*, 6304-6314.
- Baouz,S., Jacquet,E., Accorsi,K., Hountondji,C., Balestrini,M., Zippel,R., Sturani,E., and Parmeggiani,A. (2001). Sites of Phosphorylation by Protein Kinase A in CDC25Mm/GRF1, a Guanine Nucleotide Exchange Factor for Ras. *J. Biol. Chem.* *276*, 1742-1749.
- Bartsch,D., Ghirardi,M., Skehel,P.A., Karl,K.A., Herder,S.P., Chen,M., Bailey,C.H., and Kandel,E.R. (1995). *Aplysia* CREB2 represses long-term facilitation: relief of repression converts transient facilitation into long-term functional and structural change. *Cell* *83*, 979-992.
- Bateman,A., Coin,L., Durbin,R., Finn,R.D., Hollich,V., Griffiths-Jones,S., Khanna,A., Marshall,M., Moxon,S., Sonnhammer,E.L., Studholme,D.J., Yeats,C., and Eddy,S.R. (2004). The Pfam protein families database. *Nucleic Acids Res.* *32*, D138-D141.
- Bayer,T.A., Paliga,K., Weggen,S., Wiestler,O.D., Beyreuther,K., and Multhaup,G. (1997). Amyloid precursor-like protein 1 accumulates in neuritic plaques in Alzheimer's disease. *Acta Neuropathol. (Berl)* *94*, 519-524.
- Bellefroid,E.J., Poncelet,D.A., Lecocq,P.J., Revelant,O., and Martial,J.A. (1991). The Evolutionarily Conserved Kruppel-Associated Box Domain Defines a Subfamily of Eukaryotic Multifingered Proteins. *PNAS* *88*, 3608-3612.
- Bennett,M.R. (1999). The early history of the synapse: from plato to sherrington. *Brain Research Bulletin* *50*, 95-118.
- Benson,D.L., Gall,C.M., and Isackson,P.J. (1992). Dendritic localization of type II calcium calmodulin-dependent protein kinase mRNA in normal and reinnervated rat hippocampus. *Neuroscience* *46*, 851-857.
- Bienkowska-Szewczyk,K. and Ehrenfeld,E. (1988). An internal 5'-noncoding region required for translation of poliovirus RNA in vitro. *J. Virol.* *62*, 3068-3072.
- Bliss,T.V. and Lomo,T. (1973). Long-lasting potentiation of synaptic transmission in the dentate area of the anaesthetized rabbit following stimulation of the perforant path. *J. Physiol* *232*, 331-356.
- Bliss,T.V. and Collingridge,G.L. (1993). A synaptic model of memory: long-term potentiation in the hippocampus. *Nature* *361*, 31-39.
- Bochtler,M., Ditzel,L., Groll,M., Hartmann,C., and Huber,R. (1999). The proteasome. *Annu. Rev. Biophys. Biomol. Struct.* *28*, 295-317.
- Bourtchuladze,R., Frenquelli,B., Blendy,J., Cioffi,D., Schutz,G., and Silva,A.J. (1994). Deficient long-term memory in mice with a targeted mutation of the cAMP-responsive element-binding protein. *Cell* *79*, 59-68.
- Bozon,B., Davis,S., and Laroche,S. (2002). Regulated transcription of the immediate-early gene *Zif268*: mechanisms and gene dosage-dependent function in synaptic plasticity and memory formation. *Hippocampus* *12*, 570-577.
- Bradford,M.M. (1976). A rapid and sensitive method for the quantitation of microgram quantities of protein utilizing the principle of protein-dye binding. *Anal. Biochem.* *72*, 248-254.
- Brakeman,P.R., Lanahan,A.A., O'Brien,R., Roche,K., Barnes,C.A., Haganir,R.L., and Worley,P.F. (1997). Homer: a protein that selectively binds metabotropic glutamate receptors. *Nature* *386*, 284-288.
- Brambilla,R., Gnesutta,N., Minichiello,L., White,G., Roylance,A.J., Herron,C.E., Ramsey,M., Wolfer,D.P., Cestari,V., Rossi-Arnaud,C., Grant,S.G., Chapman,P.F., Lipp,H.P., Sturani,E.,

- and Klein,R. (1997). A role for the Ras signalling pathway in synaptic transmission and long-term memory. *Nature* 390, 281-286.
- Braun,A.P. and Schulman,H. (1995). The multifunctional calcium/calmodulin-dependent protein kinase: from form to function. *Annu. Rev. Physiol* 57, 417-445.
- Bredt,D.S. and Nicoll,R.A. (2003). AMPA receptor trafficking at excitatory synapses. *Neuron* 40, 361-379.
- Brown,V., Jin,P., Ceman,S., Darnell,J.C., O'Donnell,W.T., Tenenbaum,S.A., Jin,X., Feng,Y., Wilkinson,K.D., Keene,J.D., Darnell,R.B., and Warren,S.T. (2001). Microarray identification of FMRP-associated brain mRNAs and altered mRNA translational profiles in fragile X syndrome. *Cell* 107, 477-487.
- Buchs,P.A. and Muller,D. (1996). Induction of long-term potentiation is associated with major ultrastructural changes of activated synapses. *PNAS* 93, 8040-8045.
- Buchsbaum,R., Telliez,J.B., Goonesekera,S., and Feig,L.A. (1996). The N-terminal pleckstrin, coiled-coil, and IQ domains of the exchange factor Ras-GRF act cooperatively to facilitate activation by calcium. *Mol. Cell Biol.* 16, 4888-4896.
- Burgin,K.E., Waxham,M.N., Rickling,S., Westgate,S.A., Mobley,W.C., and Kelly,P.T. (1990). In situ hybridization histochemistry of Ca²⁺/calmodulin-dependent protein kinase in developing rat brain. *J. Neurosci.* 10, 1788-1798.
- Burridge,K. and Wennerberg,K. (2004). Rho and Rac take center stage. *Cell* 116, 167-179.
- Cali,J.J., Zwaagstra,J.C., Mons,N., Cooper,D.M., and Krupinski,J. (1994). Type VIII adenylyl cyclase. A Ca²⁺/calmodulin-stimulated enzyme expressed in discrete regions of rat brain. *J. Biol. Chem.* 269, 12190-12195.
- Cammalleri,M., Lutjens,R., Berton,F., King,A.R., Simpson,C., Francesconi,W., and Sanna,P.P. (2003). Time-restricted role for dendritic activation of the mTOR-p70S6K pathway in the induction of late-phase long-term potentiation in the CA1. *Proc. Natl. Acad. Sci. U. S. A* 100, 14368-14373.
- Cannone,J.J., Subramanian,S., Schnare,M.N., Collett,J.R., D'Souza,L.M., Du,Y., Feng,B., Lin,N., Madabusi,L.V., Muller,K.M., Pande,N., Shang,Z., Yu,N., and Gutell,R.R. (2002). The comparative RNA web (CRW) site: an online database of comparative sequence and structure information for ribosomal, intron, and other RNAs. *BMC. Bioinformatics.* 3, 2.
- Cao,Q. and Richter,J.D. (2002). Dissolution of the maskin-eIF4E complex by cytoplasmic polyadenylation and poly(A)-binding protein controls cyclin B1 mRNA translation and oocyte maturation. *EMBO J.* 21, 3852-3862.
- Ceman,S., Brown,V., and Warren,S.T. (1999). Isolation of an FMRP-Associated Messenger Ribonucleoprotein Particle and Identification of Nucleolin and the Fragile X-Related Proteins as Components of the Complex. *Mol. Cell. Biol.* 19, 7925-7932.
- Cerione,R.A. and Zheng,Y. (1996). The Dbl family of oncogenes. *Curr. Opin. Cell Biol.* 8, 216-222.
- Chen,A., Muzzio,I.A., Malleret,G., Bartsch,D., Verbitsky,M., Pavlidis,P., Yonan,A.L., Vronskaya,S., Grody,M.B., Cepeda,I., Gilliam,T.C., and Kandel,E.R. (2003). Inducible enhancement of memory storage and synaptic plasticity in transgenic mice expressing an inhibitor of ATF4 (CREB-2) and C/EBP proteins. *Neuron* 39, 655-669.
- Chen,L., Chetkovich,D.M., Petralia,R.S., Sweeney,N.T., Kawasaki,Y., Wenthold,R.J., Bredt,D.S., and Nicoll,R.A. (2000). Stargazin regulates synaptic targeting of AMPA receptors by two distinct mechanisms. *Nature* 408, 936-943.
- Cheng,J.G., Tiedge,H., and Brosius,J. (1996). Identification and characterization of BC1 RNP particles. *DNA Cell Biol.* 15, 549-559.

