

CURRICULUM VITAE

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Department of Biomedicine
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SCIENTIFIC CAREER

Department of Biomedicine, University of Basel

Since 2015 Privatdozentin in the Medical Faculty, University of Basel
Since 2007 Research Group Leader, Developmental Genetics together with Prof. Rolf Zeller <http://www.devqenbasel.com/>
Since 2003 Tenured Senior Scientist in the Medical Faculty, University of Basel

Department of Developmental Biology, University of Utrecht, The Netherlands

2002 to 2003 Tenure track Fellow of the Dutch Royal Academy of Sciences
1999 to 2001 Senior researcher

Developmental Biology Program, EMBL, Heidelberg, and at the University of Heidelberg

1994 to 1998 Postdoctoral fellow

EDUCATION

1990 to 1994 PhD research in the Differentiation Program at EMBL. PhD thesis from the University Paris XI-Orsay on "A Novel Fibroblast Growth Factor-2 Isoform and its Possible Roles during Avian Embryogenesis" with "Mention très honorable avec les félicitations du jury" (Highest grade in the French system).

1985 to 1990 Undergraduate studies at the University Paris XI-Orsay with Profs. Jean-Luc Rossignol and André Adoutte. Graduated in Molecular Biology, Biochemistry, Genetics and Developmental Biology.

Fellowships

2002 Fellowship from the Dutch Royal Academy of Sciences (KNAW). Carrier development award (tenure track).
1990 EMBL 4-year PhD fellowship awarded by the European Molecular Biology Laboratory, Heidelberg, Germany.
1989 D.E.A scholarship, awarded for academic merits.

ADDITIONAL ACTIVITIES

Peer review for various national grant agencies (e.g. France, Belgian, Israel, Czech Republic)
Peer review for journals including *Nature Communications*, *Nature Ecology and Evolution*, *Developmental Cell*

Board member of Animal Research Tomorrow <https://animalresearchtomorrow.org/>

Science communication (e.g. interviews, hosting Gymnasium pupils, sharing science on social media Twitter handler: @aimeezun)

HONORS

2020: Elected Fellow of the Royal Society of Biology

TEACHING EXPERIENCE

Undergraduate teaching Utrecht University 1998-2003

Undergraduate teaching at the Basel Medical Faculty since 2006

Graduate student program common to the faculties of biology and medicine

Supervision of PhD students and Master students since 1998

Master students

Utrecht University

Gwen Soete

Silwia Kuc

University of Basel

Rushiketh Seth,

Patric Schlenker,

Vivian Tschan

PhD students

Utrecht University

Odyssé Michos

Lia Panman

University of Basel

Simone Probst

Frédéric Laurent

Julie Gamart

Laurène Ramos Martin

Ausra Girdziusaite

Jonas Malkmus

Victorio Palacio

Geoffrey Soussi

PhD jury member at other universities

Vardina Bensoussan (Pasteur Institute/Université Paris 6)

Zeba Malik (University of Zürich)

Marc Fernandez Guerrero (University of Santander)

Leibniz mentoring (2017-2018). Mentor in the Leibniz mentoring program

INVITED SPEAKER (*) and SELECTED TALKS

1. Guest Seminar, University of Alberta, Canada (2023)
2. 13th BMP International Conference on Bone Morphogenetic Proteins*, Dubrovnik, Croatia (2022)
3. 16th International Conference on Limb Development and Regeneration*, Cambridge, Massachusetts, USA (2022).
4. Limb Development and Regeneration: New Tools for a Classic Model System EMBO Workshop*, Barcelona, Spain (2019).
5. Guest Seminar, Leibniz-Institut für Evolutions- und Biodiversitätsforschung, Berlin (2018).
6. EuroEvoDevo 2018, Galway, Ireland.
7. FELASA*, Brussels, Belgium (2016).
8. 13th International Limb Development & Regeneration Conference*, St. Petersburg, USA (2015).
9. Symposium "Osteoarthritis -The Challenge"*, Berlin, Germany (2014).
10. 17th International Congress of Developmental Biology, Cancun, Mexico (2013).
11. ACFAS Congress*, Montreal, Canada (2010).
12. 11th International Conference on Limb Development and Regeneration, Williamsburg, Virginia (2010).
13. Guest Seminar, Pasteur Institute (2009).
14. International Limb Conference, Awaji, Japan (2006).
15. Juan March Workshop "Developmental Mechanisms in Vertebrate Organogenesis", Madrid, Spain (2003).
16. 30th Conference of the European Teratology Society*, Hannover, Germany (2002).
17. 61st Society of Developmental Biology Annual Meeting, Madison, U.S.A. (2002).
18. Guest Seminar*, University of Heidelberg (2001).
19. Workshop: The Evolution of Signalling Centres*, Darmstadt, Germany (2001).
20. Euro Conference on the Genetic Control of Morphogenesis, San Feliz de Guixols, Spain. Awarded an ESF travel grant (2000).
21. Mouse Molecular Genetics (1999), Heidelberg, Germany.
22. 6th International Limb Development and Regeneration Conference (1998), Sun Valley, USA.
23. 13th International Congress of Developmental Biology (1997), Snowbird, USA.
24. Mouse Molecular Genetics (1997), Heidelberg, Germany.

