Paul Gottlob Layer

Stand: May 2024

Selected Publications - grouped by research subjects

Ausgewählte Publikationen - nach Sachgebieten geordnet

Spatiotemporal Development of Embryonic Tissues:

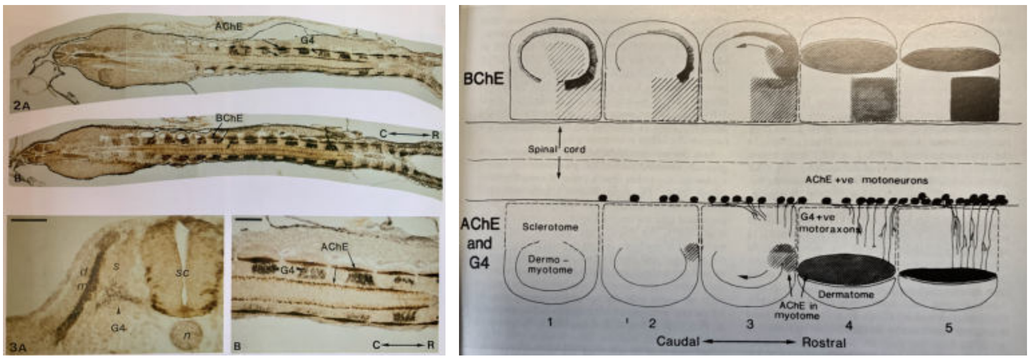
Layer PG, Kotz S (1983). Asymmetrical developmental pattern of uptake of Lucifer Yellow into Amacrine cells in the embryonic chick retina. Neuroscience 9, 931-941.

Layer PG (1983). Comparative localization of acetylcholinesterase and pseudo-cholinesterase during morphogenesis of the chicken brain. Proc. Natl. Acad. Sci., USA, 80, 6413-6417.

Liu L, Layer PG (1984). Spatio-temporal patterns of differentiation of whole heads of the embryonic chick as revealed by binding of a FITC-coupled Peanut-agglutinin (FITC-PNA). Dev. Brain Res. 12 (2), 173-182.

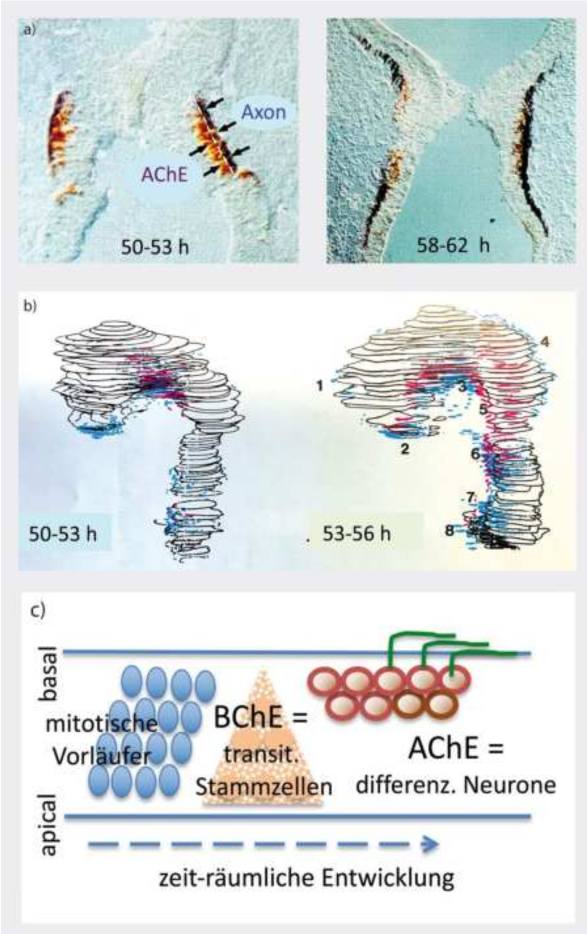
Layer PG, Rommel S, Bülthoff H, Hengstenberg R (1988). Independent spatial waves of biochemical differentiation along the surface of chicken brain as revealed by the sequential expression of acetylcholinesterase. Cell Tiss. Res. 251, 587-595.

Layer PG, Alber R, Rathjen FG (1988). Sequential activation of butyrylcholinesterase in rostral half somites and acetylcholinesterase in motoneurones and myotomes preceding growth of motor axons. Development, 102, 387-396



The acetylcholine (ACh)-degrading enzymes AChE and BChE distinctly localize during differentiation of chicken spinal cord & somites, announcing areas of axon ingrowth from AChE+ motor neurons into rostral half somites.

Weikert T, Rathjen FG, Layer PG (1990). Developmental maps of acetylcholinesterase and G4-antigen of the early chicken brain: long distance tracts originate from AChE-producing cell bodies. J. Neurobiol. 21, 482-498.



AChE as a postmitotic marker outlines differentiation waves throughout early avian brain, revealing two independent starting points (ventral mesenc., rhombencephalon). BChE is a transitory marker of stem cells at onset of their differentiation. Weikert et al., 1990.

Layer PG, Alber R (1990). Patterning of chick brain vesicles as revealed by peanut agglutinin and cholinesterases. Development 109, 613-624.

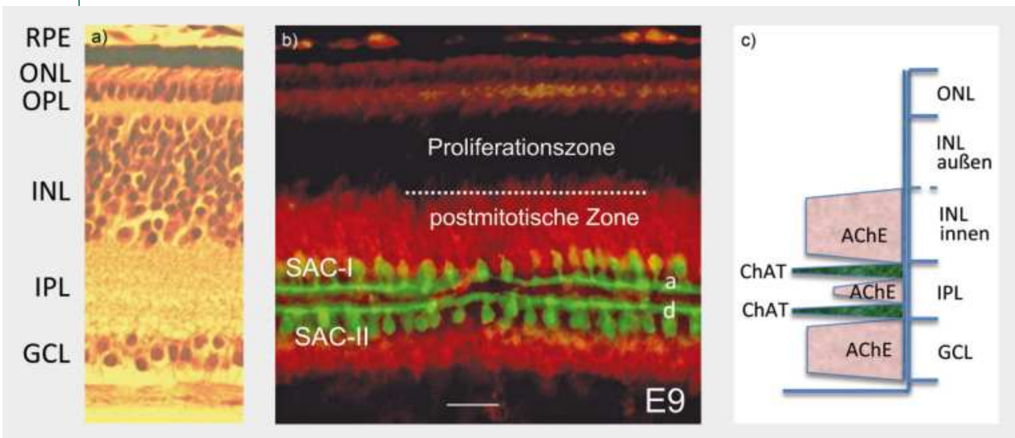
Nonclassical Functions of Cholinesterases (nonsynaptic, noncholinergic):

Layer PG, Sporns O (1987). Spatiotemporal relationship of embryonic cholinesterases with cell proliferation in chick retina and eye. Proc.Natl.Acad.Sci. USA, 84, 284-288.