- Cho,S., Park,E.M., Kim,Y., Liu,N., Gal,J., Volpe,B.T., and Joh,T.H. (2001). Early c-Fos induction after cerebral ischemia: a possible neuroprotective role. *J. Cereb. Blood Flow Metab* *21*, 550-556.
- Chong,H., Vikis,H.G., and Guan,K.L. (2003). Mechanisms of regulating the Raf kinase family. *Cell Signal*. *15*, 463-469.
- Ciechanover,A., Finley,D., and Varshavsky,A. (1984). Ubiquitin dependence of selective protein degradation demonstrated in the mammalian cell cycle mutant ts85. *Cell* *37*, 57-66.
- Ciechanover,A. and Brundin,P. (2003). The ubiquitin proteasome system in neurodegenerative diseases: sometimes the chicken, sometimes the egg. *Neuron* *40*, 427-446.
- Cline,H. (2003). Synaptic Plasticity: Importance of Proteasome-Mediated Protein Turnover. *Current Biology* *13*, R514-R516.
- Clemens,K.R., Wolf,V., McBryant,S.J., Zhang,P., Liao,X., Wright,P.E., and Gottesfeld,J.M. (1993). Molecular basis for specific recognition of both RNA and DNA by a zinc finger protein. *Science* *260*, 530-533.
- Coates,P.J. and Hall,P.A. (2003). The yeast two-hybrid system for identifying protein-protein interactions. *J. Pathol.* *199*, 4-7.
- Cokol,M., Nair,R., and Rost,B. (2000). Finding nuclear localization signals. *EMBO Rep.* *1*, 411-415.
- Cole,A.J., Saffen,D.W., Baraban,J.M., and Worley,P.F. (1989). Rapid increase of an immediate early gene messenger RNA in hippocampal neurons by synaptic NMDA receptor activation. *Nature* *340*, 474-476.
- Corbin,F., Bouillon,M., Fortin,A., Morin,S., Rousseau,F., and Khandjian,E.W. (1997). The fragile X mental retardation protein is associated with poly(A)⁺ mRNA in actively translating polyribosomes. *Hum. Mol. Genet.* *6*, 1465-1472.
- Costa,R.M., Federov,N.B., Kogan,J.H., Murphy,G.G., Stern,J., Ohno,M., Kucherlapati,R., Jacks,T., and Silva,A.J. (2002). Mechanism for the learning deficits in a mouse model of neurofibromatosis type 1. *Nature* *415*, 526-530.
- Cote,F., Boisvert,F.M., Grondin,B., Bazinet,M., Goodyer,C.G., Bazett-Jones,D.P., and Aubry,M. (2001). Alternative promoter usage and splicing of ZNF74 multifinger gene produce protein isoforms with a different repressor activity and nuclear partitioning. *DNA Cell Biol.* *20*, 159-173.
- Cotman,C.W., Banker,G., Churchill,L., and Taylor,D. (1974). Isolation of postsynaptic densities from rat brain. *J. Cell Biol.* *63*, 441-455.
- Coux,O., Tanaka,K., and Goldberg,A.L. (1996). Structure and functions of the 20S and 26S proteasomes. *Annu. Rev. Biochem.* *65*, 801-847.
- Crechet,J.B., Pouillet,P., Mistou,M.Y., Parmeggiani,A., Camonis,J., Boy-Marcotte,E., Damak,F., and Jacquet,M. (1990). Enhancement of the GDP-GTP exchange of RAS proteins by the carboxyl-terminal domain of SCD25. *Science* *248*, 866-868.
- Crino,P., Khodakhah,K., Becker,K., Ginsberg,S., Hemby,S., and Eberwine,J. (1998). Presence and phosphorylation of transcription factors in developing dendrites. *Proc. Natl. Acad. Sci. U. S. A* *95*, 2313-2318.
- Crossley,M., Merika,M., and Orkin,S.H. (1995). Self-association of the erythroid transcription factor GATA-1 mediated by its zinc finger domains. *Mol. Cell Biol.* *15*, 2448-2456.
- Dash,P.K., Hochner,B., and Kandel,E.R. (1990). Injection of the cAMP-responsive element into the nucleus of *Aplysia* sensory neurons blocks long-term facilitation. *Nature* *345*, 718-721.
- Dasso,M.C. and Jackson,R.J. (1989). On the fidelity of mRNA translation in the nuclease-treated rabbit reticulocyte lysate system. *Nucleic Acids Res.* *17*, 3129-3144.

- Dauge,V., Pophillat,M., Crete,D., Melik-Parsadaniantz,S., and Roques,B.P. (2003). Involvement of brain endogenous cholecystokinin in stress-induced impairment of spatial recognition memory. *Neuroscience* 118, 19-23.
- Davis,H.P. and Squire,L.R. (1984). Protein synthesis and memory: a review. *Psychol. Bull.* 96, 518-559.
- Davis,L., Banker,G.A., and Steward,O. (1987). Selective dendritic transport of RNA in hippocampal neurons in culture. *Nature* 330, 477-479.
- Davis,M. (1992). The role of the amygdala in fear and anxiety. *Annu. Rev. Neurosci.* 15, 353-375.
- Davis,S., Bozon,B., and Laroche,S. (2003). How necessary is the activation of the immediate early gene *zif268* in synaptic plasticity and learning? *Behav. Brain Res.* 142, 17-30.
- de Moor,C.H. and Richter,J.D. (1999). Cytoplasmic polyadenylation elements mediate masking and unmasking of cyclin B1 mRNA. *EMBO J.* 18, 2294-2303.
- Deisseroth,K., Bito,H., and Tsien,R.W. (1996). Signaling from synapse to nucleus: postsynaptic CREB phosphorylation during multiple forms of hippocampal synaptic plasticity. *Neuron* 16, 89-101.
- Deveraux,Q., Jensen,C., and Rechsteiner,M. (1995). Molecular cloning and expression of a 26 S protease subunit enriched in dileucine repeats. *J. Biol. Chem.* 270, 23726-23729.
- Diez,M., Danner,S., Frey,P., Sommer,B., Staufenbiel,M., Wiederhold,K.H., and Hokfelt,T. (2003). Neuropeptide alterations in the hippocampal formation and cortex of transgenic mice overexpressing beta-amyloid precursor protein (APP) with the Swedish double mutation (APP23). *Neurobiol. Dis.* 14, 579-594.
- Donai,H., Sugiura,H., Ara,D., Yoshimura,Y., Yamagata,K., and Yamauchi,T. (2003). Interaction of Arc with CaM kinase II and stimulation of neurite extension by Arc in neuroblastoma cells expressing CaM kinase II. *Neurosci. Res.* 47, 399-408.
- Dong,E., Caruncho,H., Liu,W.S., Smalheiser,N.R., Grayson,D.R., Costa,E., and Guidotti,A. (2003). A reelin-integrin receptor interaction regulates Arc mRNA translation in synaptoneuroosomes. *PNAS* 100, 5479-5484.
- Dragunow,M., Abraham,W.C., Goulding,M., Mason,S.E., Robertson,H.A., and Faull,R.L. (1989). Long-term potentiation and the induction of *c-fos* mRNA and proteins in the dentate gyrus of unanesthetized rats. *Neurosci. Lett.* 101, 274-280.
- Dragunow,M. (1996). A role for immediate-early transcription factors in learning and memory. *Behav. Genet.* 26, 293-299.
- Du,F., Whetsell,W.O., Jr., Abou-Khalil,B., Blumenkopf,B., Lothman,E.W., and Schwarcz,R. (1993). Preferential neuronal loss in layer III of the entorhinal cortex in patients with temporal lobe epilepsy. *Epilepsy Res.* 16, 223-233.
- Du,F., Eid,T., Lothman,E.W., Kohler,C., and Schwarcz,R. (1995). Preferential neuronal loss in layer III of the medial entorhinal cortex in rat models of temporal lobe epilepsy. *J. Neurosci.* 15, 6301-6313.
- Dyer,J.R., Michel,S., Lee,W., Castellucci,V.F., Wayne,N.L., and Sossin,W.S. (2003). An activity-dependent switch to cap-independent translation triggered by eIF4E dephosphorylation. *Nat. Neurosci.* 6, 219-220.
- Ehlers,M.D. (2003). Activity level controls postsynaptic composition and signaling via the ubiquitin-proteasome system. *Nat. Neurosci.* 6, 231-242.
- Eisenhardt,D., Fiala,A., Braun,P., Rosenboom,H., Kress,H., Ebert,P.R., and Menzel,R. (2001). Cloning of a catalytic subunit of cAMP-dependent protein kinase from the honeybee (*Apis mellifera*) and its localization in the brain. *Insect Mol. Biol.* 10, 173-181.

- El-Husseini, A.E., Fretier, P., and Vincent, S.R. (2001). Cloning and characterization of a gene (RNF22) encoding a novel brain expressed ring finger protein (BERP) that maps to human chromosome 11p15.5. *Genomics* 71, 363-367.
- English, J.D. and Sweatt, J.D. (1997). A Requirement for the Mitogen-activated Protein Kinase Cascade in Hippocampal Long Term Potentiation. *J. Biol. Chem.* 272, 19103-19106.
- Eom, T., Antar, L.N., Singer, R.H., and Bassell, G.J. (2003). Localization of a {beta}-Actin Messenger Ribonucleoprotein Complex with Zipcode-Binding Protein Modulates the Density of Dendritic Filopodia and Filopodial Synapses. *J. Neurosci.* 23, 10433-10444.
- Fam, N.P., Fan, W.T., Wang, Z., Zhang, L.J., Chen, H., and Moran, M.F. (1997). Cloning and characterization of Ras-GRF2, a novel guanine nucleotide exchange factor for Ras. *Mol. Cell Biol.* 17, 1396-1406.
- Fan, W.T., Koch, C.A., de Hoog, C.L., Fam, N.P., and Moran, M.F. (1998). The exchange factor Ras-GRF2 activates Ras-dependent and Rac-dependent mitogen-activated protein kinase pathways. *Curr. Biol.* 8, 935-938.
- Farah, M.J., Illes, J., Cook-Deegan, R., Gardner, H., Kandel, E., King, P., Parens, E., Sahakian, B., and Wolpe, P.R. (2004). Neurocognitive enhancement: what can we do and what should we do? *Nat Rev Neurosci* 5, 421-425.
- Farnsworth, C.L., Freshney, N.W., Rosen, L.B., Ghosh, A., Greenberg, M.E., and Feig, L.A. (1995). Calcium activation of Ras mediated by neuronal exchange factor Ras-GRF. *Nature* 376, 524-527.
- Feig, L.A., Urano, T., and Cantor, S. (1996). Evidence for a Ras/Ral signaling cascade. *Trends Biochem. Sci.* 21, 438-441.
- Feilotter, H.E., Hannon, G.J., Ruddell, C.J., and Beach, D. (1994). Construction of an improved host strain for two hybrid screening. *Nucleic Acids Res.* 22, 1502-1503.
- Feng, Y., Gutekunst, C.A., Eberhart, D.E., Yi, H., Warren, S.T., and Hersch, S.M. (1997). Fragile X mental retardation protein: nucleocytoplasmic shuttling and association with somatodendritic ribosomes. *J. Neurosci.* 17, 1539-1547.
- Feng, Y., Absher, D., Eberhart, D.E., Brown, V., Malter, H.E., and Warren, S.T. (1997). FMRP associates with polyribosomes as an mRNP, and the I304N mutation of severe fragile X syndrome abolishes this association. *Mol. Cell* 1, 109-118.
- Fernandez-Medarde, A., Esteban, L.M., Nunez, A., Porteros, A., Tessarollo, L., and Santos, E. (2002). Targeted disruption of Ras-Grf2 shows its dispensability for mouse growth and development. *Mol. Cell Biol.* 22, 2498-2504.
- Ferrandon, D., Elphick, L., Nusslein-Volhard, C., and St Johnston, D. (1994). Staufin protein associates with the 3'UTR of bicoid mRNA to form particles that move in a microtubule-dependent manner. *Cell* 79, 1221-1232.
- Ferrari, C., Zippel, R., Martegani, E., Gnesutta, N., Carrera, V., and Sturani, E. (1994). Expression of two different products of CDC25Mm, a mammalian Ras activator, during development of mouse brain. *Exp. Cell Res.* 210, 353-357.
- Fiala, A., Muller, U., and Menzel, R. (1999). Reversible downregulation of protein kinase A during olfactory learning using antisense technique impairs long-term memory formation in the honeybee, *Apis mellifera*. *J. Neurosci.* 19, 10125-10134.
- Fields, S. and Song, O. (1989). A novel genetic system to detect protein-protein interactions. *Nature* 340, 245-246.
- Fink, H., Rex, A., Voits, M., and Voigt, J.P. (1998). Major biological actions of CCK--a critical evaluation of research findings. *Exp. Brain Res.* 123, 77-83.
- Finley, D., Ciechanover, A., and Varshavsky, A. (1984). Thermolability of ubiquitin-activating enzyme from the mammalian cell cycle mutant ts85. *Cell* 37, 43-55.

