

6 Literaturverzeichnis

Altman, J. (1982) Morphological development of the rat cerebellum and some of its mechanisms. *Exp. Brain Res. Suppl.* 6:8-49

Andressen, C., Blümcke, I., Celio, M. (1993) Calcium-binding proteins: selective markers of nerve cells. *Cell Tissue Res.* 271:181-208

Angaut, P. & Brodal, A. (1967) The projection of the "vestibulocerebellum" onto the vestibular nuclei in the cat. *Arch. Ital. Biol.* 105:441-479

Aoki, E., Semba, R., Seto-Ohshima, A., Heizmann, C. W., Kashiwamata, S. (1990) Coexistence of parvalbumin and glycine in the rat brainstem. *Brain Res.* 525:140-143

Augustine, G. J., Charlton, M. P., Smith, S. J. (1987) Calcium action in synaptic transmitter release. *Annu. Rev. Neurosci.* 10:633-693

Bäurle, J. (1993) Qualitative und quantitative Analyse morphologischer Korrelate synaptischer Plastizität und degenerativer Prozesse im cerebellovestibulären System. Inauguraldissertation, Freie Universität Berlin

Bäurle, J., Grover, B., Grüsser-Cornehls, U. (1992) Plasticity of GABAergic terminals in Deiters' nucleus of weaver mutant and normal mice: a quantitative light microscopic study. *Brain Res.* 591:305-318

Bäurle, J. & Grüsser-Cornehls, U. (1994) Calbindin D-28k in the lateral vestibular nucleus of mutant mice as a tool to reveal Purkinje cell plasticity. *Neurosci. Lett.* 167:85-88

Bäurle, J. & Grüsser-Cornehls, U. (1997) Differential number of glycine- and GABA-immunopositive neurons and terminals in the deep cerebellar nuclei of normal and Purkinje cell degeneration mutant mice. *J. Comp. Neurol.* 382:443-458

Bäurle, J., Helmchen, C., Grüsser-Cornehls, U. (1997) Diverse effects of Purkinje cell loss on deep cerebellar and vestibular nuclei neurons in Purkinje cell degeneration mice: a possible compensatory mechanism. *J. Comp. Neurol.* 384:580-596

Bäurle, J., Hoshi, M., Grüsser-Cornehls, U. (1998a) Dependence of parvalbumin expression on Purkinje cell input in the deep cerebellar nuclei. *J. Comp. Neurol.* 392:499-514

Bäurle, J., Vogten, H., Grüsser-Cornehls, U. (1998b) Course and targets of the Calbindin D-28k subpopulation of primary vestibular afferents. *J. Comp. Neurol.* 402:111-128

Baimbridge, K. G., Miller, J. J., Parkes, C. O. (1982) Calcium-binding protein distribution in the rat brain. *Brain Res.* 239:519-525

Baimbridge, K. G., Mody, I., Miller, J. J. (1985) Reduction of rat hippocampal calcium-binding protein following commissural, amygdala, septal, perforant path, and olfactory bulb kindling. *Epilepsia* 26:460-465

- Batini, C. (1990) Cerebellar localization and colocalization of GABA and calcium binding protein D-28k. *Arch. Ital. Biol.* 128:127-149
- Batini, C., Buisseret-Delmas, C., Compoin, C., Herve, D. (1989) The GABAergic neurones of the cerebellar nuclei in the rat: projections to the cerebellar cortex. *Neurosci. Lett.* 99:251-256
- Batini, C., Compoin, C., Buisseret-Delmas, C., Herve, D., Guegan, M. (1992) Cerebellar nuclei and the nucleocortical projections in the rat: retrograde tracing coupled to GABA and glutamate immunohistochemistry. *J. Comp. Neurol.* 315:74-84
- Benninghoff, A., *Makroskopische und mikroskopische Anatomie des Menschen, 3. Band: Nervensystem, Haut und Sinnesorgane.* Urban & Schwarzenberg, München-Wien-Baltimore. 1985
- Blatt, G. J. & Eisenman, L. M. (1985) A qualitative and quantitative light microscopic study of the inferior olivary complex in the adult staggerer mutant mouse. *J. Neurogenet.* 2:51-66
- Blatt, G. J. & Eisenman, L. M. (1989) Regional and topographic organization of the olivocerebellar projection in homozygous staggerer (sg/sg) mutant mice: an anterograde and retrograde tracing study. *Neuroscience* 30:703-715
- Braun, K., Schachner, M., Scheich, H., Heizmann, C. W. (1986) Cellular localization of the Ca²⁺ binding protein parvalbumin in the developing avian cerebellum. *Cell Tissue Res.* 243:69-78
- Braun, K. (1990) Calcium-binding proteins in avian and mammalian central nervous system: localization, development and possible functions. *Prog. Histochem. Cytochem.* 21:1-64
- Brodal, A., *Neurological anatomy. In relation to clinical medicine.* Oxford University Press, Oxford, New York. 1981
- Buisseret-Delmas, C. (1988a) Sagittal organization of the olivocerebellonuclear pathway in the rat. I. Connections with the nucleus fastigii and the nucleus vestibularis lateralis. *Neurosci. Res.* 5:475-493
- Buisseret-Delmas, C. (1988b) Sagittal organization of the olivocerebellonuclear pathway in the rat. II. Connections with the nucleus interpositus. *Neurosci. Res.* 5:494-512
- Buisseret-Delmas, C. & Angaut, P. (1989) Anatomical mapping of the cerebellar nucleocortical projections in the rat: a retrograde labeling study. *J. Comp. Neurol.* 288:297-310
- Butterworth, R. F., Animal models of cerebellar ataxia. In: Boulton, I. A., Baker, G. Butterworth (Eds.) *Neuromethods: Vol. 21, Animal Models of Neurological Disease.* Humana Press Inc., 1992 pp.275-294
- Caddy, K. W. T. & Biscoe, T. J. (1975) Preliminary observations on the cerebellum in the mutant mouse Lurcher. *Brain Res.* 91:276-280