Layer PG (1990). Cholinesterases preceding major tracts in vertebrate neurogenesis. BioEssays 12, 415-420.

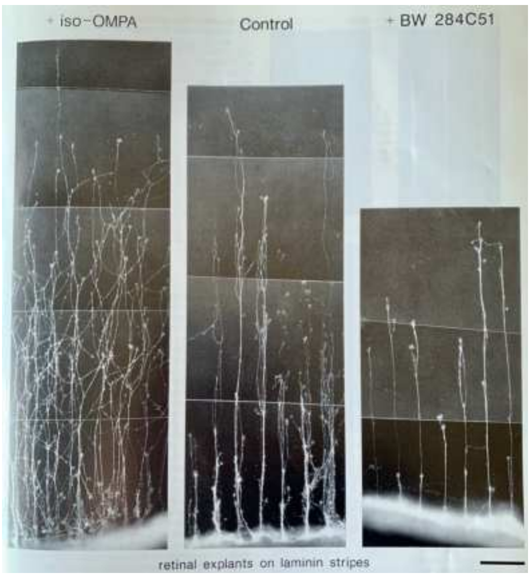
Layer PG (1991). Cholinesterases during development of the avian nervous system. Mol. & Cell. Neurobiology 11, 7-33.

ABB. 5 | CHOLINERGE MECHANISMEN IN DER RETINA



Modell cholinerger Musterbildung in der Wirbeltierretina. (Links) Zell- und plexiforme Schichten in der Retina des Hühnchens. (Mitte) AChE+ Zellen (rot) umhüllen die paarweise angeordneten ChAT+ *Starburst* Amakrinzellen mit ihren beiden synaptischen IPL Subbanden (grün). Die schematische Verteilung ist rechts gezeigt. Als Folge ergibt sich eine spezifische Verteilung von ACh über die Breite der Retina: ihre äußere Hälfte (Prolferationszone) ist frei von ACh; in der inneren Hälfte (Differenzierungszone) ist ACh auf die ChAT+ Zellen mit ihren Fortsätzen begrenzt. Dies bezeichnet den Beginn der komplexen IPL-Netzwerkbildung.

Layer PG, Weikert T, Alber R (1993). Cholinesterases regulate neurite growth of chick nerve cells in vitro by means of a non-enzymatic mechanism. Cell Tissue Res. 273, 219-226.



Retinal neurite growth is disturbed by cholinesterase inhibitors, revealing non-synaptic cholinergic functioning. Layer et al. 1993

Layer PG, Willbold E (1994). Cholinesterases in Avian Neurogenesis (invited review). Int. Rev. Cytol. 151, 139-181.
Layer PG, Willbold E (1995). Novel functions of cholinesterases in development,

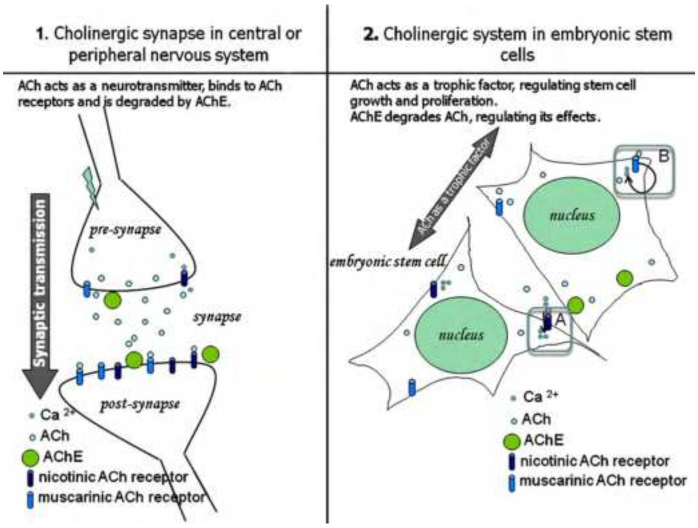
physiology and disease (invited monograph). Progr. Histochem. Cytochem. 29 (3), 1-94.

Layer PG (1995). Nonclassical roles of cholinesterases in the embryonic brain and possible links to Alzheimer disease. Alzheimer Disease & Assoc. Disorders Vol. 9 (suppl. 2), 29-36, invited paper.

Layer PG, Berger J, Kinkl N (1997). Cholinesterases announce "ON-OFF" channel dichotomy in the embryonic chick retina before onset of synaptogenesis. Cell Tissue Res. 288, 407-416.

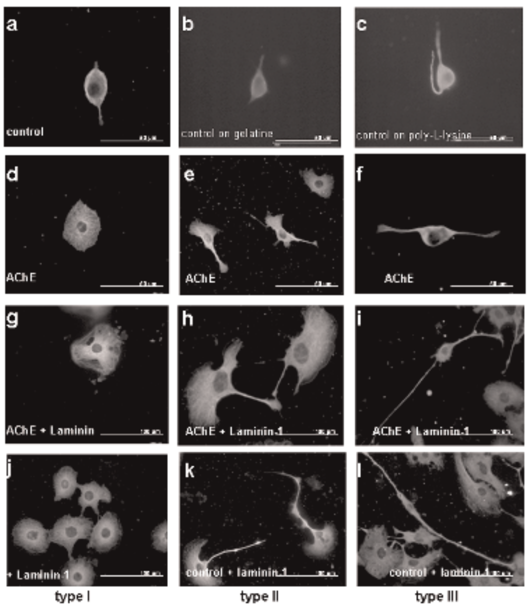
Weitnauer E, Ebert C, Hucho F, Robitzki A, Weise C, Layer PG (1999). Butyrylcholinesterase is complexed with transferrin in chicken serum. J. Prot. Chem. 18(2), 205-214.

Paraoanu LE, Layer PG (2004). Mouse acetylcholinesterase interacts in yeast with the extracellular matrix component laminin-1ß. FEBS Letters 576: 161-164.



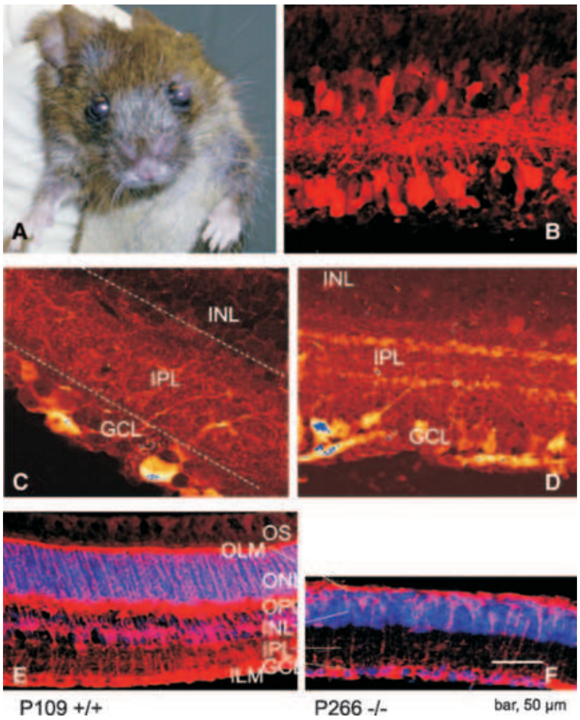
Classical and non-classical cholinergic functions: e.g., synaptic (left), trophic (right). Paraoanu et al. 2004

Paraoanu LE, Layer PG (2005). Mouse AChE binds in vivo to domain IV of laminin-1ß. Chem Biol Interact 157-158, 411-413.