- Fosnaugh, J.S., Bhat, R.V., Yamagata, K., Worley, P.F., and Baraban, J.M. (1995). Activation of arc, a putative "effector" immediate early gene, by cocaine in rat brain. *Journal Of Neurochemistry* 64, 2377-2380.
- Frangioni, J.V. and Neel, B.G. (1993). Solubilization and purification of enzymatically active glutathione S-transferase (pGEX) fusion proteins. *Anal. Biochem.* 210, 179-187.
- Franklin, B.J.K. and Paxinos G. (1997). The mouse brain in stereotaxic coordinates. Academic Press, San Diego, CA
- Frey, U., Huang, Y.Y., and Kandel, E.R. (1993). Effects of cAMP simulate a late stage of LTP in hippocampal CA1 neurons. *Science* 260, 1661-1664.
- Frey, U. and Morris, R.G. (1997). Synaptic tagging and long-term potentiation. *Nature* 385, 533-536.
- Friesen, W.J. and Darby, M.K. (1997). Phage display of RNA binding zinc fingers from transcription factor IIIA. *J. Biol. Chem.* 272, 10994-10997.
- Frodin, M. and Gammeltoft, S. (1999). Role and regulation of 90 kDa ribosomal S6 kinase (RSK) in signal transduction. *Mol. Cell Endocrinol.* 151, 65-77.
- Gahring, L.C., Cauley, K., and Rogers, S.W. (1996). Kainic acid induced excitotoxicity and cfos expression in fibroblasts transfected with glutamate receptor subunit, GluR1. *J. Neurobiol.* 31, 56-66.
- Ganeshina, O., Berry, R.W., Petralia, R.S., Nicholson, D.A., and Geinisman, Y. (2004). Differences in the expression of AMPA and NMDA receptors between axospinous perforated and nonperforated synapses are related to the configuration and size of postsynaptic densities. *J. Comp Neurol.* 468, 86-95.
- Gao, X., Li, J., Pratt, G., Wilk, S., and Rechsteiner, M. (2004). Purification procedures determine the proteasome activation properties of REG gamma (PA28 gamma). *Arch. Biochem. Biophys.* 425, 158-164.
- Gardiol, A., Racca, C., and Triller, A. (1999). Dendritic and Postsynaptic Protein Synthetic Machinery. *J. Neurosci.* 19, 168-179.
- Garner, C.C., Tucker, R.P., and Matus, A. (1988). Selective localization of messenger RNA for cytoskeletal protein MAP2 in dendrites. *Nature* 336, 674-677.
- Geinisman, Y., deToledo-Morrell, L., Morrell, F., Persina, I.S., and Beatty, M.A. (1996). Synapse restructuring associated with the maintenance phase of hippocampal long-term potentiation. *J. Comp Neurol.* 368, 413-423.
- Giel-Pietraszuk, M. and Barciszewska, M.Z. (2002). Additivity of interactions of zinc finger motifs in specific recognition of RNA. *J. Biochem. (Tokyo)* 131, 571-578.
- Giese, K.P., Friedman, E., Telliez, J.B., Fedorov, N.B., Wines, M., Feig, L.A., and Silva, A.J. (2001). Hippocampus-dependent learning and memory is impaired in mice lacking the Ras-guanine-nucleotide releasing factor 1 (Ras-GRF1). *Neuropharmacology* 41, 791-800.
- Giglione, C., Gonfloni, S., and Parmeggiani, A. (2001). Differential actions of p60c-Src and Lck kinases on the Ras regulators p120-GAP and GDP/GTP exchange factor CDC25Mm. *Eur. J. Biochem.* 268, 3275-3283.
- Giove, F., Mangia, S., Bianciardi, M., Garreffa, G., Di Salle, F., Morrone, R., and Maraviglia, B. (2003). The physiology and metabolism of neuronal activation: in vivo studies by NMR and other methods. *Magnetic Resonance Imaging* 21, 1283-1293.
- Goosens, K.A. and Maren, S. (2002). Long-term potentiation as a substrate for memory: evidence from studies of amygdaloid plasticity and Pavlovian fear conditioning. *Hippocampus* 12, 592-599.
- Gray, N.K. and Hentze, M.W. (1994). Iron regulatory protein prevents binding of the 43S translation pre- initiation complex to ferritin and eALAS mRNAs. *EMBO J.* 13, 3882-3891.

- Grondin,B., Bazinet,M., and Aubry,M. (1996). The KRAB Zinc Finger Gene ZNF74 Encodes an RNA-binding Protein Tightly Associated with the Nuclear Matrix. *J. Biol. Chem.* *271*, 15458-15467.
- Gu,J., Stephenson,C.G., and Iadarola,M.J. (1994). Recombinant proteins attached to a nickel-NTA column: use in affinity purification of antibodies. *Biotechniques* *17*, 257, 260, 262.
- Guan,K.L. and Dixon,J.E. (1991). Eukaryotic proteins expressed in Escherichia coli: an improved thrombin cleavage and purification procedure of fusion proteins with glutathione S-transferase. *Anal. Biochem.* *192*, 262-267.
- Guthrie, C. and Fink, G. R. (1991) Guide to yeast genetics and molecular biology. In *Methods in Enzymology* (Academic Press, San Diego)194:1-932.
- Guzowski,J.F., McNaughton,B.L., Barnes,C.A., and Worley,P.F. (1999). Environment-specific expression of the immediate-early gene Arc in hippocampal neuronal ensembles. *Nat. Neurosci.* *2*, 1120-1124.
- Guzowski,J.F., Lyford,G.L., Stevenson,G.D., Houston,F.P., McGaugh,J.L., Worley,P.F., and Barnes,C.A. (2000). Inhibition of Activity-Dependent Arc Protein Expression in the Rat Hippocampus Impairs the Maintenance of Long-Term Potentiation and the Consolidation of Long-Term Memory. *J. Neurosci.* *20*, 3993-4001.
- Habelhah,H., Shah,K., Huang,L., Ostareck-Lederer,A., Burlingame,A.L., Shokat,K.M., Hentze,M.W., and Ronai,Z. (2001). ERK phosphorylation drives cytoplasmic accumulation of hnRNP-K and inhibition of mRNA translation. *Nat. Cell Biol.* *3*, 325-330.
- Hagemann,C., Patel,R., and Blank,J.L. (2003). MEKK3 interacts with the PA28 gamma regulatory subunit of the proteasome. *Biochem. J.* *373*, 71-79.
- Han,J.R., Gu,W., and Hecht,N.B. (1995a). Testis-brain RNA-binding protein, a testicular translational regulatory RNA-binding protein, is present in the brain and binds to the 3' untranslated regions of transported brain mRNAs. *Biol. Reprod.* *53*, 707-717.
- Han,J.R., Yiu,G.K., and Hecht,N.B. (1995b). Testis/brain RNA-binding protein attaches translationally repressed and transported mRNAs to microtubules. *Proc. Natl. Acad. Sci. U. S. A* *92*, 9550-9554.
- Harlow,E. and Lane,D. (1988) Bacterial Cell Wall Proteins that Bind Antibodies. *Antibodies: A Laboratory Manual*, 615-619.
- Harper,J.W., Adami,G.R., Wei,N., Keyomarsi,K., and Elledge,S.J. (1993). The p21 Cdk-interacting protein Cip1 is a potent inhibitor of G1 cyclin-dependent kinases. *Cell* *75*, 805-816.
- Harris,E.W., Ganong,A.H., and Cotman,C.W. (1984). Long-term potentiation in the hippocampus involves activation of N-methyl-D-aspartate receptors. *Brain Res.* *323*, 132-137.
- Harris,K.M. and Kater,S.B. (1994). Dendritic spines: cellular specializations imparting both stability and flexibility to synaptic function. *Annu. Rev. Neurosci.* *17*, 341-371.
- Hart,M.J., Eva,A., Evans,T., Aaronson,S.A., and Cerione,R.A. (1991). Catalysis of guanine nucleotide exchange on the CDC42Hs protein by the dbl oncogene product. *Nature* *354*, 311-314.
- Haslam,R.J., Koide,H.B., and Hemmings,B.A. (1993). Pleckstrin domain homology. *Nature* *363*, 309-310.
- Hatakeyama,S., Osawa,M., Omine,M., and Ishikawa,F. (1999). JTB: a novel membrane protein gene at 1q21 rearranged in a jumping translocation. *Oncogene* *18*, 2085-2090.
- Hebb, D. O. (1949). *The Organization of Behavior*. New York: John Wiley.
- Henikoff,S. and Henikoff,J.G. (1992). Amino Acid Substitution Matrices from Protein Blocks. *PNAS* *89*, 10915-10919.
- Herdegen,T. and Waetzig,V. (2001). AP-1 proteins in the adult brain: facts and fiction about effectors of neuroprotection and neurodegeneration. *Oncogene* *20*, 2424-2437.