- Caddy, K. W. T. & Biscoe, T. J. (1976) The number of Purkinje cells and olive neurones in the normal and Lurcher mutant mouse. *Brain Res.* 111:396-398
- Caddy, K. W. T. & Biscoe, T. J. (1979) Structural and quantitative studies on the normal C3H and Lurcher mutant mouse. *Phil. Trans. R. Soc. Lond. B Biol. Sci.* 287:167-201
- Caddy, K. W. T. & Herrup, K. (1991) The fine structure of the Purkinje cell and its afferents in lurcher chimeric mice. *J. Comp. Neurol.* 305:421-434
- Campbell, D. B. & Hess, E. J. (1996) Chromosomal localization of the neurological mouse mutations tottering (*tg*), Purkinje cell degeneration (*pcd*) and nervous (*nr*). *Mol. Brain Res.* 37:79-84
- Celio, M. R. (1984) Parvalbumin as a marker for fast firing neurons. *Neurosci. Lett. Suppl.* 18 p.332
- Celio, M. R. (1986) Parvalbumin in most γ -aminobutyric acid-containing neurons of the rat cerebral cortex. *Science* 231:995-997
- Celio, M. R. (1990) Calbindin D-28k and parvalbumin in the rat nervous system. *Neuroscience* 35:375-475
- Celio, M. R. & Heizmann, C. W. (1981) Calcium-binding protein parvalbumin as a neuronal marker. *Nature* 293:300-302
- Celio, M. R. & Heizmann, C. W. (1982) Calcium-binding protein parvalbumin is associated with fast contracting muscle fibres. *Nature* 297:504-506
- Celio, M. R., Baier, W., Schärer, L., De Viragh, P.A., Gerday, CH. (1988) Monoclonal antibodies directed against the calcium binding protein parvalbumin. *Cell Calcium* 9:81-86
- Celio, M. R., Baier, W., Schärer, L., Gregersen, H. J., De Viragh, P. A., Norman, A. W. (1990) Monoclonal antibodies directed against the calcium binding protein Calbindin D-28k. *Cell Calcium* 11:599-602
- Chan-Palay, V., *Cerebellar dentate nucleus: organization, cytology and transmitters.* Springer, Berlin. 1977
- Chan-Palay, V., *Neurotransmitters and receptors in the cerebellum: Immunocytochemical localization of glutamic acid decarboxylase, GABA-transaminase, and cyclic GMP and autoradiography with ³H-muscimol.* In: Palay, S. L., Chan-Palay, V. (Eds.) *The cerebellum - new vistas.* Springer, Berlin. 1982 pp. 552-584
- Chan-Palay, V., Nilaver, G., Palay, S. L., Beinfeld, M. C., Zimmerman, E. A., Wu, J.-Y., O'Donohue, T. L. (1981) Chemical heterogeneity in cerebellar Purkinje cells: existence and coexistence of glutamic acid decarboxylase-like and motilin-like immunoreactivities. *Proc. Natl. Acad. Sci. USA* 78:7787-7791
- Chard, P. S., Bleakman, D., Christakos, S., Fullmer, C. S., Miller, R. (1993) Calcium buffering properties of calbindin D_{28k} and parvalbumin in rat sensory neurones. *J. Physiol. (Lond)* 472:341-357

- Chen, S. & Hillman, D. E. (1993) Colocalization of neurotransmitters in the deep cerebellar nuclei. *J. Neurocytol.* 22:81-91
- Cheng, S. S.-W. & Heintz, N. (1997) Massive loss of mid- and hindbrain neurones during embryonic development of homozygous Lurcher mice. *J. Neurosci.* 17:2400-2407
- Cheung, W. Y. (1980) Calmodulin plays a pivotal role in cellular regulation. *Science* 207:19-27
- Clarke, P. G. H. (1989) Developmental cell death: morphological diversity and multiple mechanisms. *Anat. Embryol. (Berl.)* 181:195-213
- Crepel, F. & Audinat, E. (1991) Excitatory amino acid receptors of cerebellar Purkinje cell: development and plasticity. *Prog. Biophys. Molec. Biol.* 55:31-46
- Crepel, F. & Mariani, J. (1975) Anatomical, physiological and biochemical studies of the cerebellum from mutant mice. I. Electrophysiological analysis of cerebellar cortical neurons in the staggerer mouse. *Brain Res.* 98:135-147
- Crepel, F., Delhay-Bouchaud, N., Guastavino, J. M., Sampaio, I. (1980) Multiple innervation of cerebellar Purkinje cells by climbing fibres in staggerer mutant mouse. *Nature* 283:483-484
- De Jager, P. L., Harvey, D., Polydorides, A. D., Zuo, J., Heintz, N. (1998) A high-resolution genetic map of the nervous locus on mouse chromosome 8. *Genomics* 48:346-353
- Desclin, J. C. (1974) Histological evidence supporting the inferior olive as the major source of cerebellar climbing fibers in the rat. *Brain Res.* 77:365-384
- De Zeeuw, C. I. & Berrebi, A. S. (1996) Individual Purkinje cell axons terminate on both inhibitory and excitatory neurons in the cerebellar and vestibular nuclei. *Ann. N. Y. Acad. Sci.* 781:607-610
- Doughty, M. L., Lohof, A., Selimi, F., Delhay-Bouchaud, N., Mariani, J. (1999) Afferent-target cell interactions in the cerebellum: negative effect of granule cells on Purkinje cell development in Lurcher mice. *J. Neurosci.* 19:3448-3456
- Doulazmi, M., Frederic, F., Lemaigre-Dubreuil, Y, Hadj-Sahraoui, N., Delhay-Bouchaud, N., Mariani, J. (1999) Cerebellar Purkinje cell loss during life span of the heterozygous staggerer mouse (Rora(+)/Rora(sg)) is gender-related. *J. Comp. Neurol.* 411:267-273
- Dreessen, J., Lutum, C., Schäfer, B. W., Heizmann, C. W., Knöpfel, T. (1996) α -parvalbumin reduces depolarization-induced elevations of cytosolic free calcium in human neuroblastoma cells. *Cell Calcium* 19:527-533
- Duensing, F. & Schäfer, K. P. (1958) Die Aktivität einzelner Neurone im Bereich der Vestibulariskerne bei Horizontalbeschleunigung unter besonderer Berücksichtigung des vestibulären Nystagmus. *Arch. Psychiatr. Nervenkr.* 198:225-252
- Dumesnil-Bousez, N. & Sotelo, C. (1992) Early development of the Lurcher cerebellum: Purkinje cell alterations and impairment of synaptogenesis. *J. Neurocytol.* 21:506-529