AChE complexes with laminin: AChE overexpression on laminin-1 surface affects cell morphology and enhances neurite growth.
Paraoanu et al. 2012.

Bytyqi AH, Lockridge O, Duysen EG, Wang Y, Wolfrum U, Layer PG (2004). Impaired formation of the inner retina in an AChE knockout mouse results in degeneration of all photo-receptors. Eur. J. Neurosci. 20: 2953-2962.



Developmental functions of AChE as revealed in AChE KO mouse: (B) IPL formation in retina is disturbed; photo-receptors are slowly but vastly lost (F).
Bytyqi et al. 2007.

Boopathy R, Rajesh RV, Darvesh S, Layer PG (2007). Human serum cholinesterase from liver pathological samples exhibit highly elevated aryl acylamidase activity. Clinica Chimica Acta 380, 151-156.

Paraoanu L, Boutter J, Landgraf D, Barth M, Wessler I, Layer P (2007). Cholinesterases and cholinergic system in embryonic stem cell regulation: data on gene expression and functions. J Stem Cells Regen Med. 16;2(1):139. eCollection 2007.

Rajesh RV, Chitra L, Layer PG, Boopathy R (2009). The aryl acylamidase activity is much more sensitive to Alzheimer drugs than the esterase activity of acetylcholinesterase in chicken embryonic brain. Biochimie 91, 1087-1094.

Sperling LE, Spieker J, Willbold E, Layer PG (2020). Cholinerge Mechanismen fernab von Synapsen. Cholinesterasen mit Nebenjobs. Biol. unserer Zeit 5/2020, 318-330; doi:10.1002/biuz.202010714.

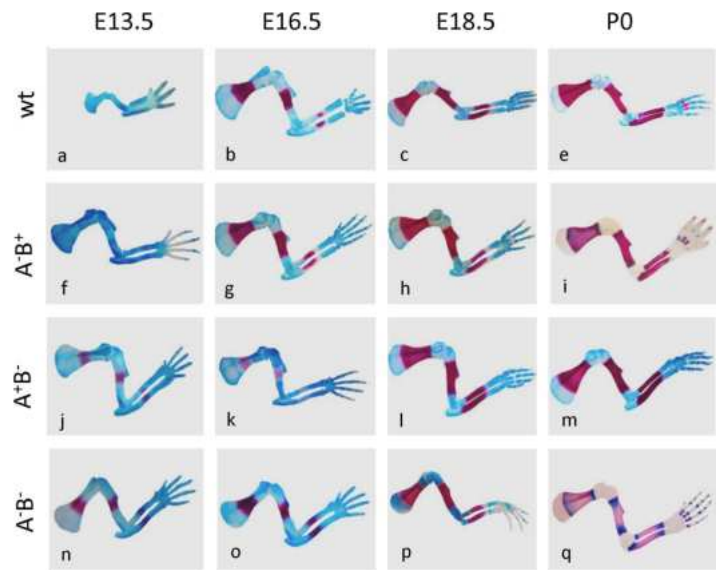
Bone Development & Cholinergic Functioning:

Spieker J, Ackermann A, Salfelder A, Vogel-Höpker A, Layer PG (2016). Acetylcholinesterase regulates skeletal in ovo development of chicken limbs by ACh-dependent and -independent mechanisms. PLoS One. 11(8):e0161675. doi: 10.1371/journal.pone.0161675.

Spieker J, Mudersbach T, Vogel-Höpker A, Layer PG (2017). Endochondral ossification is accelerated in cholinesterase-deficient mice and in avian mesenchymal micromass cultures. PLoS ONE, 12(1):e0170252. doi: 10.1371/journal.pone.0170252. eCollection 2017.

Spieker J, Frieß JL, Sperling L, Thangaraj G, Vogel-Höpker A, Layer PG (2020). Cholinergic control of bone development and beyond. Int Immuno-pharmacol. 83:106405.

doi: 10.1016/j.intimp .2020.106405.

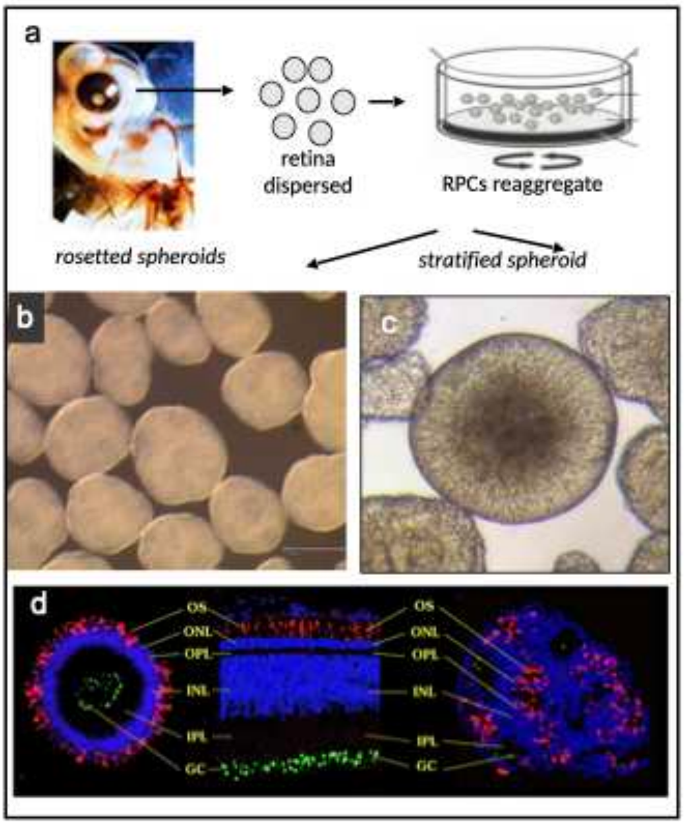


KO mouse mutants of AChE (A^-) & BCHE (B^-) present disturbed skeletal developments (Alizarin red = bone; Alcian blue = cartilage)

Retinal Reaggregates - Retinospheroids, Retinal Organoids:

Vollmer G, Layer PG, Gierer A (1984). Reaggregation of embryonic chick retina cells: pigment epithelial cells induce a high order of stratification. Neurosci. Letts. 48, 191-196.