- Ho,S.N., Hunt,H.D., Horton,R.M., Pullen,J.K., and Pease,L.R. (1989). Site-directed mutagenesis by overlap extension using the polymerase chain reaction. *Gene* 77, 51-59.
- Hofer,F., Fields,S., Schneider,C., and Martin,G.S. (1994). Activated Ras interacts with the Ral guanine nucleotide dissociation stimulator. *Proc. Natl. Acad. Sci. U. S. A* 91, 11089-11093.
- Holcik,M. and Korneluk,R.G. (2000). Functional characterization of the X-linked inhibitor of apoptosis (XIAP) internal ribosome entry site element: role of La autoantigen in XIAP translation. *Mol. Cell Biol.* 20, 4648-4657.
- Horton,R.M., Hunt,H.D., Ho,S.N., Pullen,J.K., and Pease,L.R. (1989). Engineering hybrid genes without the use of restriction enzymes: gene splicing by overlap extension. *Gene* 77, 61-68.
- Huang,Y.S., Jung,M.Y., Sarkissian,M., and Richter,J.D. (2002). N-methyl-D-aspartate receptor signaling results in Aurora kinase-catalyzed CPEB phosphorylation and alpha CaMKII mRNA polyadenylation at synapses. *EMBO J.* 21, 2139-2148.
- Huang,Y.Y., Kandel,E.R., Varshavsky,L., Brandon,E.P., Qi,M., Idzerda,R.L., McKnight,G.S., and Bourchouladze,R. (1995). A genetic test of the effects of mutations in PKA on mossy fiber LTP and its relation to spatial and contextual learning. *Cell* 83, 1211-1222.
- Hudder,A. and Werner,R. (2000). Analysis of a Charcot-Marie-Tooth disease mutation reveals an essential internal ribosome entry site element in the connexin-32 gene. *J. Biol. Chem.* 275, 34586-34591.
- Husi,H., Ward,M.A., Choudhary,J.S., Blackstock,W.P., and Grant,S.G. (2000). Proteomic analysis of NMDA receptor-adhesion protein signaling complexes. *Nat. Neurosci.* 3, 661-669.
- Husi,H. and Grant,S.G. (2001). Isolation of 2000-kDa complexes of N-methyl-D-aspartate receptor and postsynaptic density 95 from mouse brain. *J. Neurochem.* 77, 281-291.
- Impey,S., Obrietan,K., and Storm,D.R. (1999). Making new connections: role of ERK/MAP kinase signaling in neuronal plasticity. *Neuron* 23, 11-14.
- Innocenti,M., Zippel,R., Brambilla,R., and Sturani,E. (1999). CDC25Mm/Ras-GRF1 regulates both Ras and Rac signaling pathways. *FEBS Letters* 460, 357-362.
- Inoue,H., Nojima,H., and Okayama,H. (1990). High efficiency transformation of *Escherichia coli* with plasmids. *Gene* 96, 23-28.
- Irwin,S.A., Galvez,R., and Greenough,W.T. (2000). Dendritic spine structural anomalies in fragile-X mental retardation syndrome. *Cereb. Cortex* 10, 1038-1044.
- Itier,J.M., Tremp,G.L., Leonard,J.F., Multon,M.C., Ret,G., Schweighoffer,F., Tocque,B., Bluet-Pajot,M.T., Cormier,V., and Dautry,F. (1998). Imprinted gene in postnatal growth role. *Nature* 393, 125-126.
- Iuchi,S. (2001). Three classes of C2H2 zinc finger proteins. *Cell Mol. Life Sci.* 58, 625-635.
- Jacinto,E. and Hall,M.N. (2003). Tor signalling in bugs, brain and brawn. *Nat. Rev. Mol. Cell Biol.* 4, 117-126.
- Janknecht,R., de Martynoff,G., Lou,J., Hipskind,R.A., Nordheim,A., and Stunnenberg,H.G. (1991). Rapid and efficient purification of native histidine-tagged protein expressed by recombinant vaccinia virus. *Proc. Natl. Acad. Sci. U. S. A* 88, 8972-8976.
- Job,C. and Eberwine,J. (2001). Localization and translation of mRNA in dendrites and axons. *Nat. Rev. Neurosci.* 2, 889-898.
- Jopling,C.L. and Willis,A.E. (2001). N-myc translation is initiated via an internal ribosome entry segment that displays enhanced activity in neuronal cells. *Oncogene* 20, 2664-2670.
- Kandel ER, Schwarz JH and Jessell TM (1995) *Neurowissenschaften*, Spektrum Akademischer Verlag, Heidelb Karin,M., Liu,Z., and Zandi,E. (1997). AP-1 function and regulation. *Curr. Opin. Cell Biol.* 9, 240-246.

- Karin, M., Liu, Z., and Zandi, E. (1997). AP-1 function and regulation. *Curr. Opin. Cell Biol.* 9, 240-246.
- Kauselmann, G., Weiler, M., Wulff, P., Jessberger, S., Konietzko, U., Scafidi, J., Staubli, U., Bereiter-Hahn, J., Strebhardt, K., and Kuhl, D. (1999). The polo-like protein kinases Fnk and Snk associate with a Ca(2+)- and integrin-binding protein and are regulated dynamically with synaptic plasticity. *EMBO J.* 18, 5528-5539.
- Kelleher, R.J., III, Govindarajan, A., Jung, H.Y., Kang, H., and Tonegawa, S. (2004). Translational control by MAPK signaling in long-term synaptic plasticity and memory. *Cell* 116, 467-479.
- Kelly, M.P. and Deadwyler, S.A. (2002). Acquisition of a novel behavior induces higher levels of Arc mRNA than does overtrained performance. *Neuroscience* 110, 617-626.
- Kelly, M.P. and Deadwyler, S.A. (2003). Experience-Dependent Regulation of the Immediate-Early Gene Arc Differs across Brain Regions. *J. Neurosci.* 23, 6443-6451.
- Kimura, H., Ohtomo, T., Yamaguchi, M., Ishii, A., and Sugimoto, K. (1996). Mouse MCM proteins: complex formation and transportation to the nucleus. *Genes Cells* 1, 977-993.
- Kislauskis, E.H., Zhu, X., and Singer, R.H. (1994). Sequences responsible for intracellular localization of beta-actin messenger RNA also affect cell phenotype. *J. Cell Biol.* 127, 441-451.
- Kitada, T., Asakawa, S., Hattori, N., Matsumine, H., Yamamura, Y., Minoshima, S., Yokochi, M., Mizuno, Y., and Shimizu, N. (1998). Mutations in the parkin gene cause autosomal recessive juvenile parkinsonism. *Nature* 392, 605-608.
- Kiyono, M., Kato, J., Kataoka, T., Kaziro, Y., and Satoh, T. (2000). Stimulation of Ras Guanine Nucleotide Exchange Activity of Ras-GRF1/CDC25Mm upon Tyrosine Phosphorylation by the Cdc42-regulated Kinase ACK1. *J. Biol. Chem.* 275, 29788-29793.
- Knauf, U., Tschopp, C., and Gram, H. (2001). Negative regulation of protein translation by mitogen-activated protein kinase-interacting kinases 1 and 2. *Mol. Cell Biol.* 21, 5500-5511.
- Koch, C. and Zador, A. (1993). The function of dendritic spines: devices subserving biochemical rather than electrical compartmentalization. *J. Neurosci.* 13, 413-422.
- Kodaki, T., Woscholski, R., Hallberg, B., Rodriguez-Viciana, P., Downward, J., Parker, P.J., Rodriguez-Viciana, P., Warne, P.H., Dhand, R., Vanhaesebroeck, B., Gout, I., Fry, M.J., Waterfield, M.D., and Downward, J. (1994). The activation of phosphatidylinositol 3-kinase by Ras Phosphatidylinositol-3-OH kinase as a direct target of Ras. *Curr. Biol.* 4, 798-806.
- Kodama, M., Akiyama, K., Ujike, H., Shimizu, Y., Tanaka, Y., and Kuroda, S. (1998). A robust increase in expression of arc gene, an effector immediate early gene, in the rat brain after acute and chronic methamphetamine administration. *Brain Research* 796, 273-283.
- Kohler, C. (1986). Intrinsic connections of the retrohippocampal region in the rat brain. II. The medial entorhinal area. *J. Comp Neurol.* 246, 149-169.
- Konietzko, U., Kauselmann, G., Scafidi, J., Staubli, U., Mikkers, H., Berns, A., Schweizer, M., Waltereit, R., and Kuhl, D. (1999). Pim kinase expression is induced by LTP stimulation and required for the consolidation of enduring LTP. *EMBO J.* 18, 3359-3369.
- Kozak, M. (1987). An analysis of 5'-noncoding sequences from 699 vertebrate messenger RNAs. *Nucleic Acids Res.* 15, 8125-8148.
- Kozak, M. (2003). Alternative ways to think about mRNA sequences and proteins that appear to promote internal initiation of translation. *Gene* 318, 1-23.
- Krapivinsky, G., Krapivinsky, L., Manasian, Y., Ivanov, A., Tyzio, R., Pellegrino, C., Ben Ari, Y., Clapham, D.E., and Medina, I. (2003). The NMDA Receptor Is Coupled to the ERK Pathway by a Direct Interaction between NR2B and RasGRF1. *Neuron* 40, 775-784.
- Krauss, G. (1997). *Biochemie der Regulation und Signaltransduktion*. Wiley-VCH
- Kuhl, D. and Skehel, P. (1998). Dendritic localization of mRNAs. *Curr. Opin. Neurobiol.* 8, 600-606.