Eccles, J. C., Ito, M., Szentágothai, J., *The Cerebellum as a Neuronal Machine*. Springer, Berlin, Heidelberg, New York. 1967

Edwards, M. A., Crandall, J. E., Leclerc, N., Yamamoto, M. (1994) Effects of nervous mutation on Purkinje cell compartments defined by Zebrin II and 9-O-acetylated gangliosides expression. *Neurosci. Res.* 19:167-174

Endo, T., Takazawa K., Onaya, T. (1985) Parvalbumin exists in rat endocrine glands. *Endocrinology* 117:527-531

Fiez, J. A. (1996) Cerebellar contributions to cognition. *Neuron* 16:13-15

Fletcher, C. F., Lutz, C. M., O'Sullivan, T. N., Shaughnessy, J. D. Jr., Hawkes, R., Frankel, W. N., Copeland, N. G., Jenkins, N. A. (1996) Absence epilepsy in tottering mutant mice is associated with calcium channel defects. *Cell* 87:607-617

Föhr, U. G., Weber, B. R., Müntener, M. (1993) Human α and β parvalbumins. Structure and tissue-specific expression. *Eur. J. Biochem.* 215:719-727

Fonnum, F. & Walberg, F. (1973) An estimation of the concentration of γ -aminobutyric acid and glutamate decarboxylase in the inhibitory purkinje axon terminals in the cat. *Brain Res.* 54:115-127

Fortier, P. A., Smith, A. M., Rossignol, S. (1987) Locomotor deficits in the mutant mouse Lurcher. *Exp. Brain Res.* 66:271-286

Fredette, B. J. & Mugnaini, E. (1991) The GABAergic cerebello-olivary projection in the rat. *Anat. Embryol. (Berl.)* 184:225-243

Furuya, N., Kawano, K., Shimazu, H. (1975) Functional organization of vestibulofastigial projection in the horizontal semicircular canal system in the cat. *Exp. Brain Res.* 24:75-87

Garcia-Segura, L. M., Baetens, D., Roth, J., Norman, A. W., Orci, L. (1984) Immunohistochemical mapping of calcium-binding protein immunoreactivity in the rat central nervous system. *Brain Res.* 296:75-86

Gardette, R., Alvarado-Mallart, R. M., Crepel, F., Sotelo, C. (1988) Electrophysiological demonstration of a synaptic integration of transplanted Purkinje cells into the cerebellum of the adult Purkinje cell degeneration mutant mouse. *Neuroscience* 24:777-789

Garthwaite, J. & Brodbelt, A. R. (1989) Glutamate as the principal mossy fibre transmitter in the rat cerebellum: pharmacological evidence. *Eur. J. Neurosci.* 2:177-180

Ghetti, B., Norton, J., Triarhou, L. C. (1987) Nerve cell atrophy and loss in the inferior olivary complex of "Purkinje cell degeneration" mutant mice. *J. Comp. Neurol.* 260:409-422

Ghez, C., *The Cerebellum*. In: Kandel, E. R., Schwartz, J. H., Jessell, T. M. (Eds.) *Principles of Neural Science*. Elsevier, New York. 1991 pp. 626-646

Gilman, S., Bloedel, J., Lechtenberg, R., *Disorders of the Cerebellum*. F.A. Davis Company, Philadelphia 1981

- Goldowitz, D., Vincent, S. R., Wu, J.-Y., Hökfelt, T. (1982) Immunohistochemical demonstration of plasticity in GABA neurons of the adult rat dentate gyrus. *Brain Res.* 238:413-420
- Grüsser, C. (1997) Cerebellectomie und Verhaltensbeobachtungen an Mäuse-Mutanten mit degenerativen Veränderungen im cerebellären und nigrostriatalen System. Inaugural-Dissertation, Freie Universität Berlin
- Grüsser, C. & Grüsser-Cornehls, U. (1998) Improvement in motor performance of Weaver mutant mice following lesions of the cerebellum. *Behav. Brain Res.* 97:189-94
- Grüsser-Cornehls, U., Compensatory mechanisms at the level of the vestibular nuclei following post-natal degeneration of specific cerebellar cell classes and ablation of the cerebellum in mutant mice. In: Flohr, H. (Ed.) *Post-lesion Neural Plasticity* Springer, Berlin, Heidelberg. 1988 pp. 431-442
- Grüsser-Cornehls, U. (1995) Responses of flocculus and vestibular nuclei neurons in Weaver mutant mice (B6CBA wv/wv) to combined head and body rotation. *Exp. Brain Res.* 107:26-33
- Grüsser-Cornehls, U., Luy, M., Bäumle, J. (1995a) Electrophysiology and GABA-immunocytochemistry in the vestibular nuclei of normal (C57BL/6J) and Leaner mutant mice. *Brain Res.* 703:51-62
- Grüsser-Cornehls, U., Niemschynski, A., Plassmann, W. (1995b) Vestibular responses of flocculus and vestibular nuclei neurons in mice (B6CBA). *Exp. Brain Res.* 107:17-25
- Grüsser-Cornehls, U., Hoshi, M., Bäumle, J. (1996) Parvalbumin increases selectively in denervated areas of the deep cerebellar nuclei: A study in cerebellar mutants. In: *Soc. Neurosci. Abstr.* 22:1649
- Grüsser-Cornehls, U., Grüsser, C., Bäumle, J. (1999) Vermectomy enhances parvalbumin expression and improves motor performance in Weaver mutant mice: an animal model for cerebellar ataxia. *Neuroscience* 91(1):315-326
- Hadj-Sahraoui, N., Frederic, F., Zanjani, H., Herrup, K., Delhaye-Bouchaud, N., Mariani, J. (1997) Purkinje cell loss in heterozygous staggerer mutant mice during aging. *Dev. Brain Res.* 98:1-8
- Hall, T. C., Miller, A. K. H., Corsellis, J. A. N. (1975) Variations in the human Purkinje cell population according to age and sex. *Neuropath. Appl. Neurobiol.* 1:267-292
- Hamilton, B. A., Frankel, W. N., Kerrebrock, A. W., Hawkins, T. L., Fitzhugh, W., Kusumi, K., Russel, L. B., Mueller, K. L., Berkel, V. V., Birren, B. W., Kruglyak, L., Lander, E. S. (1996) Disruption of the nuclear hormone receptor ROR α in staggerer mice. *Nature* 379:736-739
- Hawkes, R., Colonnier, M., Leclerc, N. (1985) Monoclonal antibodies reveal sagittal banding in the rodent cerebellar cortex. *Brain Res.* 333:359-365