Vollmer G, Layer PG (1986). An in vitro model of proliferation and differentiation of the chick retina: coaggregates of retinal and pigment epithelial cells. J. Neurosci. 6, 1885-1896.



A milestone in organoid technologies:
complete retinal tissue reconstitution by cell reaggregation (retinal spheroids). Factors from RPE or Müller glial cells induce complete retinal lamination (c), as was first documented in
Vollmer, Layer, Gierer 1984.

Layer PG, Willbold E (1989). Embryonic chicken retinal cells can regenerate all cell layers in vitro, but ciliary pigmented cells induce their correct polarity. Cell Tissue Res. 258, 233-242.

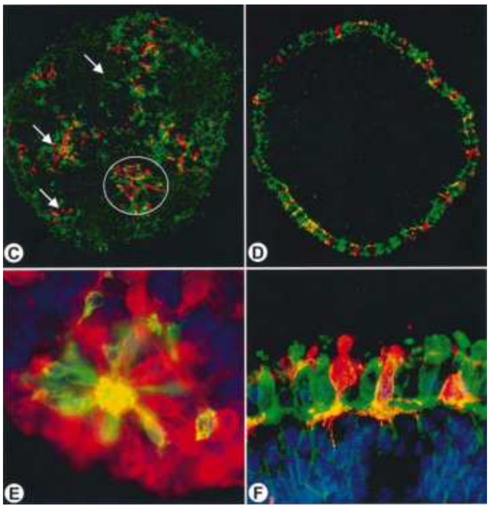
Layer PG, Alber R, Mansky P, Vollmer G, Willbold E (1990). Regeneration of a chimeric retina from single cells in vitro: cell-lineage-dependent formation of radial cell columns by segregated chick and quail cells. Cell Tissue Res. 259, 187-198.

Layer PG, Willbold E (1993). Histogenesis of the avian retina in reaggregation culture: from dissociated cells to laminar neuronal networks. Int. Rev. Cytol., 146, 1-47, Academic Press (invited review).

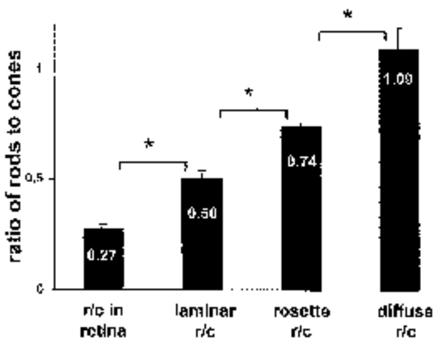
Layer PG, Willbold E (1994). Regeneration of the avian retina by Retinospheroid Technology (invited review). Prog. Ret. Res. 13 (1), 197-229.

Rothermel, A., Willbold, E., DeGrip, W.J., and P.G. Layer (1997). Pigmented epithelium induces complete retinal recon-stitution from fully dispersed embryonic chick retinae in reaggregation culture. Proc.R.Soc.London Ser.B, 264, 1293-1302.

Rothermel A, Layer PG (2001). Photoreceptor plasticity in reaggregates of embryonic chick retina: rods depend on proximal cones and on tissue organization. Eur J Neurosci 13, 949-958.



Ratio of rods (red) to RG-cones (green) increases as tissue organization decreases, approx. 1:1 in diffused areas (arrows in C). Rothermel & Layer 2001.

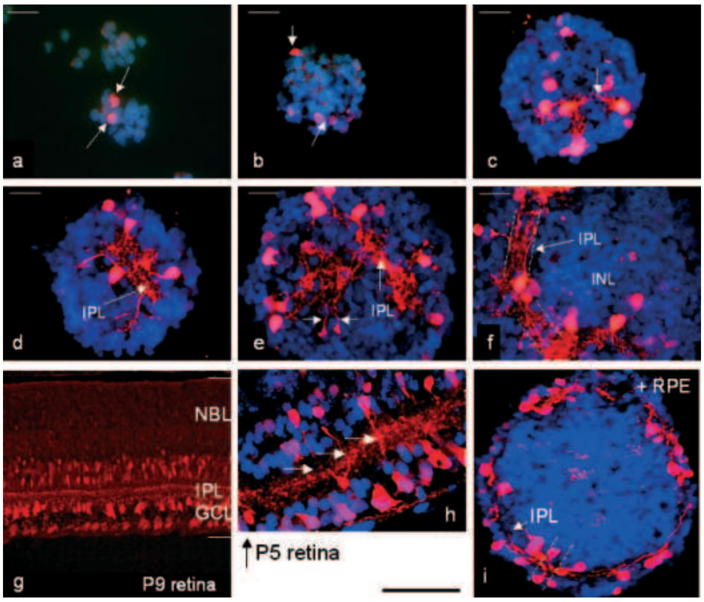


Layer PG, Rothermel A, Willbold E (2001). From stem cells towards neural layers: a lesson from re-aggregated embryonic retinal cells. NeuroReport 12(7), A39-46 (incl. cover picture).

Layer PG, Robitzki A, Rothermel A, Willbold E (2002). Of layers and spheres: the reaggregate approach in tissue engineering. Trends Neurosci. 25(3), 131-134.

Willbold E, Huhn J, Korf HW, Voisin P, Layer PG (2002). Light-dark and circadian rhythms are established de novo in reaggregates of the embryonic chicken retina. Dev Neurosci. 24(6), 504-11.

Bytyqi AH, Bachmann G, Rieke M, Paraoanu LE, Layer PG (2007). Cell-by-cell reconstruction in reaggregates from neonatal gerbil retina begins from the inner retina and is promoted by retinal pigmented epithelium. Eur J Neurosci 26, 1560-1574.



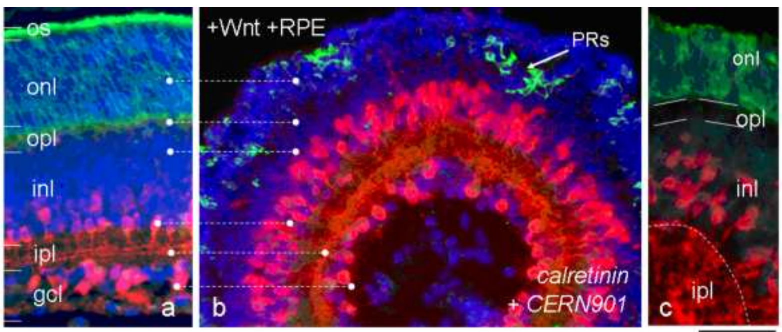
3D tissue formation from a rodent retina (Gerbil) is different, not beginning with rosette formation of photo-receptors as in avians, but with formation of an IPL by amacrine cells.
Bytyqi et al. 2007.