- Laemmli,U.K. (1970). Cleavage of structural proteins during the assembly of the head of bacteriophage T4. *Nature* 227, 680-685.
- Laggerbauer,B., Ostareck,D., Keidel,E.M., Ostareck-Lederer,A., and Fischer,U. (2001). Evidence that fragile X mental retardation protein is a negative regulator of translation. *Hum. Mol. Genet.* 10, 329-338.
- Lanahan,A. and Worley,P. (1998). Immediate-early genes and synaptic function. *Neurobiol. Learn. Mem.* 70, 37-43.
- Lauterborn,J.C., Rivera,S., Stinis,C.T., Hayes,V.Y., Isackson,P.J., and Gall,C.M. (1996). Differential effects of protein synthesis inhibition on the activity-dependent expression of BDNF transcripts: evidence for immediate-early gene responses from specific promoters. *J. Neurosci.* 16, 7428-7436.
- Layfield,R., Tooth,D., Landon,M., Dawson,S., Mayer,J., and Alban,A. (2001). Purification of poly-ubiquitinated proteins by S5a-affinity chromatography. *Proteomics.* 1, 773-777.
- Lee,K.S., Schottler,F., Oliver,M., and Lynch,G. (1980). Brief bursts of high-frequency stimulation produce two types of structural change in rat hippocampus. *J. Neurophysiol.* 44, 247-258.
- Lee,M.S., Gippert,G.P., Soman,K.V., Case,D.A., and Wright,P.E. (1989). Three-dimensional solution structure of a single zinc finger DNA-binding domain. *Science* 245, 635-637.
- Leroy,E., Boyer,R., Auburger,G., Leube,B., Ulm,G., Mezey,E., Harta,G., Brownstein,M.J., Jonnalagada,S., Chernova,T., Dehejia,A., Lavedan,C., Gasser,T., Steinbach,P.J., Wilkinson,K.D., and Polymeropoulos,M.H. (1998). The ubiquitin pathway in Parkinson's disease. *Nature* 395, 451-452.
- Levchenko,A. (2003). Dynamical and integrative cell signaling: challenges for the new biology. *Biotechnol. Bioeng.* 84, 773-782.
- Li,N., Lerea,K.M., and Etlinger,J.D. (1996). Phosphorylation of the proteasome activator PA28 is required for proteasome activation. *Biochem. Biophys. Res. Commun.* 225, 855-860.
- Li,P., Yang,X., Wasser,M., Cai,Y., and Chia,W. (1997). Inscuteable and Staufen mediate asymmetric localization and segregation of prospero RNA during Drosophila neuroblast cell divisions. *Cell* 90, 437-447.
- Li,Z., Zhang,Y., Ku,L., Wilkinson,K.D., Warren,S.T., and Feng,Y. (2001). The fragile X mental retardation protein inhibits translation via interacting with mRNA. *Nucl. Acids. Res.* 29, 2276-2283.
- Link,W., Konietzko,U., Kauselmann,G., Krug,M., Schwanke,B., Frey,U., and Kuhl,D. (1995). Somatodendritic expression of an immediate early gene is regulated by synaptic activity. *Proc. Natl. Acad. Sci. U. S. A* 92, 5734-5738.
- Looman,C., Abrink,M., Mark,C., and Hellman,L. (2002). KRAB zinc finger proteins: an analysis of the molecular mechanisms governing their increase in numbers and complexity during evolution. *Mol. Biol. Evol.* 19, 2118-2130.
- Loonam,T.M., Noailles,P.A., Yu,J., Zhu,J.P., and Angulo,J.A. (2003). Substance P and cholecystinin regulate neurochemical responses to cocaine and methamphetamine in the striatum. *Life Sci.* 73, 727-739.
- Loreni,F., Thomas,G., and Amaldi,F. (2000). Transcription inhibitors stimulate translation of 5' TOP mRNAs through activation of S6 kinase and the mTOR/FRAP signalling pathway. *Eur. J. Biochem.* 267, 6594-6601.
- Lu,D., Searles,M.A., and Klug,A. (2003). Crystal structure of a zinc-finger-RNA complex reveals two modes of molecular recognition. *Nature* 426, 96-100.
- Lupas,A. (1996). Coiled coils: new structures and new functions. *Trends Biochem. Sci.* 21, 375-382.

- Lyford,G.L., Yamagata,K., Kaufmann,W.E., Barnes,C.A., Sanders,L.K., Copeland,N.G., Gilbert,D.J., Jenkins,N.A., Lanahan,A.A., and Worley,P.F. (1995). Arc, a growth factor and activity-regulated gene, encodes a novel cytoskeleton-associated protein that is enriched in neuronal dendrites. *Neuron* 14, 433-445.
- Lynch,G., Gall,C., and Cotman,C. (1977). Temporal parameters of axon "sprouting" in the brain of the adult rat. *Exp. Neurol.* 54 , 179-183.
- Ma,C.P., Slaughter,C.A., and DeMartino,G.N. (1992). Identification, purification, and characterization of a protein activator (PA28) of the 20 S proteasome (macropain). *J. Biol. Chem.* 267, 10515-10523.
- Macejak,D.G. and Sarnow,P. (1991). Internal initiation of translation mediated by the 5' leader of a cellular mRNA. *Nature* 353, 90-94.
- Mackay,J.P. and Crossley,M. (1998). Zinc fingers are sticking together. *Trends Biochem. Sci.* 23, 1-4.
- MacLulich,A.M., Ferguson,K.J., Deary,I.J., Seckl,J.R., Starr,J.M., and Wardlaw,J.M. (2002). Intracranial capacity and brain volumes are associated with cognition in healthy elderly men. *Neurology* 59, 169-174.
- Malenka,R.C., Lancaster,B., and Zucker,R.S. (1992). Temporal limits on the rise in postsynaptic calcium required for the induction of long-term potentiation. *Neuron* 9, 121-128.
- Malenka,R.C. and Nicoll,R.A. (1993). NMDA-receptor-dependent synaptic plasticity: multiple forms and mechanisms. *Trends Neurosci.* 16, 521-527.
- Malinow,R., Schulman,H., and Tsien,R.W. (1989). Inhibition of postsynaptic PKC or CaMKII blocks induction but not expression of LTP. *Science* 245, 862-866.
- Mallardo,M., Deitinghoff,A., Muller,J., Goetze,B., Macchi,P., Peters,C., and Kiebler,M.A. (2003). Isolation and characterization of Staufen-containing ribonucleoprotein particles from rat brain. *Proc. Natl. Acad. Sci. U. S. A* 100, 2100-2105.
- Mammen,A.L., Kameyama,K., Roche,K.W., and Huganir,R.L. (1997). Phosphorylation of the alpha - Amino-3-hydroxy-5-methylisoxazole4-propionic Acid Receptor GluR1 Subunit by Calcium/ Calmodulin-dependent Kinase II. *J. Biol. Chem.* 272, 32528-32533.
- Margolin,J.F., Friedman,J.R., Meyer,W.K., Vissing,H., Thiesen,H.J., and Rauscher,F.J., III (1994). Kruppel-associated boxes are potent transcriptional repression domains. *Proc. Natl. Acad. Sci. U. S. A* 91, 4509-4513.
- Martegani,E., Vanoni,M., Zippel,R., Coccetti,P., Brambilla,R., Ferrari,C., Sturani,E., and Alberghina,L. (1992). Cloning by functional complementation of a mouse cDNA encoding a homologue of CDC25, a *Saccharomyces cerevisiae* RAS activator. *EMBO J.* 11, 2151-2157.
- Martin,K.C., Michael,D., Rose,J.C., Barad,M., Casadio,A., Zhu,H., and Kandel,E.R. (1997). MAP kinase translocates into the nucleus of the presynaptic cell and is required for long-term facilitation in *Aplysia*. *Neuron* 18, 899-912.
- Martin,K.C., Casadio,A., Zhu,H., Yaping,E., Rose,J.C., Chen,M., Bailey,C.H., and Kandel,E.R. (1997). Synapse-specific, long-term facilitation of *aplysia* sensory to motor synapses: a function for local protein synthesis in memory storage. *Cell* 91, 927-938.
- Martin,K.C., Barad,M., and Kandel,E.R. (2000). Local protein synthesis and its role in synapse-specific plasticity. *Curr. Opin. Neurobiol.* 10, 587-592.
- Martin,K.C. and Kosik,K.S. (2002). Synaptic tagging -- who's it? *Nat. Rev. Neurosci.* 3, 813-820.
- Matthews,P.M. and Jezzard,P. (2004). Functional magnetic resonance imaging. *J Neurol Neurosurg Psychiatry* 75, 6-12.
- Mattingly,R.R. and Macara,I.G. (1996). Phosphorylation-dependent activation of the Ras-GRF/CDC25Mm exchange factor by muscarinic receptors and G-protein beta gamma subunits. *Nature* 382, 268-272.

- Mayer, M.L., Westbrook, G.L., and Guthrie, P.B. (1984). Voltage-dependent block by Mg²⁺ of NMDA responses in spinal cord neurones. *Nature* 309, 261-263.
- Mayford, M., Baranes, D., Podsypanina, K., and Kandel, E. (1996). The 3'-untranslated region of CaMKIIalpha is a cis-acting signal for the localization and translation of mRNA in dendrites. *PNAS* 93, 13250-13255.
- Mazumder, B., Seshadri, V., and Fox, P.L. (2003). Translational control by the 3'-UTR: the ends specify the means. *Trends Biochem. Sci.* 28, 91-98.
- Mazzucchelli, C. and Brambilla, R. (2000). Ras-related and MAPK signalling in neuronal plasticity and memory formation. *Cell Mol. Life Sci.* 57, 604-611.
- McCormick, F. and Harlow, E. (1980). Association of a murine 53,000-dalton phosphoprotein with simian virus 40 large-T antigen in transformed cells. *J. Virol.* 34, 213-224.
- McKeehan, W. and Hardesty, B. (1969). The mechanism of cycloheximide inhibition of protein synthesis in rabbit reticulocytes. *Biochem. Biophys. Res. Commun.* 36, 625-630.
- Mendez, R. and Richter, J.D. (2001). Translational control by CPEB: a means to the end. *Nat. Rev. Mol. Cell Biol.* 2, 521-529.
- Merika, M. and Orkin, S.H. (1995). Functional synergy and physical interactions of the erythroid transcription factor GATA-1 with the Kruppel family proteins Sp1 and EKLF. *Mol. Cell Biol.* 15, 2437-2447.
- Michael, D., Martin, K.C., Seger, R., Ning, M.M., Baston, R., and Kandel, E.R. (1998). Repeated pulses of serotonin required for long-term facilitation activate mitogen-activated protein kinase in sensory neurons of Aplysia. *Proc. Natl. Acad. Sci. U. S. A* 95, 1864-1869.
- Miller, O.L., Jr., Hamkalo, B.A., and Thomas, C.A., Jr. (1970). Visualization of bacterial genes in action. *Science* 169, 392-395.
- Miller, S., Yasuda, M., Coats, J.K., Jones, Y., Martone, M.E., and Mayford, M. (2002). Disruption of dendritic translation of CaMKIIalpha impairs stabilization of synaptic plasticity and memory consolidation. *Neuron* 36, 507-519.
- Milner, B., Corkin, S., and Teuber, H.-L. (1968). Further analysis of the hippocampal amnesic syndrome. *Neuropsychologica* 6, 215-234.
- Milner, B., Squire, L.R., and Kandel, E.R. (1998). Cognitive neuroscience and the study of memory. *Neuron* 20, 445-468.
- Moede, T., Leibiger, B., Pour, H.G., Berggren, P., and Leibiger, I.B. (1999). Identification of a nuclear localization signal, RRMKWKK, in the homeodomain transcription factor PDX-1. *FEBS Lett.* 461, 229-234.
- Moilanen, A.M., Karvonen, U., Poukka, H., Janne, O.A., and Palvimo, J.J. (1998a). Activation of androgen receptor function by a novel nuclear protein kinase. *Mol. Biol. Cell* 9, 2527-2543.
- Moilanen, A.M., Poukka, H., Karvonen, U., Hakli, M., Janne, O.A., and Palvimo, J.J. (1998b). Identification of a novel RING finger protein as a coregulator in steroid receptor-mediated gene transcription. *Mol. Cell Biol.* 18, 5128-5139.
- Moilanen, A.M., Karvonen, U., Poukka, H., Yan, W., Toppari, J., Janne, O.A., and Palvimo, J.J. (1999). A testis-specific androgen receptor coregulator that belongs to a novel family of nuclear proteins. *J. Biol. Chem.* 274, 3700-3704.
- Montag-Sallaz, M., Welzl, H., Kuhl, D., Montag, D., and Schachner, M. (1999). Novelty-induced increased expression of immediate-early genes c-fos and arg 3.1 in the mouse brain. *J. Neurobiol.* 38, 234-246.
- Montminy, M. (1997). Transcriptional regulation by cyclic AMP. *Annu. Rev. Biochem.* 66, 807-822.
- Morgan, J.I., Cohen, D.R., Hempstead, J.L., and Curran, T. (1987). Mapping patterns of c-fos expression in the central nervous system after seizure. *Science* 237, 192-197.