- Hawkes, R. & Leclerc, N. (1987) Antigenic map of the rat cerebellar cortex: the distribution of parasagittal bands as revealed by monoclonal anti-Purkinje cell antibody mabQ113. *J. Comp. Neurol.* 256:29-41
- Heckroth, J. A. (1994a) Quantitative morphological analysis of the cerebellar nuclei in normal and lurcher mutant mice. I. Morphology and cell number. *J. Comp. Neurol.* 343:173-182
- Heckroth, J. A. (1994b) Quantitative morphological analysis of the cerebellar nuclei in normal and lurcher mutant mice. II. Volumetric changes in cytological components. *J. Comp. Neurol.* 343:183-192
- Heckroth, J. A. & Eisenman, L. (1988) The olivocerebellar projection in 'lurcher' mutant mice. *Neurosci. Lett.* 85:199-204
- Heckroth, J. A. & Eisenman, L. (1991) Olivary morphology and olivocerebellar topography in adult Lurcher mutant mice. *J. Comp. Neurol.* 312:641-651
- Heckroth, J. A. & Abbott, .C. (1994) Purkinje cell loss from alternating sagittal zones in the cerebellum of leaner mutant mice. *Brain Res.* 658:93-104
- Heckroth, J. A., Goldowitz, D., Eisenman, L. M. (1990) Olivocerebellar fibre maturation in normal and lurcher mutant mice: defective development in lurcher. *J. Comp. Neurol.* 291:415-430
- Heizmann, C. W., Parvalbumin in nonmuscle cells. In: Gerday, C., Gilles, R., Bolis, L. (Eds.) *Calcium and Calcium Binding Proteins.* Springer, Berlin. 1988 pp. 93-101
- Heizmann, C. W. & Hunziker, W. (1991) Intracellular calcium-binding proteins: more sights than insights. *Trends Biochem. Sci.* 16:98-103
- Heizmann, C. W. & Braun, K. (1992) Changes in Ca²⁺-binding proteins in human neurodegenerative disorders. *Trends Neurosci.* 15:259-264
- Herrup, K. & Mullen, R. J. (1979a) Regional variation and absence of large neurons in the cerebellum of the staggerer mouse. *Brain Res.* 172:1-12
- Herrup, K. & Mullen, R. J. (1979b) Staggerer chimeras: Intrinsic nature of Purkinje cell defects and implications for normal cerebellar development. *Brain Res.* 178: 443-457
- Herrup, K. & Wilczynski, S. L. (1982) Cerebellar cell degeneration in the leaner mutant mouse. *Neuroscience* 7:2185-2196
- Herrup, K. & Trenkner, E. (1987) Regional differences in cytoarchitecture of the Weaver cerebellum suggest a new model for Weaver gene action. *Neuroscience* 7:871-885
- Heuzé, P., Féron, C., Baudoin, C. (1997) Early behavioral development of mice is affected by staggerer mutation as soon as postnatal day three. *Dev. Brain Res.* 101:81-84
- Hirano, A. & Dembitzer, H. M. (1975) The fine structure of the staggerer cerebellum. *J Neuropathol. Exp. Neurol.* 1:1-11

- Hoshi, M., Bäurle, J., Grüsser-Cornehls, U. (1996) Parvalbumin in neurons of the deep cerebellar nuclei is controlled by Purkinje cell input: A study in cerebellar mutants. In: Elsner, N. & Schnitzler, H. U. (Eds.) Brain and Evolution, Contributions to the 24th Göttingen Neurobiology Conference, p.464
- Hou, T.-T., Johnson, J. D., Rall, J. A. (1991) Parvalbumin content Ca^{2+} and Mg^{2+} dissociation rates correlated with changes in relaxation rate of frog muscle fibres. *J. Physiol. (Lond.)* 441:285-304
- Inouye, M. & Murakami, U. (1980) Temporal and spatial patterns of Purkinje cell formation in the mouse cerebellum. *J. Comp. Neurol.* 194:499-503
- Ito, M. *The cerebellum and neural control*, Raven Press, New York. 1984
- Ito, M. (1990) A new physiological concept on cerebellum. *Rev. Neurol. (Paris)* 146:564-569
- Ito, M. & Yoshida M. (1966) The origin of cerebellar-induced inhibition of Deiters neurones. I. Monosynaptic initiation of the inhibitory postsynaptic potentials. *Exp. Brain Res.* 2:330-349
- Ito, M., Obata, K., Ochi, R. (1966) The origin of cerebellar-induced inhibition of Deiters neurones. II. Temporal correlations between the trans-synaptic activation of Purkinje cells and the inhibition of Deiters neurones. *Exp. Brain Res.* 2:350-364
- Jande, S. S., Maler, L., Lawson, D. E. M. (1981) Immunohistochemical mapping of vitamin D-dependent calcium binding protein in brain. *Nature* 294:765-767
- Jansen, J. & Brodal, A. (1940) Experimental studies on the intrinsic fibers of the cerebellum. II. The cortico-nuclear projection. *J. Comp. Neurol.* 73:267-321
- Jansen, J. & Brodal, A. (1942) Experimental studies on the intrinsic fibers of the cerebellum. III. The cortico-nuclear projection in the rabbit and the monkey. *Norske Vid. Akad., Ahv. 1, Math. Nat. Kl.*, 3:1-50
- Ji, Z., Jin, Q., Vogel, M. W. (1997) Evidence of spinocerebellar mossy fiber segregation in the juvenile staggerer cerebellum. *J. Comp. Neurol.* 378:354-362
- Kamphuis, W., Huisman, E., Waldman, W. J., Heizmann, C. W., Lopes da Silva, F. H. (1989) Kindling induced changes in parvalbumin immunoreactivity in rat hippocampus and its relation to long-term decrease in GABA-immunoreactivity. *Brain Res.* 47:23-34
- Kosaka, T., Katsumaru, H., Hama, K., Wu, J. H., Heizmann, C. (1987a) GABAergic neurons containing the Ca^{2+} -binding protein parvalbumin in the rat hippocampus and dentate gyrus. *Brain Res.* 419:119-130
- Kosaka, T., Kosaka, K., Heizmann, C. W., Nagatsu, I., Wu, J. Y., Yanaihara, N., Hama, K. (1987b) An aspect of the GABAergic system in the rat main olfactory bulb: laminar distribution of immunohistochemically defined subpopulations of GABAergic neurons. *Brain Res.* 411:373-378
- Kosaka, T., Kosaka, K., Nakayama, T., Hunziker, W., Heizmann, C. W. (1993) Axons and axon terminals of cerebellar Purkinje cells and basket cells have higher levels of parvalbumin