Layer PG, Araki M, Vogel-Höpker A (2010). New concepts for reconstruction of retinal and pigment epithelial tissues. Exp Rev Ophthalmol 5(4), 523-544.

Berchtold D, Fesser S, Bachmann G, Kaiser A, Eilert JC, Frohns F, Sadoni N, Muck J, Kremmer E, Eick D, Layer PG, Zink D(2011). Nuclei of chicken neurons in tissues and three-dimensional cell cultures are organized into distinct radial zones. Chromosome Res. 19(2): 165-182. Epub 2011 Jan 20.

Layer PG (2017). Ein biomedizinischer Durchbruch mit neuen Zellen und alter Technik: Humane Organoide. BIUZ 5/2017 (47), 312-318. DOI: 10.1002/biuz.201710630.

Rieke M, Bytyqi A, Frohns F, Layer PG (2018). Reconstructing mammalian retinal tissue: Wnt3a regulates laminar polarity in retinal spheroids from neonatal Mongolian rats, while RPE promotes cell differentiation. Int J Stem Cell Res Ther 5:051 Volume 5, Issue 1, DOI: 10.23937/2469-570X/1410051.



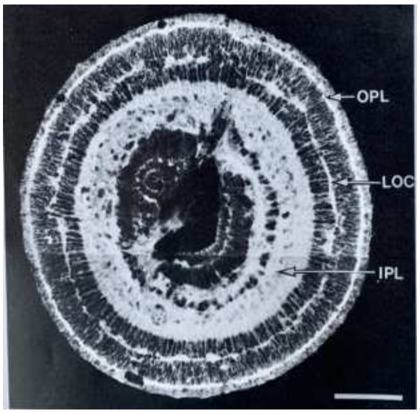
Nearly coomplete tissue reconstruction in spheroids from neonatal Gerbil (a rodent). Note differentiation of inner retina is far advanced, while that of outer retina is delayed. Rieke et al. 2018.

Bachmann G, Frohns F, Thangaraj T, Bausch A, Layer PG (2019). IPL sublamination in chicken retinal spheroids is initiated via Müller cells and cholinergic differentiation, and is disrupted by NMDA signaling. Invest Ophthalmol Vis Sci., 60(14): 4759-4773. doi: 10.1167/iovs.18-24952.

Developmental Functions of Radial Glia (Müller Glia Precursor Cells in Retinospheroids):

Wolburg H, Willbold E, Layer PG (1991). Müller glia endfeet, a basal lamina and the polarity of retinal layers form properly in vitro only in the presence of marginal pigmented epithelium. Cell Tissue Res. 264, 437-451.

Willbold, E. and Layer, P.G. (1992). Formation of neuroblastic layers in chicken retinospheroids: the fibre layer of Chievitz secludes AChE-positive cells from mitotic cells. Cell Tissue Res. 268, 401-408.



Evolutionary cryptic structures are revealed in chick retinal stratospheroids: here „Layer of Chievitz“ (LOC), which *in situ* has been detected only for a few mammals, but never for avians (staining: radial Müller glia).
Willbold & Layer 1992.

Willbold E, Reinicke M, Lance-Jones C, Lagenaur C, Lemmon V, Layer PG (1995). Müller glia stabilizes cell columns during retinal development: lateral migration but not neuropil growth is inhibited in mixed chick-quail retinospheroids. Eur. J. Neurosci. 7, 2277-2284.

Willbold E, Reinicke MKW, Layer PG (1996). Müller cell differentiation and column formation in chicken retinospheroids. J. Brain Res. 37, 228-229.

Willbold E, Mansky P, Layer PG (1996). Lateral and radial growth uncoupled in reaggregated retinospheroids of embryonic avian retina. Int. J. Dev. Biol. 40, 1151-1159.

Willbold E, Layer PG (1998). Müller glia cells and their possible roles during retina differentiation in vivo and in vitro (Invited review), Histol. Histopathol. 13, 531-552.

Willbold E, Tomlinson S, Rothermel A, Layer PG (2000). Müller glia cells reorganize rosettes to a laminar retina in reaggregation culture of the chick embryo, Glia 29, 45-57.

Willbold E, Rothermel A, Huhn J, Reinicke M, Layer PG (2001). Cerebellar glia cells induce a correct laminar organization in chicken retinal reaggregates. Cells Tissues Organs 169 (2), 104-112.

Keller M, Robitzki A, Layer PG (2001). Heterologous expression of acetylcholinesterase affects proliferation and glial cytoskeleton of adherent chicken retinal cells. Cell Tissue Res. 306, 187-198.

Bachmann G, Frohns F, Thangaraj T, Bausch A, Layer PG (2019). IPL sublamination in chicken retinal spheroids is initiated via Müller cells and cholinergic differentiation, and is disrupted by NMDA signaling. Invest Ophthalmol Vis Sci., 60(14): 4759-4773. doi: 10.1167/iovs.18-24952.

Growth Factors in 2D- and 3D Cell Cultures - NGF, EGF, FGF, IGF, CNTF, GDNF, PEDF:

Gunning PW, Landreth GE, Layer P, Ignatius M, Shooter EM (1981). Nerve Growth Factor-induced differentiation of PC12 cells: Evaluation of changes in RNA and DNA-metabolism. J. Neurosci. 1, 368-379.

Landreth GE, Yankner BA, Layer P, Shooter EM (1982). The Role of Nerve Growth Factor in the Generation of Nerve Fibers. In: Disorders of the Motor Unit. (Ed. D. Shotland), Wiley and Sons, N.Y., 143-156.

Layer PG, Shooter EM (1983). Binding and degradation of Nerve Growth Factor by PC12 pheochromocytoma cells. J. Biol. Chem. 258, 3012-3018.

Rothermel A, Layer PG (2003). GDNF regulates chicken rod photoreceptor development and survival in reaggregated histotypic retinal spheres. Invest Ophthalmol Vis Sci. 44, 2221-2228.

Seydewitz V, Rothermel A, Schneider A, DeGrip WJ, Layer PG, Hofmann HD (2004). Expression of CNTF receptor in chick violet-sensitive cones with unique morphological properties. Invest. Ophthalmol. Vis. Sci. 45(2): 655-661.

Rothermel A, Volpert K, Huhn J, Stotz-Reimers M, Schlichting R, Robitzki AA, Layer PG (2004). Spatial and temporal expression patterns of GDNF family receptor alpha4 in the developing chicken retina. Gene Expr Patterns 4(1): 59-63.

Rothermel A, Volpert K, Burghardt M, Lantzsch C, Robitzki AA, Layer PG (2006). Knock-down of GFRα4 expression by RNA interference affects the development of retinal cell types in three-dimensional histiotypic retinal spheres. Invest. Ophthalmol. Vis. Sci. 47, 2716-2725.