- Mori, Y., Imaizumi, K., Katayama, T., Yoneda, T., and Tohyama, M. (2000). Two cis-acting elements in the 3' untranslated region of alpha-CaMKII regulate its dendritic targeting. *Nat. Neurosci.* *3*, 1079-1084.
- Munro, T.P., Magee, R.J., Kidd, G.J., Carson, J.H., Barbarese, E., Smith, L.M., and Smith, R. (1999). Mutational Analysis of a Heterogeneous Nuclear Ribonucleoprotein A2 Response Element for RNA Trafficking. *J. Biol. Chem.* *274*, 34389-34395.
- Muramatsu, T., Ohmae, A., and Anzai, K. (1998). BC1 RNA protein particles in mouse brain contain two γ -h-element-binding proteins, translin and a 37 kDa protein. *Biochem. Biophys. Res. Commun.* *247*, 7-11.
- Murata, S., Kawahara, H., Tohma, S., Yamamoto, K., Kasahara, M., Nabeshima, Y., Tanaka, K., and Chiba, T. (1999). Growth retardation in mice lacking the proteasome activator PA28 γ . *J. Biol. Chem.* *274*, 38211-38215.
- Nakamura, M., Masuda, H., Horii, J., Kuma, K., Yokoyama, N., Ohba, T., Nishitani, H., Miyata, T., Tanaka, M., and Nishimoto, T. (1998). When overexpressed, a novel centrosomal protein, RanBPM, causes ectopic microtubule nucleation similar to gamma-tubulin. *J. Cell Biol.* *143*, 1041-1052.
- Nicoll, R.A. (2003). Expression mechanisms underlying long-term potentiation: a postsynaptic view. *Philos. Trans. R. Soc. Lond B Biol. Sci.* *358*, 721-726.
- Nieto-Sampedro, M., Bussineau, C.M., and Cotman, C.W. (1981). Postsynaptic density antigens: preparation and characterization of an antiserum against postsynaptic densities. *J. Cell Biol.* *90*, 675-686.
- Nieto-Sampedro, M., Hoff, S.F., and Cotman, C.W. (1982). Perforated postsynaptic densities: probable intermediates in synapse turnover. *Proc. Natl. Acad. Sci. U. S. A* *79*, 5718-5722.
- Ohashi, S., Koike, K., Omori, A., Ichinose, S., Ohara, S., Kobayashi, S., Sato, T.A., and Anzai, K. (2002). Identification of mRNA/protein (mRNP) complexes containing Puralpha, mStaufen, fragile X protein, and myosin Va and their association with rough endoplasmic reticulum equipped with a kinesin motor. *J. Biol. Chem.* *277*, 37804-37810.
- Orban, P.C., Chapman, P.F., and Brambilla, R. (1999). Is the Ras-MAPK signalling pathway necessary for long-term memory formation? *Trends Neurosci.* *22*, 38-44.
- Ouyang, Y., Rosenstein, A., Kreiman, G., Schuman, E.M., and Kennedy, M.B. (1999). Tetanic Stimulation Leads to Increased Accumulation of Ca²⁺/Calmodulin-Dependent Protein Kinase II via Dendritic Protein Synthesis in Hippocampal Neurons. *J. Neurosci.* *19*, 7823-7833.
- Palay, S.L. (1956). Synapses in the central nervous system. *J. Biophys. Biochem. Cytol.* *2*, 193-202.
- Patel, P.H., Thapar, N., Guo, L., Martinez, M., Maris, J., Gau, C.L., Lengyel, J.A., and Tamanoi, F. (2003). Drosophila Rheb GTPase is required for cell cycle progression and cell growth. *J. Cell Sci.* *116*, 3601-3610.
- Pei, Q., Lewis, L., Sprakes, M.E., Jones, E.J., Grahame-Smith, D.G., and Zetterstrom, T.S. (2000). Serotonergic regulation of mRNA expression of Arc, an immediate early gene selectively localized at neuronal dendrites. *Neuropharmacology* *39*, 463-470.
- Penfield, W. and Milner, B. (1958). Memory deficit produced by bilateral lesions in the hippocampal zone. *AMA. Arch. Neurol. Psychiatry* *79*, 475-497.
- Peng, H., Begg, G.E., Harper, S.L., Friedman, J.R., Speicher, D.W., and Rauscher, F.J., III (2000). Biochemical analysis of the Kruppel-associated box (KRAB) transcriptional repression domain. *J. Biol. Chem.* *275*, 18000-18010.
- Pestova, T.V., Kolupaeva, V.G., Lomakin, I.B., Pilipenko, E.V., Shatsky, I.N., Agol, V.I., and Hellen, C.U.T. (2001). Molecular mechanisms of translation initiation in eukaryotes. *PNAS* *98*, 7029-7036.

- Peters,M. (1993). Still no convincing evidence of a relation between brain size and intelligence in humans. *Canadian Journal of Experimental Psychology* 47, 751-756.
- Pinaud,R., Penner,M.R., Robertson,H.A., and Currie,R.W. (2001). Upregulation of the immediate early gene arc in the brains of rats exposed to environmental enrichment: implications for molecular plasticity. *Brain Res. Mol. Brain Res.* 91, 50-56.
- Pinkstaff,J.K., Chappell,S.A., Mauro,V.P., Edelman,G.M., and Krushel,L.A. (2001). Internal initiation of translation of five dendritically localized neuronal mRNAs. *PNAS* 98, 2770-2775.
- Plath,N., Ohana,O., Dammermann,B., Welzl,H., Waltereit,R., Bick-Sander,A., Wolfer,D.P., Therstappen,E., Husi,H., Errington,M., Blanquet,V., Wurst,W., Bliss,T.V.P., Grant,S.G., Lipp,H.P., Bösl,M., and Kuhl,D. Arg3.1 is associated with the NMDA receptor complex and is required for memory formation. Abstract Viewer and Itinerary Planner. Washington, DC: Society for Neuroscience, 2003. Online.
- Plath,N. (2004). Funktionelle Charakterisierung des aktivitätsregulierten Gens Arg3.1. Dissertation, Berlin
- Preiss,T. and Hentze,W. (2003). Starting the protein synthesis machine: eukaryotic translation initiation. *Bioessays* 25, 1201-1211.
- Putz,U., Skehel,P., and Kuhl,D. (1996). A tri-hybrid system for the analysis and detection of RNA--protein interactions. *Nucleic Acids Res.* 24, 4838-4840.
- Putz,U. (1996). Untersuchungen zur dendritischen Lokalisation der mRNA von arg3.1, einem durch synaptische Aktivität regulierten Gen. Diplomarbeit, Hamburg.
- Putz,U. (1999). Identifizierung und Charakterisierung eines arg3.1 mRNA-Bindungsproteins im Tri-Hybrid System. Dissertation, Hamburg
- Putz,U., Kremerskothen,J., Skehel,P., and Kuhl,D. (2000). RNA-protein interactions reconstituted by a Tri-Hybrid System In: Zhu, L and Hannon, G.J. (Ed.) *Yeast Hybrid Technologies*. BioTechiques Book. Eaton Publishing.
- Pyronnet,S., Pradayrol,L., and Sonenberg,N. (2000). A cell cycle-dependent internal ribosome entry site. *Mol. Cell* 5, 607-616.
- Qian,Z., Gilbert,M.E., Colicos,M.A., Kandel,E.R., and Kuhl,D. (1993). Tissue-plasminogen activator is induced as an immediate-early gene during seizure, kindling and long-term potentiation. *Nature* 361, 453-457.
- Quimby,B.B. and Dasso,M. (2003). The small GTPase Ran: interpreting the signs. *Curr. Opin. Cell Biol.* 15, 338-344.
- Ramakrishnan,V. (2002). Ribosome structure and the mechanism of translation. *Cell* 108, 557-572.
- Ramón y Cajal (1888). Estructura de los centros nerviosos de les aves. *Revista trimestral de histologia normal y patológica*.
- Realini,C., Dubiel,W., Pratt,G., Ferrell,K., and Rechsteiner,M. (1994). Molecular cloning and expression of a gamma-interferon-inducible activator of the multicatalytic protease. *J. Biol. Chem.* 269, 20727-20732.
- Reeben M. *Rattus norvegicus* mRNA for small androgen receptor-interacting protein. 1999. Ref Type: Data File
- Richter,J.D. and Lorenz,L.J. (2002). Selective translation of mRNAs at synapses. *Curr. Opin. Neurobiol.* 12, 300-304.
- Robbins,D.J., Cheng,M., Zhen,E., Vanderbilt,C.A., Feig,L.A., and Cobb,M.H. (1992). Evidence for a Ras-Dependent Extracellular Signal-Regulated Protein Kinase (ERK) Cascade. *PNAS* 89, 6924-6928.