immunoreactivity than somata and dendrites: quantitative analysis by immunogold labeling. *Exp. Brain Res.* 93:483-491

Kretsinger, R. H. (1981) Mechanism of selective signaling by calcium. *Neurosci. Res. Progr. Bull.* 19:215-291

Kretsinger, R. H. & Nockolds, C. E. (1973) Carp muscle calcium-binding protein. II. Structure determination and general description. *J. Biol. Chem.* 248:3313-3326

Lainé, J. & Axelrad, H. (1998) Lugaro cells target basket and stellate cells in the cerebellar cortex. *Neuroreport* 9:2399-2403

Landis, D. M. D. & Sidman, R. L. (1978) Electron microscopic analysis of postnatal histogenesis in the cerebellar cortex of Staggerer mutant mice. *J. Comp. Neurol.* 179:831-863

Landis, S. C. (1973) Ultrastructural changes in the mitochondria of cerebellar Purkinje cells of Nervous mutant mice. *J. Cell. Biol.* 57:782-797

Landis, S. C. & Mullen, R. J. (1978) The development and degeneration of Purkinje cells in pcd mutant mice. *J. Comp. Neurol.* 177:125-143

Larramendi, L. M. H., Analysis of synaptogenesis in cerebellum of the mouse. In: *Neurobiology of cerebellar evolution and development.* Llinás, R. R. (Ed.), American Medical Association/Education and Research Foundation, Chicago. 1969 pp. 803-843

Larramendi, L. M. H. & Victor, T. (1967) Synapse on the Purkinje cell spines in the mouse. An electronmicroscopic study. *Brain Res.* 5:15-30

Larsell, O., Jansen, J., Korneliussen, H. K., Mugnaini, E., Dow, R., *The Comparative Anatomy and Histology of the Cerebellum.* The University of Minnesota Press, Minneapolis. 1972

LaVail, M. M., Blanks, J. C., Mullen, R. J. (1982) Retinal degeneration in the pcd cerebellar mutant mouse. I. Light microscopic and autoradiographic analysis. *J. Comp. Neurol.* 212:217-230

Legrand, C., Thomasset, M., Parkes, C. O., Clavel, M. C., Rabié, A. (1983) Calcium-binding protein in the developing rat cerebellum. *Cell Tiss. Res.* 233:389-402

Leiner, H. C., Leiner, A. L., Dow, R. S. (1986) Does the cerebellum contribute to mental skills? *Behav. Neurosci.* 100:443-453

Levitt, P. & Rakic, P. (1980) Immunoperoxidase localization of glial fibrillary acidic protein in the radial glial cells and astrocytes of the developing rhesus monkey brain. *J. Comp. Neurol.* 193:815-840

Mallet, J., Huchet, M., Pougeois, R., Changeux, J. P. (1976) Anatomical, physiological and biochemical studies on the cerebellum from mutant mice. III. Protein differences associated with the weaver, staggerer and nervous mutations. *Brain Res.* 103:291-312

- Mariani, J. & Changeux, J. P. (1981) Ontogenesis of olivocerebellar relationship. I. Studies by intracellular recordings of the multiple innervation of Purkinje cells by climbing fibres in the developing rat cerebellum. *J. Neurosci.* 1:696-702
- Martin, M. R. & Caddy, K. W. T. (1977) Electrophysiological studies on interpositus neurones in the normal and Lurcher mutant mouse. *Exp. Brain Res.* 29: 275-281
- Matsushita, M. & Iwahori, N. (1971) Structural organization of the fastigial nucleus. I. Dendrites and axonal pathways. *Brain Res.* 25:597-610
- Mehler, W. R. & Rubertone, J. A., Anatomy of the Vestibular Nucleus Complex. In: Paxinos, G. (Ed.) *The Rat nervous System. Vol. 2: Hindbrain and Spinal Cord.* Academic Press, New York. 1985 pp. 185-219
- Miale, I. & Sidman, R. L. (1961) An autoradiographic analysis of histogenesis in the mouse cerebellum. *Exp. Neurol.* 4:277-296
- Moews, P. C. & Kretsinger, R. H. (1975) Refinement of the structure of carp muscle calcium-binding protein parvalbumin by model building and different Fourier analysis. *J. Mol. Biol.* 91:201-228
- Monaghan, P. L., Bietz, A. J., Larson, A. A., Altschuler, R. A., Madl, J. E., Mullett, M. A. (1986) Immunocytochemical localization of glutamate-, glutaminase- and aspartate aminotransferase-like immunoreactivity in the rat deep cerebellar nuclei. *Brain Res.* 363:364-370
- Mugnaini, E. & Floris, A. (1994) The unipolar brush cell: a neglected neuron of the mammalian cerebellar cortex. *J. Comp. Neurol.* 339:174-180
- Mugnaini, E., Dino, MR., Jaarsma, D. (1997) The unipolar brush cells of the mammalian cerebellum and cochlear nucleus: cytology and microcircuitry. *Prog. Brain Res.* 114:131-150
- Mullen, R. J., Analysis of CNS development with mutant mice and chimeras. In: Tsukada, Y., (Ed.) *Genetic Approaches to Developmental Neurobiology.* Univ. of Tokyo Press, Tokyo. 1982 pp. 183-193
- Mullen, R. J., Eicher, E. M., Sidman, R. L. (1976) Purkinje cell degeneration, a new neurological mutant in the mouse. *Proc. Natl. Acad. Sci. USA* 73:208-212
- Muri, R. & Knöpfel, T. (1994) Activity induced elevations of intracellular calcium concentration in neurons of the deep cerebellar nuclei. *J. Neurophysiol.* 71:420-428
- Nakagawa, S., Watanabe, M., Isobe, T., Kondo, H., Inoue, Y. (1998) Cytological compartmentalization in the staggerer cerebellum, as revealed by calbindin immunocytochemistry for Purkinje cells. *J. Comp. Neurol.* 395:112-120
- Neveu, I. & Arenas, B. (1996) Neurotrophins promote the survival and development in the cerebellum of hypothyroid rats in vivo. *J. Cell Biol.* 133:631-646
- Nieoullon, A. & Dusticier, N. (1981) Increased glutamate decarboxylase activity in the red nucleus of the adult cat after cerebellar lesions. *Brain Res.* 224:129-139