Araki M, Suzuki H, Layer P (2007). Differential enhancement of neural and photoreceptor cell differentiation of cultured pineal cells by FGF-1, IGF-1 and EGF. Devel Neurobiol. 67(12), 1641-54.

Volpert KN, Rothermel A, Layer PG (2007). GDNF stimulates rod photoreceptors and dopaminergic amacrine cells in chicken retinal reaggregates. Invest. Ophthalmol. Vis. Sci. 48, 5306-5314.

Volpert KN, Tombran-Tink J, Barnstable C, Layer PG (2009). PEDF and GDNF are key regulators of photoreceptor development and retinal neurogenesis in reaggregates from chick embryonic retina. J Ocul Biol Dis Inform, 2:1-11.

Frohns F, Mager M, Layer PG (2009). FGF-2 increases the precursor pool of photoreceptors, but inhibits their differentiation and apoptosis in chicken retinal reaggregates. Eur J Neurosci 29, 1931-1942.

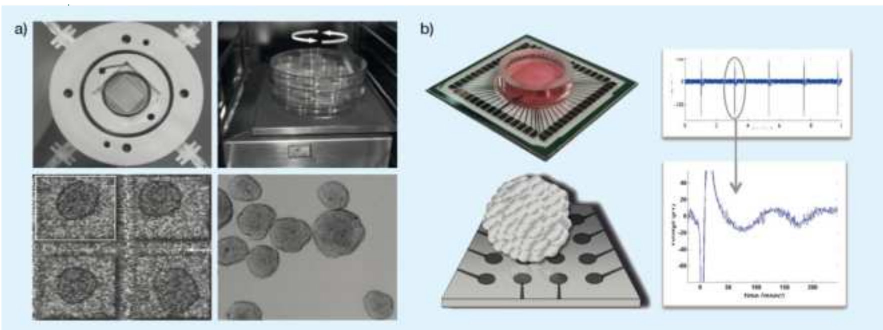
Thangaraj G, Bachmann G, Christophel J, Greif A, Layer PG (2015). PEDF counteracts DL-α-aminoadipate toxicity and rescues gliotic damages in RPE-free chicken retinal explants. Exp Eye Res. 134:111-22. doi: 10.1016/j.exer.2015.02.010.

Medical & Technical Applications of Organoids and Explants (In vitro-Methoden für die Anwendung):

Layer PG (2005). Mit Stammzellen und Tissue Engineering zu Netzhaut-implantaten. In: Bionik - Aktuelle Forschungsergebnisse in Natur-, Ingenieur- und Geisteswissenschaft. Rossmann T, Tropea C (Hg.), Springer-Verlag, ISBN: 3-540-21890-4, pp. 439-449.

Rothermel A, Biedermann T, Weigel W, Kurz R, Rüffer M, Layer PG, Robitzki AA (2005). Artificial design of 3D retina-like tissue from dissociated cells of the mammalian retina by rotation-mediated cell aggregation. Tissue Engineering 11, 1749-1756.

Rieke M, Gottwald E, Weibezahn KF, Layer PG (2008). Tissue reconstruction in 3D-spheroids from rodent retina in a motion-free, bioreactor-based microstructure. Lab Chip 8(12): 2206-2213.



Organoide eignen sich als biomedizinische Testsysteme, die ausgehend von humanen iPSCs bis hin zu patienten-spezifischer Medikamentenentwicklung einsetzbar werden könnten. a) Einzelne Retinosphäroide aus Embryos des Huhn oder der Maus, in Mikrokavitäten eines Durchfluss-Bioreaktors gehalten, eignen sich für pharmakologische Serienuntersuchungen. Bild: aus Lab Chip 2008, 8, 2206-2213. **b) Einzelne Retinosphäroide aus dem Hühnerembryo auf MEA-Chip können elektrophysiologisch analysiert werden.** Bild: aus Sens. & Actuat. B, 2012, 165, 53–58.

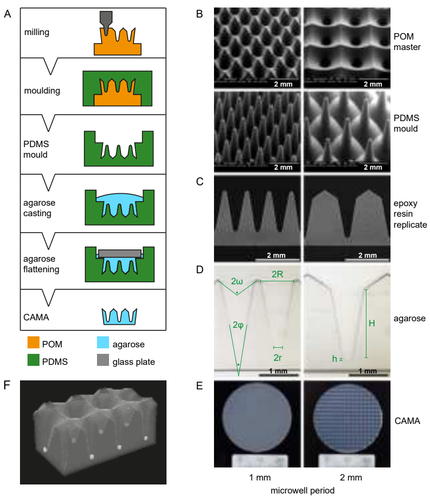
Spheroids provide excellent tools for biomedical high throughput applications; e.g., replacing animal experimentation. Review, Layer 2024.

Daus A, Goldhammer M, Layer PG, Thielemann C (2011). Electromagnetic exposure of scaffold-free three-dimensional cell culture systems. Bioelectro-magnetics 32(5): 351-359. doi: 10.1002/bem.20649. Epub 2011 Jan 28.

Thangaraj G, Greif A, Layer PG (2011). Simple explant culture of the embryonic chicken retina with long-term preservation of photoreceptors. Exp Eye Res 93(4): 556-564.

Daus AW, Layer PG, Thielemann C (2012). A spheroid-based biosensor for the label-free detection of drug-induced field potential alterations. Sensors and Actuators B, 165, 53-58.

Thomsen AR, Aldrian C, Heselich A, Melin N, Rücker G, Bronsert P, Thomann Y, Follo M, Nanko N, Grosu AL, Niedermann G, Layer PG, Lund PG (2018). A deep conical agarose microwell array for adhesion independent three-dimensional cell culture and dynamic volume measurement. Lab on a chip, 18(1): 179-189. doi: 10.1039/c7lc00832e.



Adaptations of cell culture conditions expands applicabilities of 3D cell structures. Here: development of novel agarose culture microwell containers.
Thomsen et al. 2018.

Layer, PG (2024). In a century from agitated cells to human organoids. J. Neurosci. Meth. 405, 110083; doi.org/10.1016/j.jneumeth.2024.110083.

Radiation Biology:

Seo S, Stintzing T, Block ID, Pavlidis D, Rieke M, Layer PG (2008). Wideband complex permittivity measurements of liquids up to 32 GHz using coplanar waveguides and application to cell suspensions. Microwave Symposium Digest, 2008 IEEE MTT-S, 915-918. Doi: 10.1109/MWSYM.2008.4632982.