- Rodriguez-Viciano,P., Warne,P.H., Dhand,R., Vanhaesebroeck,B., Gout,I., Fry,M.J., Waterfield,M.D., and Downward,J. (1994). Phosphatidylinositol-3-OH kinase as a direct target of Ras. *Nature* 370, 527-532.
- Rook,M.S., Lu,M., and Kosik,K.S. (2000). CaMKIIalpha 3' untranslated region-directed mRNA translocation in living neurons: visualization by GFP linkage. *J. Neurosci.* 20, 6385-6393.
- Rouleau,N., Domans'kyi,A., Reeben,M., Moilanen,A.M., Havas,K., Kang,Z., Owen-Hughes,T., Palvimo,J.J., and Janne,O.A. (2002). Novel ATPase of SNF2-like protein family interacts with androgen receptor and modulates androgen-dependent transcription. *Mol. Biol. Cell* 13, 2106-2119.
- Ross,A.F., Oleynikov,Y., Kislauskis,E.H., Taneja,K.L., and Singer,R.H. (1997). Characterization of a beta-actin mRNA zipcode-binding protein. *Mol. Cell. Biol.* 17, 2158-2165.
- Rushton,J.P. and Ankney,C.D. (1995). Brain size matters: a reply to Peters. *Can. J. Exp. Psychol.* 49, 562-569.
- Sambrook, J. and Russell,D. (2001). *Molecular Cloning. A Laboratory Manual*. CSHL Press, Cold Spring Harbor, New York.
- Sanger,F. and Coulson,A.R. (1975). A rapid method for determining sequences in DNA by primed synthesis with DNA polymerase. *J. Mol. Biol.* 94, 441-448.
- Saucedo,L.J., Gao,X., Chiarelli,D.A., Li,L., Pan,D., and Edgar,B.A. (2003). Rheb promotes cell growth as a component of the insulin/TOR signalling network. *Nat. Cell Biol.* 5, 566-571.
- Schaeffer,C., Bardoni,B., Mandel,J.L., Ehresmann,B., Ehresmann,C., and Moine,H. (2001). The fragile X mental retardation protein binds specifically to its mRNA via a purine quartet motif. *EMBO J.* 20, 4803-4813.
- Scheetz,A.J., Nairn,A.C., and Constantine-Paton,M. (2000). NMDA receptor-mediated control of protein synthesis at developing synapses. *Nat. Neurosci.* 3, 211-216.
- Schwarcz,R., Eid,T., and Du,F. (2000). Neurons in layer III of the entorhinal cortex. A role in epileptogenesis and epilepsy? *Ann. N. Y. Acad. Sci.* 911, 328-342.
- Schwartz,J.H. (2003). Ubiquitination, protein turnover, and long-term synaptic plasticity. *Sci. STKE.* 2003, e26.
- Sebret,A., Lena,I., Crete,D., Matsui,T., Roques,B.P., and Dauge,V. (1999). Rat hippocampal neurons are critically involved in physiological improvement of memory processes induced by cholecystokinin-B receptor stimulation. *J. Neurosci.* 19, 7230-7237.
- Severt,W.L., Biber,T.U., Wu,X., Hecht,N.B., DeLorenzo,R.J., and Jakoi,E.R. (1999). The suppression of testis-brain RNA binding protein and kinesin heavy chain disrupts mRNA sorting in dendrites. *J. Cell Sci.* 112 (Pt 21), 3691-3702.
- Shan,J., Munro,T.P., Barbarese,E., Carson,J.H., and Smith,R. (2003). A Molecular Mechanism for mRNA Trafficking in Neuronal Dendrites. *J. Neurosci.* 23, 8859-8866.
- Sheng,M. (2001). Molecular organization of the postsynaptic specialization. *Proc. Natl. Acad. Sci. U. S. A* 98, 7058-7061.
- Shimura,H., Hattori,N., Kubo,S., Mizuno,Y., Asakawa,S., Minoshima,S., Shimizu,N., Iwai,K., Chiba,T., Tanaka,K., and Suzuki,T. (2000). Familial Parkinson disease gene product, parkin, is a ubiquitin-protein ligase. *Nat. Genet.* 25, 302-305.
- Shou,C., Wurmser,A., Suen,K.L., Barbacid,M., Feig,L.A., and Ling,K. (1995). Differential response of the Ras exchange factor, Ras-GRF to tyrosine kinase and G protein mediated signals. *Oncogene* 10, 1887-1893.
- Si,K., Giustetto,M., Etkin,A., Hsu,R., Janisiewicz,A.M., Miniaci,M.C., Kim,J.H., Zhu,H., and Kandel,E.R. (2003a). A neuronal isoform of CPEB regulates local protein synthesis and stabilizes synapse-specific long-term facilitation in aplysia. *Cell* 115, 893-904.

- Si, K., Lindquist, S., and Kandel, E.R. (2003b). A neuronal isoform of the aplysia CPEB has prion-like properties. *Cell* *115*, 879-891.
- Silva, A.J., Frankland, P.W., Marowitz, Z., Friedman, E., Laszlo, G.S., Cioffi, D., Jacks, T., Bourchouladze, R., and Lazlo, G. (1997). A mouse model for the learning and memory deficits associated with neurofibromatosis type I. *Nat. Genet.* *15*, 281-284.
- Siomi, H., Siomi, M.C., Nussbaum, R.L., and Dreyfuss, G. (1993). The protein product of the fragile X gene, FMR1, has characteristics of an RNA-binding protein. *Cell* *74*, 291-298.
- Siomi, M.C., Zhang, Y., Siomi, H., and Dreyfuss, G. (1996). Specific sequences in the fragile X syndrome protein FMR1 and the FXR proteins mediate their binding to 60S ribosomal subunits and the interactions among them. *Mol. Cell Biol.* *16*, 3825-3832.
- Smith, D.B. and Johnson, K.S. (1988). Single-step purification of polypeptides expressed in *Escherichia coli* as fusions with glutathione S-transferase. *Gene* *67*, 31-40.
- Soderling, T.R. and Derkach, V.A. (2000). Postsynaptic protein phosphorylation and LTP. *Trends Neurosci.* *23*, 75-80.
- Sotelo, C. (2003). Viewing the brain through the master hand of Ramon y Cajal. *Nat. Rev. Neurosci.* *4*, 71-77.
- Spain, B.H., Bowditch, K.S., Pacal, A.R., Staub, S.F., Koo, D., Chang, C.Y., Xie, W., and Colicelli, J. (1996). Two human cDNAs, including a homolog of Arabidopsis FUS6 (COP11), suppress G-protein- and mitogen-activated protein kinase-mediated signal transduction in yeast and mammalian cells. *Mol. Cell Biol.* *16*, 6698-6706.
- Spitzka, E.A. (1909). A Study of the brains of Eminent Scientists and Scholars. *Transactions of the American Philosophical Society* *21*, 175-308.
- St Johnston, D., Beuchle, D., and Nusslein-Volhard, C. (1991). *Staufen*, a gene required to localize maternal RNAs in the *Drosophila* egg. *Cell* *66*, 51-63.
- Standart, N. and Jackson, R.J. (1994). Regulation of translation by specific protein/mRNA interactions. *Biochimie* *76*, 867-879.
- Stebbins-Boaz, B., Cao, Q., de Moor, C.H., Mendez, R., and Richter, J.D. (1999). Maskin is a CPEB-associated factor that transiently interacts with eIF-4E. *Mol. Cell* *4*, 1017-1027.
- Steward, O. (1976). Topographic organization of the projections from the entorhinal area to the hippocampal formation of the rat. *J. Comp Neurol.* *167*, 285-314.
- Steward, O. and Scoville, S.A. (1976). Cells of origin of entorhinal cortical afferents to the hippocampus and fascia dentata of the rat. *J. Comp Neurol.* *169*, 347-370.
- Steward, O. and Levy, W.B. (1982). Preferential localization of polyribosomes under the base of dendritic spines in granule cells of the dentate gyrus. *J. Neurosci.* *2*, 284-291.
- Steward, O., Falk, P.M., and Torre, E.R. (1996). Ultrastructural basis for gene expression at the synapse: synapse-associated polyribosome complexes. *J. Neurocytol.* *25*, 717-734.
- Steward, O., Wallace, C.S., Lyford, G.L., and Worley, P.F. (1998). Synaptic activation causes the mRNA for the IEG *Arc* to localize selectively near activated postsynaptic sites on dendrites. *Neuron* *21*, 741-751.
- Steward, O. and Schuman, E.M. (2001). Protein synthesis at synaptic sites on dendrites. *Annu. Rev. Neurosci.* *24*, 299-325.
- Steward, O. and Worley, P.F. (2001). Selective targeting of newly synthesized *Arc* mRNA to active synapses requires NMDA receptor activation. *Neuron* *30*, 227-240.
- Steward, O. and Schuman, E.M. (2003). Compartmentalized synthesis and degradation of proteins in neurons. *Neuron* *40*, 347-359.