- Norman, D. J., Fletcher, C., Heintz, N. (1991) Genetic mapping of the *lurcher* locus on mouse chromosome 6 using an intersubspecific backcross. *Genomics* 9:147-153
- Norman, D. J., Feng, L., Cheng, S. S., Gubbay, J., Chan, E., Heintz, N. (1995) The *lurcher* gene induces apoptotic death in cerebellar Purkinje cells. *Development* 121:1183-1193
- Obata, K. (1969) Gamma-aminobutyric acid in Purkinje cells and motoneurons. *Experientia*, 25:1283
- O’Gorman, S. (1985) Degeneration of thalamic neurons in “Purkinje cell degeneration” mutant mice. II. Cytology of neuron loss. *J. Comp. Neurol.* 234:298-316
- O’Gorman, S. & Sidman, R. L. (1985) Degeneration of thalamic neurons in „Purkinje cell degeneration“ mutant mice. I. Distribution of neuron loss. *J. Comp. Neurol.* 234:277-297
- Oscarsson, O. (1976) Spatial distribution of climbing and mossy fiber inputs into the cerebellar cortex. *Exp. Brain Res. Suppl.* 1:34-42
- Ottersen, O. P. & Storm-Mathisen J. (1984) Glutamate- and GABA-containing neurons in the mouse and rat brain, as demonstrated with a new immunocytochemical technique. *J. Comp. Neurol.* 229:374-392
- Ottersen, O. P., Madsen, S., Storm-Mathisen, J., Somogyi, P., Scopsi, L, Larsson, L. I. (1988) Immunocytochemical evidence suggests that taurine is colocalized with GABA in the Purkinje cell terminals, but that the stellate cell terminals predominantly contain GABA: a light- and electronmicroscopic study of the rat cerebellum. *Exp. Brain Res.* 72:407-16
- Palay, S. L. (1961) The electron microscopy of the glomeruli cerebellosi. *Proc. Anat. Soc. Great Britain and Ireland*, London, pp. 82-84
- Palay, S. L. & Chan-Palay, V., *Cerebellar Cortex. Cytology and Organization.* Springer, Berlin. 1974
- Palkovits, M., Mezey, É., Hámori, J, Szentágothai, J. (1977) Quantitative histological analysis of the cerebellar nuclei in the cat. I. Numerical data on cells and on synapses. *Exp. Brain Res.* 28:189-209
- Patil, N., Cox, D. R., Bhat, D., Faham, M., Myers, R. M., Peterson, A. S. (1995) A potassium channel mutation in weaver mice implicates membrane excitability in granule cell differentiation. *Nature Genet.* 11:126-129
- Phillips, R. J. S. (1960) ‘Lurcher’, a new gene in linkage group XI of the house mouse. *J. Genet.* 57:35-42
- Pompeiano, O. & Brodal, A. (1957) Spino-vestibular fibers in the cat. An experimental study. *J. Comp. Neurol.* 108:353-381
- Precht, W., Neuronal operation in the vestibular system. In: Braitenberg, V. (Ed.) *Studies of brain function 2.* Springer, Berlin, Heidelberg, New York. 1978