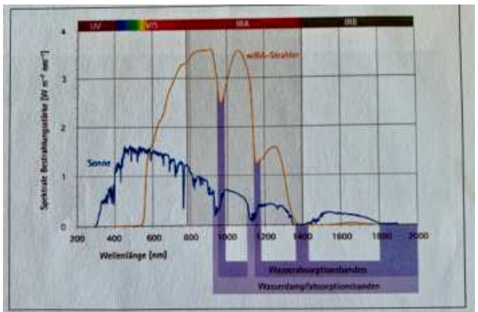


Abb. 1 Vergleich der Spektren eines Strahlers für wassergefiltertes Infrarot A [wIRA] und der Sonne. Beide Spektren zeigen die Verminderung der Bestrahlungsstärke durch die in diesem Bereich erhöhte Absorption durch Wasser. Der Filtereffekt der in der Atmosphäre auf Wasserdampf zurückzuführen ist, wird beim wIRA-Strahler durch den Einsatz eines Wasserfilters hervorgerufen und ermöglicht eine Bestrahlung der Patienten mit hohen Dosen ohne schmerzhafte Erwärmung des Gewebes.

Water-filtered near infrared (WIRA) radiation has high impact on cell physiology; its prospects for wound healing are excellent. Heselich et al. 2012.

Heselich A, Frohns F, Frohns A, Naumann SC, Layer PG (2012). Near-infrared exposure changes cellular responses to ionizing radiation. Photochem. Photobiol, 88(1): 135-146. doi: 10.1111/j.1751-1097.2011.01031.x.

Frieß J, Heselich A, Ritter S, Haber A, Kaiser N, Layer PG, Thielemann C (2015). Electrophysiological and Cellular Characteristics of Cardiomyocytes after X-ray Irradiation. Mutation Res., 777:1-10. doi: 10.1016/j.mrfmmm.2015.03.012.

Simoniello P, Wiedemann J, Zink J, Thönnes E, Stange M, Layer PG, Kovacs M, Podda M, Durante M, Fournier C (2016). Exposure to carbon ions triggers pro-inflammatory signals, changes in homeostasis and epidermal tissue organization to a similar extent as photons. Frontiers Oncol. Vol. 5, Article 294; doi: 10.3389/fonc.2015.00294, 1-13.

Thangaraj G, Manakov V, Cucu A, Fournier C, Layer PG (2016). Inflammatory effects of TNFα are counteracted by X-ray irradiation and AChE inhibition in mouse micromass cultures. Chem Biol Interact. 259(Pt B):313-318doi: 10.1016/ j.cbi.2016.03.027.

2 G. Thangaraj et al. / Chemico-Biological Interactions xxx (2016) 1–6

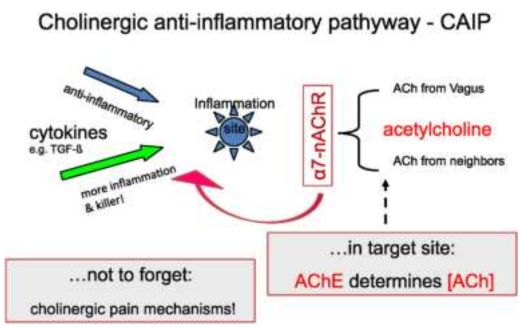


Fig. 1. Schematic action of cholinergic anti-inflammatory pathway (CAIP) in inflammation. Non-neuronal ACh acting via α7-nAChRs is considered to counteract inflammatory cytokines, like TNF-α, in order to balance inflammation and pain reactions. What is often neglected, is a major role of AChE in this process, since its presence or absence at the site of action will determine the effective ACh concentration.

Non-classsical cholinergic actions in inflammation: the CAIP acts via the α7-nicotinic AChR.

Mayer M, Kaiser N, Layer PG, Frohns F (2016). Cell Cycle Regulation and Apoptotic Responses of the Embryonic Chick Retina by Ionizing Radiation. PLOS One, 11(5):e0155093. doi:10.1371/journal. pone.0155093.

Heselich A, Frieß JL, Ritter S, Benz NP, Layer PG, Thielemann C (2018). High LET Radiation Shows no Major Cellular and Functional Effects on Primary Cardiomyocytes in Vitro. Life Sci Space Res.16:93-100. doi.org/10.1016/j.lssr.2018.01.001.

König A, Zöller N, Kippenberger S, Bernd A, Kaufmann R, Layer PG, Heselich A (2018). Non-thermal Near-infrared Exposure Photobiomodulates Cellular Responses to Ionizing Radiation in Human Full Thickness Skin Models. J Photochem Photobiol B: Biology, 178, 115-123. DOI 10.1016/j.photobiol.2017.11.003.

Photoaffinty Labeling (PhD work, 1976):

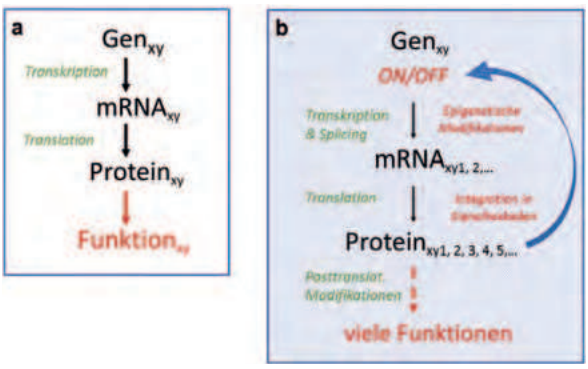
Layer PG (1976). Struktur- und Funktionsuntersuchungen von cholinergen Proteinen mit einem Photoaffinitätsreagenz. Dissertation, Universität Konstanz. (Erste erfolgreiche Photoaffinitätsmarkierung eines biol. System).

Hucho F, Layer P, Kiefer HR, Bandini G (1976). Photoaffinity Labeling and Quarternary Structure of the Acetylcholine Receptor from Torpedo californica. Proc. Natl. Acad. Sci., USA, 13, 2624-2628.

Layer P, Kiefer HR, Hucho F (1976). Selective Labeling of Anionic Sites of the Acetylcholine Esterase from Torpedo californica with a photoaffinity label. Mol. Pharmacol., 12, 958-965.

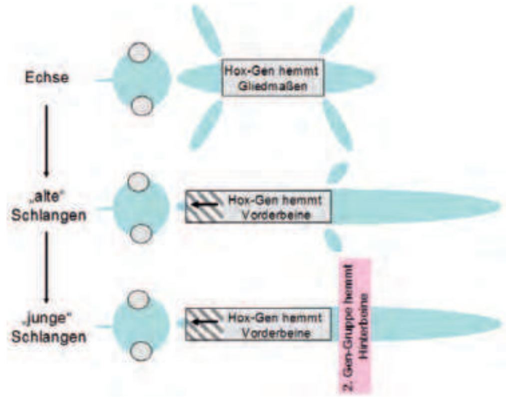
Evolutionary Theory - EvoDevo & Epigenetics:

Layer PG (2009). EvoDevo: die molekulare Entwicklungsbiologie als Schlüssel zum Verständnis der Evolutionstheorie. Zeitschrift für Pädagogik und Theologie 61. Jhg. (ZPT 4/09), S. 322- 333.