- Stocker,H., Radimerski,T., Schindelholz,B., Wittwer,F., Belawat,P., Daram,P., Breuer,S., Thomas,G., and Hafen,E. (2003). Rheb is an essential regulator of S6K in controlling cell growth in *Drosophila*. *Nat. Cell Biol.* 5, 559-565.
- Sturani,E., Abbondio,A., Branduardi,P., Ferrari,C., Zippel,R., Martegani,E., Vanoni,M., and Denis-Donini,S. (1997). The Ras Guanine nucleotide Exchange Factor CDC25Mm is present at the synaptic junction. *Exp. Cell Res.* 235, 117-123.
- Swanson,L.W. and Cowan,W.M. (1977). An autoradiographic study of the organization of the efferent connections of the hippocampal formation in the rat. *J. Comp Neurol.* 172, 49-84.
- Tabancay,A.P., Jr., Gau,C.L., Machado,I.M., Uhlmann,E.J., Gutmann,D.H., Guo,L., and Tamanoi,F. (2003). Identification of dominant negative mutants of Rheb GTPase and their use to implicate the involvement of human Rheb in the activation of p70S6K. *J. Biol. Chem.* 278, 39921-39930.
- Tan,A., Moratalla,R., Lyford,G.L., Worley,P., and Graybiel,A.M. (2000). The activity-regulated cytoskeletal-associated protein arc is expressed in different striosome-matrix patterns following exposure to amphetamine and cocaine. *Journal Of Neurochemistry* 74, 2074-2078.
- Tan,S.E., Wenthold,R.J., and Soderling,T.R. (1994). Phosphorylation of AMPA-type glutamate receptors by calcium/calmodulin- dependent protein kinase II and protein kinase C in cultured hippocampal neurons. *J. Neurosci.* 14, 1123-1129.
- Tanaka,K., Suzuki,T., and Chiba,T. (1998). The ligation systems for ubiquitin and ubiquitin-like proteins. *Mol. Cells* 8, 503-512.
- Tang,S.J., Reis,G., Kang,H., Gingras,A.C., Sonenberg,N., and Schuman,E.M. (2002). A rapamycin-sensitive signaling pathway contributes to long-term synaptic plasticity in the hippocampus. *PNAS* 99, 467-472.
- Tatusova,T.A. and Madden,T.L. (1999). BLAST 2 Sequences, a new tool for comparing protein and nucleotide sequences. *FEMS Microbiol. Lett.* 174, 247-250.
- Thomas,G.M. and Huganir,R.L. (2004). MAPK cascade signalling and synaptic plasticity. *Nat. Rev. Neurosci.* 5, 173-183.
- Thomas,M.J. and Malenka,R.C. (2003). Synaptic plasticity in the mesolimbic dopamine system. *Philos. Trans. R. Soc. Lond B Biol. Sci.* 358, 815-819.
- Thompson,J.D., Higgins,D.G., and Gibson,T.J. (1994). CLUSTAL W: improving the sensitivity of progressive multiple sequence alignment through sequence weighting, position-specific gap penalties and weight matrix choice. *Nucleic Acids Res.* 22, 4673-4680.
- Tiedge,H., Fremeau,R.T., Jr., Weinstock,P.H., Arancio,O., and Brosius,J. (1991). Dendritic Location of Neural BC1 RNA. *PNAS* 88, 2093-2097.
- Tiedge,H., Chen,W., and Brosius,J. (1993). Primary structure, neural-specific expression, and dendritic location of human BC200 RNA. *J. Neurosci.* 13, 2382-2390.
- Tinland,B., Koukolikova-Nicola,Z., Hall,M.N., and Hohn,B. (1992). The T-DNA-linked VirD2 protein contains two distinct functional nuclear localization signals. *Proc. Natl. Acad. Sci. U. S. A* 89, 7442-7446.
- Todd,P.K., Mack,K.J., and Malter,J.S. (2003). The fragile X mental retardation protein is required for type-I metabotropic glutamate receptor-dependent translation of PSD-95. *PNAS* 100, 14374-14378.
- Tonini,R., Franceschetti,S., Parolaro,D., Sala,M., Mancinelli,E., Tininini,S., Brusetti,R., Sancini,G., Brambilla,R., Martegani,E., Sturani,E., and Zippel,R. (2001). Involvement of CDC25Mm/Ras-GRF1-dependent signaling in the control of neuronal excitability. *Mol. Cell Neurosci.* 18, 691-701.
- Triller,A. and Choquet,D. (2003). Synaptic structure and diffusion dynamics of synaptic receptors. *Biol. Cell* 95, 465-476.

- van Groen,T. (2001). Entorhinal cortex of the mouse: cytoarchitectonical organization. *Hippocampus* 11, 397-407.
- van Groen,T., Miettinen,P., and Kadish,I. (2003). The entorhinal cortex of the mouse: organization of the projection to the hippocampal formation. *Hippocampus* 13, 133-149.
- Waltereit,R., Dammermann,B., Wulff,P., Scafidi,J., Staubli,U., Kauselmann,G., Bundman,M., and Kuhl,D. (2001). Arg3.1/Arc mRNA Induction by Ca²⁺ and cAMP Requires Protein Kinase A and Mitogen-Activated Protein Kinase/Extracellular Regulated Kinase Activation. *J. Neurosci.* 21, 5484-5493.
- Wang,D., Li,Z., Messing,E.M., and Wu,G. (2002a). Activation of Ras/Erk pathway by a novel MET-interacting protein RanBPM. *J. Biol. Chem.* 277, 36216-36222.
- Wang,H., Iacoangeli,A., Popp,S., Muslimov,I.A., Imataka,H., Sonenberg,N., Lomakin,I.B., and Tiedge,H. (2002b). Dendritic BC1 RNA: Functional Role in Regulation of Translation Initiation. *J. Neurosci.* 22, 10232-10241.
- Weiler,I.J., Hawrylak,N., and Greenough,W.T. (1995). Morphogenesis in memory formation: synaptic and cellular mechanisms. *Behav. Brain Res.* 66, 1-6.
- Wells,D.G., Dong,X., Quinlan,E.M., Huang,Y.S., Bear,M.F., Richter,J.D., and Fallon,J.R. (2001). A role for the cytoplasmic polyadenylation element in NMDA receptor-regulated mRNA translation in neurons. *J. Neurosci.* 21, 9541-9548.
- Wiggin,G.R., Soloaga,A., Foster,J.M., Murray-Tait,V., Cohen,P., and Arthur,J.S. (2002). MSK1 and MSK2 Are Required for the Mitogen- and Stress-Induced Phosphorylation of CREB and ATF1 in Fibroblasts. *Mol. Cell. Biol.* 22, 2871-2881.
- Wirtshafter,D. and Sheppard,A.C. (2003). Role of dopamine D2 receptors in the striatal immediate early gene response to amphetamine in reserpinized rats. *Brain Res. Bull.* 62, 77-83.
- Witter,M.P., Groenewegen,H.J., Lopes da Silva,F.H., and Lohman,A.H. (1989). Functional organization of the extrinsic and intrinsic circuitry of the parahippocampal region. *Prog. Neurobiol.* 33, 161-253.
- Wojcik,C., Tanaka,K., Paweletz,N., Naab,U., and Wilk,S. (1998). Proteasome activator (PA28) subunits, alpha, beta and gamma (Ki antigen) in NT2 neuronal precursor cells and HeLa S3 cells. *Eur. J. Cell Biol.* 77, 151-160.
- Wojcik,C. (1999). Proteasome activator subunit PA28 alpha and related Ki antigen (PA28 gamma) are absent from the nuclear fraction purified by sucrose gradient centrifugation. *Int. J. Biochem. Cell Biol.* 31, 273-276.
- Wolfe,S.A., Nekludova,L., and Pabo,C.O. (2000). DNA recognition by Cys2His2 zinc finger proteins. *Annu. Rev. Biophys. Biomol. Struct.* 29, 183-212.
- Wong,W.T., Faulkner-Jones,B.E., Sanes,J.R., and Wong,R.O.L. (2000). Rapid Dendritic Remodeling in the Developing Retina: Dependence on Neurotransmission and Reciprocal Regulation by Rac and Rho. *J. Neurosci.* 20, 5024-5036.
- Wu,L., Wells,D., Tay,J., Mendis,D., Abbott,M.A., Barnitt,A., Quinlan,E., Heynen,A., Fallon,J.R., and Richter,J.D. (1998). CPEB-mediated cytoplasmic polyadenylation and the regulation of experience-dependent translation of alpha-CaMKII mRNA at synapses. *Neuron* 21, 1129-1139.
- Xia,Z., Dudek,H., Miranti,C.K., and Greenberg,M.E. (1996). Calcium influx via the NMDA receptor induces immediate early gene transcription by a MAP kinase/ERK-dependent mechanism. *J. Neurosci.* 16, 5425-5436.
- Yamagata,K., Sanders,L.K., Kaufmann,W.E., Yee,W., Barnes,C.A., Nathans,D., and Worley,P.F. (1994). rheb, a growth factor- and synaptic activity-regulated gene, encodes a novel Ras-related protein. *J. Biol. Chem.* 269, 16333-16339.

- Yang,S.H., Sharrocks,A.D., and Whitmarsh,A.J. (2003). Transcriptional regulation by the MAP kinase signaling cascades. *Gene* 320 , 3-21.
- Yin,J.C., Wallach,J.S., Del Vecchio,M., Wilder,E.L., Zhou,H., Quinn,W.G., and Tully,T. (1994). Induction of a dominant negative CREB transgene specifically blocks long-term memory in *Drosophila*. *Cell* 79, 49-58.
- Yokono,M., Saegusa,N., Matsushita,K., and Sugiura,Y. (1998). Unique DNA binding mode of the N-terminal zinc finger of transcription factor Sp1. *Biochemistry* 37, 6824-6832.
- Zalfa,F., Giorgi,M., Primerano,B., Moro,A., Di Penta,A., Reis,S., Oostra,B., and Bagni,C. (2003). The fragile X syndrome protein FMRP associates with BC1 RNA and regulates the translation of specific mRNAs at synapses. *Cell* 112, 317-327.
- Zhang,X.Y., Zhou,D.F., Zhang,P.Y., and Wei,J. (2000). The CCK-A receptor gene possibly associated with positive symptoms of schizophrenia. *Mol. Psychiatry* 5, 239-240.
- Zhang,H.L., Eom,T., Olynykov,Y., Shenoy,S.M., Liebelt,D.A., Dichtenberg,J.B., Singer,R.H., and Bassell,G.J. (2001). Neurotrophin-induced transport of a beta-actin mRNP complex increases beta-actin levels and stimulates growth cone motility. *Neuron* 31, 261-275.
- Zippel,R., Gnesutta,N., Matus-Leibovitch,N., Mancinelli,E., Saya,D., Vogel,Z., Sturani,E., Renata,Z., Nerina,G., Noa,M.L., Enzo,M., Daniella,S., Zvi,V., and Emmapaola,S. (1997). Ras-GRF, the activator of Ras, is expressed preferentially in mature neurons of the central nervous system. *Brain Res. Mol. Brain Res.* 48, 140-144.
- Zippel R., Forlani G., Lavagni P., Baldassa S., Fascio U. and Sturani E. (2004). The neuron-specific guanine nucleotide exchange factor Ras-GRF1 directly binds microtubules via DH-PH2-mediated interaction. *FENS Abstr.*, vol.2, A189.10, 2004.
- Zuker,M. (2003). Mfold web server for nucleic acid folding and hybridization prediction. *Nucleic Acids Res.* 31, 3406-3415.