- Rakic, P. & Sidman, R. L. (1973a) Sequence of developmental abnormalities leading to granule cell deficit in cerebellar cortex of weaver mutant mice. *J. Comp. Neurol.* 152:103-132
- Rakic, P. & Sidman, R. L. (1973b) Organization of cerebellar cortex secondary to deficit of granule cells in weaver mutant mice. *J. Comp. Neurol.* 152:133-162
- Ramón y Cajal, S., *Histologie du système nerveux de l'homme et des vertébrés.* 2 tomes, Maloine, Paris. 1911
- Ramón y Cajal, S., *Studies on Vertebrate Neurogenesis.* L. Guth, translator. Part IV, Cerebellum. Charles Thomas, Springfield. 1960 pp. 253-301
- Roffler-Tarlov, S., Beart, P. M., O'Gorman, S., Sidman, R. L. (1979) Neurochemical and morphological consequences of axon terminal degeneration in cerebellar deep nuclei of mice with inherited Purkinje cell degeneration. *Brain Res.* 168:75-95
- Roffler-Tarlov, S. & Graybiel, A. M. (1986) Expression of the weaver gene in dopamine-containing neural systems is dose-dependent and affects both striatal and nonstriatal regions. *J. Neurosci.* 6:3319-3330
- Roffler-Tarlov, S. & Herrup, K. (1981) Quantitative examination of the deep cerebellar nuclei in the staggerer mutant mouse. *Brain Res.* 215:49-59
- Rossi, F., Jankovski, A., Sotelo, C. (1995) Target neuron controls the integrity of afferent axon phenotype: a study on the Purkinje cell-climbing fiber system in cerebellar mutant mice. *J. Neurosci.* 15:2040-2056
- Schwartz, P. M., Borghesani, P. R., Levy, R. L., Pomeroy, S. L., Segal, R. A. (1997) Abnormal cerebellar development and foliation in BDNF^{-/-} mice reveals a role for neurotrophins in CNS patterning. *Neuron* 19:269-281
- Scotti, A. L. & Nitsch, C. (1992) Differential Ca²⁺ binding properties in the human cerebellar cortex: distribution of parvalbumin and calbindin D-28k immunoreactivity. *Anat. Embryol. (Berl.)* 185:163-167
- Seguela, P., Geffard, M., Buijs, R. M., Le Moal, M. (1984) Antibodies against gamma-aminobutyric-acid: specificity studies and immunocytochemical results. *Proc. Natl. Acad. Sci. USA* 81:3888-3892
- Selimi, F., Doughty, M., Delhaye-Bouchaud, N., Mariani, J. (2000) Target-related and intrinsic neuronal death in Lurcher mutant mice are both mediated by caspase-3 activation. *J. Neurosci.* 20:992-1000
- Seyfried, T. N., Itoh, T., Glaser, G. H., Miyazawa, N., Yu, R. K., (1981) Cerebellar gangliosides and phospholipids in mutant mice with ataxia and epilepsy: the Tottering/Leaner syndrome. *Brain Res.* 216:429-436
- Shojaeian, H., Delhaye-Bouchaud, N., Mariani, J. (1985) Decreased number of cells in the inferior olivary nucleus of the developing staggerer mouse. *Brain Res.* 21:141-146

Shojaeian, H., Delhay-Bouchaud, N., Mariani, J. (1987) Decreased number of cells in the inferior olivary nucleus of the adult mouse (+/sg) heterozygous for the staggerer gene. *Neuroscience* 22:91-97

Sidman, R. L., Development of interneuronal connections in brains of mutant mice. In: Carlson F. D. (Ed.) *Physiological and Biochemical Aspects of Nervous Integration*. Englewood Cliff, N. J.:Prentice Hall. 1968, pp. 163-193

Sidman, R. L., Cell interactions in developing mammalian central nervous system. In: L. G.Silvestri (Ed.) *Cell interactions*. North Holland Publ. Co., Amsterdam. 1972 pp.1-13

Sidman, R. L., Contact interaction among developing mammalian brain cells. In: Moscana, A. A. (Ed.) *The Cell Surface in Development*. John Wiley & Sons Inc. 1974 pp.221-253

Sidman, R. L. & Green, M. C., "Nervous", a new mutant mouse with cerebellar disease. In: Sabourdy, M. (Ed.) *Les Mutants pathologiques chez l'animal*. Ed. du centre national de la recherche scient., Paris. 1970 pp. 69-79

Sidman, R. L., Lane, P. W., Dickie, M. M. (1962) Staggerer, a new mutation in the mouse affecting the cerebellum. *Science* 137: 610-612

Sidman, R. L., Green, M. C., Appel, S. H., *Catalog of the neurological mutants of the mouse*. Harvard University Press, Cambridge, Ma. 1965

Soha, J. M., Kim, S., Crandall, J. E., Vogel, M. W. (1997) Rapid growth of parallel fibers in the cerebella of normal and staggerer mutant mice. *J. Comp. Neurol.* 389:642-654

Sotelo, C. (1968) Permanence of postsynaptic specializations in the frog sympathetic ganglion cells after denervation. *Exp. Brain Res.* 6:294-305

Sotelo, C. (1975a) Anatomical, physiological and biochemical studies of the cerebellum of mutant mice. II. Morphological study of cerebellar cortical neurons and circuits in the weaver mouse. *Brain Res.* 94:19-44

Sotelo, C., Dendritic abnormalities of Purkinje cells in the cerebellum of neurologic mutant mice (weaver and staggerer). In: Kreutzberg, G. W. (Ed.) *Physiology and Pathology of Dendrites*. Raven Press, New York. 1975b pp.335-351

Sotelo, C. (1990) Axonal abnormalities in cerebellar Purkinje cells of the 'hyperspiny Purkinje cell' mutant mouse. *J. Neurocytol.* 19:737-755

Sotelo, C. & Alvarado-Mallart, R. M. (1987) Reconstruction of the cerebellar defective circuitry in adult Purkinje cell degeneration mutant mice by Purkinje cell replacement through transplantation of solid embryonic implants. *Neuroscience* 20:1-22

Sotelo, C. & Changeux, J. P. (1974) Transsynaptic degeneration 'en cascade' in the cerebellar cortex of staggerer mutant mice. *Brain Res.* 67:519-526

Sotelo, C. & Palay, S. L. (1971) Altered axons and axon terminals in the lateral vestibular nucleus of the rat. *Lab. Invest.* 25:653-671