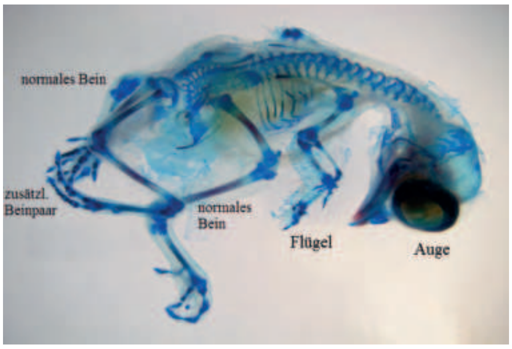
Genetic determinism is false: Gene expression mechanisms are more complex than originally thought. Hence, the neodarwinistic *Standard Evolutionary Theory* (SET) needs an overhaul towards EET (*Extended Evolutionary Theory*).

Layer PG (2009). Doppelkopf und Schrumpfbein. Evolutionsspiele im Embryo. labor&more 05/09, S. 34-38; (mit Übersetzungen in Englisch, Französisch und Russisch).



Macroevolutionary step from saurians to snakes (simplified): only a few mutations of particular homeobox genes are required.

Layer PG (2010). Evolution - ein offenes Konzept. In: Über Darwin hinaus?! Die unabgeschlossene Geschichte des naturwiss. Fortschritts (Hg. F. Vogelsang, H. Meisinger). Ev. Akademie im Rheinland - Begegnungen 25, S. 133- 152. ISBN 978-3-937621-32-6.



Chick embryo having an extra pair of legs, possibly caused by hormonal effects. Note: strucure of extra legs is normal.

Layer PG (2013). „Life" shaped by genes that depend on their surrounds. In: Annals of the History and Philosophy of Biology, Vol. 16 (2011), 153-170. ISSN 1863-0197, Universitätsverlag Göttingen.

Layer PG (2019). Brains emerging: On Modularity and Self-organisation of Neural Development In Vivo and In Vitro, pg. 145-170, in: Emergence and Modularity in Life Sciences (eds. U. Lüttge, L.H. Wegner), ISBN 978-3-030-06127-2; doi.org/10.1007/978-3-030-06128-9.

Layer PG, Lüttge U (2020). Faden oder Kugel und die Landnahme von Flora und Fauna. Naturwiss. Rundschau 73 (12), 500-513.

Layer PG (2021). Postgenomik, Evo-Devo und die Wiederkehr teleologischer Ideen. Naturwiss. Rundschau 74(5), S. 228-237.

Layer PG (2022). Post-Genomics, Evo-Devo and the recurrence of teleologic thought. Review. BIOCOSMOS 1, 12-25. DOI: 10.2478/biocosmos-2022-0002.

Science in Public, Philosophy, Religion:

Layer PG (1987). Ein Aufenthalt im neuen Gästelabor der MPG am Institut für Zellbiologie in Shanghai: Eindrücke zur Neubelebung der biologischen Forschung in China sowie der deutsch-chinesischen Wissenschaftsbeziehungen. MPG-Spiegel 2/87.

Layer PG (1987). Hoffen auf die postrevolutionäre Generation. Ein Aufenthalt im neuen

Gästelabor der Max-Planck-Gesell-schaft am Institut für Zellbiologie in Shanghai. China-Report Nr. 4, 15-18.

INSTITUTSAUSFLUG: Unser Bild zeigt die »Graduate Students« vom »Shanghai Institute of Cell Biology« zusammen mit Dr. Gerald Hansmann (hintere Reihe 4. v.r.) und Dr. Paul G. Layer (hinten 5. v.r.) vom MPI für Entwicklungsbiologie, Autor dieses MPG-Spiegel-Beitrags, mit einer Buddha-Kette, die ihm die chinesischen Studenten umgehängt hatten.

Fotos: Privatbesitz Layer

Layer PG (2003). Der biomedizinische Fortschritt. In: Zukunfts-orientierte Wissenschaft. Prospektive Wissenschafts- und Technikbewertung (Hg. W. Bender, J.C. Schmidt). Darmstädter Interdisziplinäre Beiträge 8. Agenda Verlag. ISBN 3-89688-199-X. S. 63-75.

Layer PG (2003). Zu Evolution und Entwicklung von Hirn und Bewusstsein. Über Zellen und neuronale Netze zu Qualia. In: Der Entthronte Mensch? Anfragen der Neurowissenschaften an unser Menschenbild. (Hg., J.C. Schmidt, L. Schuster), Menthis-Verlag, Paderborn, S. 79-96.

Layer PG (2005). Vernünftiges und vernünftig Vermutetes zu Gehirn, Geist und Gott. In: Gott - Geist - Gehirn. Religiöse Erfahrungen im Lichte der neuesten Hirnforchung. (Hg. W. Achtner, H. Düringer, H. Meisinger, W.R Schmidt), Arnoldshainer Texte No. 133, Haag+Herrchen Verlag, ISBN 978-3-89846-494-9. S. 134-161.

Layer PG (2007). Was ist Leben? - Von Zellen und anderen Lebewesen zwischen Genkonstanz und Umweltvarianz . In: „Der etwas andere Blick auf die Schöpfung“ (Hg. H. Düringer, H. Meisinger, W.R. Schmidt), Arnoldshainer Texte No. 136, Haag+Herrchen Verlag, ISBN 978-3-89846-494-9, S. 102-116.

Layer PG (2014). Wege eines Beutelsbacher Biologen: vom Glauben zum Wissen und wieder zurück. Die Turmuhr, Gemeinde-brief der Ev. Kirchengemeinde Beutelsbach, Nr. 62, S. 17-19. (Bericht W. Birkenmaier & P.G. Layer).

Layer PG (2013). Des Menschen Hirn - eine von Qualia gequälte Maschine? In: Evangelium und Wissenschaft. Beiträge zum interdisz. Gespräch (Hg. Karl-Heim-Gesellschaft). 34. Jg. 2012, Heft 2, ISSN 0934-0769, S. 66-81.

Layer PG (2015). “Das Andere der Natur” (Eine Abhandlung über das gleichnamige Buch von JC Schmidt im Hirzel-Verlag, 2015). UNIVERSITAS Nr. 830, 70. Jg., S. 62-73.

Brickmann J, Layer PG (2015). Die Niederkunft flüchtiger Geister. Aromen des Odenwalds. labor&more 7.15, S. 50-55.

Layer PG (2022). Wirklichkeit, Wissenschaft und Ethik in Notzeiten. In: Freies Christentum. 74. Jhg., Heft 5, Sept/Okt. 2022, S. 115-129.

Layer PG (2023). Panta rhei - alles fließt. In: Freies Christentum. Auf der Suche nach neuen Wegen. 75. Jg. - Heft 1, Jan/Feb 2023, ISSN 0931-3834. S. 15-18.