- Sotelo, C. & Triller, A. (1979) Fate of presynaptic afferents to Purkinje cells in the adult mutant mouse: a model to study presynaptic stabilization. *Brain Res.* 175:11-36
- Spencer, R., Charman, M., Wilson, P. W., Lawson, E. M. (1978) The relationship between vitamin D-stimulated calcium transport and intestinal calcium-binding protein in the chicken. *Biochem. J.* 170:93-101
- Standard Karyotype of the Mouse, *Mus musculus*. (1972) *J. Heredity*, 63:69-72
- Stichel, C. C., Kägi, U., Heizmann, C. W. (1986) Parvalbumin in the cat brain: isolation, characterisation and localization. *J. Neurochem.* 47:46-53
- Suzuki, K. & Zagoren, J. C. (1975) Focal axonal swelling in the cerebellum of the Quaking mouse: light and electron microscopic studies. *Brain Res.* 85:38-43
- Swisher, D. A. & Wilson, D. B. (1977) Cerebellar histogenesis in the lurcher (*Lc*) mutant mouse. *J. Comp. Neurol.* 173:205-218
- Tellez, I. & Terry, R. D. (1968) Fine structure of the early changes in the vestibular nuclei of the thiamine-deficient rat. *Am. J. Path.* 52:777-794
- Tolbert, D. L., Bantli, H., Bloedel, J. R. (1976) Anatomical and physiological evidence for a cerebellar nucleo-cortical projection in the cat. *Neuroscience* 1:205-217
- Triarhou, L. C. & Ghetti, B. (1991) Serotonin-immunoreactivity in the cerebellum of two neurological mutant mice and the corresponding wild-type genetic stocks. *J. Chem. Neuroanat.* 4:421-428
- Triarhou, L. C., Norton, J., Ghetti, B. (1987) Anterograde transsynaptic degeneration in the deep cerebellar nuclei of Purkinje cell degeneration (*pcd*) mutant mice. *Exp. Brain Res.* 66:577-588
- Triarhou, L. C., Zhang, W., Lee, W.-H. (1995) Graft-induced restoration of function in hereditary cerebellar ataxia. *Neuroreport* 6:1827-1832
- Tsukahara, N., Hultborn, H., Murakami, F. (1974) Sprouting of cortico-rubral synapses in red nucleus neurons after destruction of the nucleus interpositus of the cerebellum. *Experientia* 30:57-58
- Tsuzuki, M., Iino, M., Ozawa, S. (1989) Change in calcium permeability caused by quinolinic acid in cultured rat hippocampal neurons. *Neurosci. Lett.* 105:269-274
- Vogel, M. W. & Prittie, J. (1994) Topographic spinocerebellar mossy fiber projections are maintained in the Lurcher mutant. *J. Comp. Neurol.* 343:341-351
- Voogd, J., *The cerebellum of the cat*. Van Gorcum, Assen. 1964
- Voogd, J. & Bigaré, F., Topographical distribution of olivary and corticonuclear fibers in the cerebellum: a review. In: Courville, J., Montigny, C. & Lamarre, Y (Eds.), *The inferior olivary nucleus*. Raven Press, New York. 1980 pp. 207-234

- Walberg, F., Pompeiano, O., Brodal, A., Jansen, J. (1962) The fastigiovestibular projection in the cat. An experimental study with silver impregnation methods. *J. Comp. Neurol.* 118:49-76
- Wassef, M., Simons, J., Tappaz, M. L., Sotelo, C. (1986) Non-Purkinje cell GABAergic innervation of the deep cerebellar nuclei: a quantitative immunocytochemical study in C57BL and in Purkinje cell degeneration mutant mice. *Brain Res.* 399:125-135
- Wassef, M., Sotelo, C., Cholley, B., Brehier, A., Thomasset, M. (1987) Cerebellar mutations affecting the postnatal survival of Purkinje cells in the mouse disclose a longitudinal pattern of differentially sensitive cells. *Dev. Biol.* 124:379-389
- Wasserman, R. H. & Taylor, A. N. (1966) Vitamin D₃-induced calcium-binding protein in chick intestinal mucosa. *Science* 152:791-793
- Weidenreich, F. (1899) Zur Anatomie der zentralen Kleinhirnerne der Säuger. *Z. Morphol. Anthropol.* 1:259-312
- Wetts, R. & Herrup, K. (1982) Interaction of granule, Purkinje and inferior olivary neurons in lurcher chimeric mice. I. Qualitative studies. *J. Embryol. Exp. Morphol.* 68:87-98
- Wetts, R. & Herrup, K. (1983) Direct correlation between Purkinje and granule cell number in the cerebella of lurcher chimeras and wild-type mice. *Brain Res.* 312:41-47
- Wüllner, U., Löschmann, P. A., Weller, M., Klockgether, T. (1995) Apoptotic cell death in the cerebellum of mutant weaver and lurcher mice. *Neurosci. Lett.* 200:109-112
- Wüllner, U., Weller, M., Schulz, J., Krajewski, S., Reed, J., Klockgether, T. (1998) Bcl-2, Bax and Bcl-x expression in neuronal apoptosis: a study of mutant weaver and lurcher mice. *Acta Neuropathol. (Berl.)* 96:233-238
- Yamamoto, M. (1979) Topographical representation in rabbit cerebellar flocculus for variant afferent inputs from the brainstem investigated by means of retrograde axonal transport of horseradish peroxidase. *Neurosci. Lett.* 12:29-34
- Yoon, C. H. (1969) Disturbances in developmental pathways leading to a neurological disorder of genetic origin, "leaner" in mice. *Dev. Biol.* 20:158-181
- Yoon, C. H. (1972) Developmental mechanism for changes in cerebellum of "staggerer" mouse, a neurological mutant of genetic origin. *Neurology* 22:743-754
- Yoon, C. H. (1976) Pleiotropic effect of the staggerer gene. *Brain Res.* 109:206-215
- Zanjani, H. S., Mariani, J., Herrup, K. (1990) Cell loss in the inferior olive of the staggerer mutant mouse is an indirect effect of the gene. *J. Neurogenet.* 6:229-241
- Zanjani, H. S., Mariani, J., Delhaye-Bouchaud, N., Herrup, K. (1992) Neuronal cell loss in heterozygous staggerer mutant mice: a model for genetic contributions to the aging process. *Dev. Brain Res.* 67:153-160

Zhang, W., Lee, W.-H., Triarhou, L. C. (1996) Grafted cerebellar cells in a mouse model of hereditary ataxia express IGF-I system genes and partially restore behavioural function. *Nature Med.* 2:65-71

Zilla, P., Celio, M. R., Fasol, R., Zenker, W. (1985) Ectopic parvalbumin-positive cells in the cerebellum of the adult mutant mouse 'nervous'. *Acta Anat. (Basel)* 124:181-187

Zuo, J., De Jager, P. L., Takahashi, K. A., Jiang, W., Linden, D. J., Heintz, N. (1997) Neurodegeneration in Lurcher mice caused by mutation in δ -2 glutamate receptor gene. *Nature* 388:769-773