CONFERENCE ORGANISER

2024: 17th International Conference on Limb Development and Regeneration, Dresden, Germany (co-organiser)

2014-present: Tri-Regional Stem Cell and Developmental Biology Meeting (annual meeting)
<http://www.devstemcell.org/home/>

2013-present: Basel Declaration/Animal Research Tomorrow Conferences (co-organiser)

PUBLICATIONS

h-index: 26, number of citations: 5619 (source: [google scholar](#))

The six most recent publications

1. Losa M., Barozzi I., Osterwalder O., Hermosilla-Aguayo V., Morabito A., Chacon B., Zarrineh P., Girdziusaite A., Benazet JD, Zhu J., Mackem S., Capellini T., Dickel D., Bobola N., **Zuniga A.**, Visel A., Zeller R., Selleri L. (Accepted). Spatio-temporally constrained gene regulatory network directed by PBX1/2 acquires limb patterning specificity via HAND2
2. Gamart, J., I. Barozzi, F. Laurent, R. Reinhardt, L. R. Martins, T. Oberholzer, A. Visel, R. Zeller and **A. Zuniga** (2021). "SMAD4 target genes are part of a transcriptional network that integrates the response to BMP and SHH signaling during early limb bud patterning." *Development* **148**(23): dev200182.
3. Malkmus, J., L. Ramos Martins, S. Jhanwar, B. Kircher, V. Palacio, R. Sheth, F. Leal, A. Duchesne, J. Lopez-Rios, K. A. Peterson, R. Reinhardt, K. Onimaru, M. J. Cohn, **A. Zuniga** and R. Zeller (2021). "Spatial regulation by multiple Gremlin1 enhancers provides digit development with cis-regulatory robustness and evolutionary plasticity." *Nature Communications* **12**(1): 5557.
4. Jhanwar, S., J. Malkmus, J. Stolte, O. Romashkina, **A. Zuniga** and R. Zeller (2021). "Conserved and species-specific chromatin remodeling and regulatory dynamics during mouse and chicken limb bud development." *Nature Communications* **12**(1): 1-17.
5. **Zuniga, A.** and R. Zeller (2020). "Dynamic and self-regulatory interactions among gene regulatory networks control vertebrate limb bud morphogenesis." *Current Topics in Developmental Biology* **139**: 61-88.
6. Elliott, K. H., X. Chen, J. Salomone, P. Chaturvedi, P. A. Schultz, S. K. Balchand, J. D. Servetas, **A. Zuniga**, R. Zeller and B. Gebelein (2020). "Gli3 utilizes Hand2 to synergistically regulate tissue-specific transcriptional networks." *ELife* **9**: e56450.

The six most cited publications

source Google scholar May 2023

1. Mundel, P., J. Reiser, **A. Zuniga** Mejia Borja, H. Pavenstädt, G. R. Davidson, W. Kriz and R. Zeller (1997). "Rearrangements of the cytoskeleton and cell contacts induce process formation during differentiation of conditionally immortalized mouse podocyte cell lines." *Experimental Cell Research* **236**(1): 248-258. **1039 citations.**
2. Clement-Jones, M., S. Schiller, E. Rao, R. J. Blaschke, **A. Zuniga**, R. Zeller, S. C. Robson, G. Binder, I. Glass and T. Strachan (2000). "The short stature homeobox gene SHOX is involved in skeletal abnormalities in Turner syndrome." *Human Molecular Genetics* **9**(5): 695-702. **551 citations.**
3. **Zuniga, A.**, A.-P. G. Haramis, A. P. McMahon and R. Zeller (1999). "Signal relay by BMP antagonism controls the SHH/FGF4 feedback loop in vertebrate limb buds." *Nature* **401**(6753): 598-602. **506 citations.**
4. Zeller, R., J. López-Ríos and **A. Zuniga** (2009). "Vertebrate limb bud development: moving towards integrative analysis of organogenesis." *Nature Reviews Genetics* **10**(12): 845-858. **467 citations.**
5. Michos, O., L. Panman, K. Vintersten, K. Beier, R. Zeller and **A. Zuniga** (2004). "Gremlin-mediated BMP antagonism induces the epithelial-mesenchymal feedback signaling controlling metanephric kidney and limb organogenesis." *Development* **131**(14): 3401-3410. **403 citations.**
6. Welscher, P. t., **A. Zuniga**, S. Kuijper, T. Drenth, H. J. Goedemans, F. Meijlink and R. Zeller (2002). "Progression of Vertebrate Limb Development Through SHH-Mediated Counteraction of GLI3." *Science* **298** (5594): 827-830. **397 citations.**

The six most relevant reviews

1. **Zuniga A.** and Zeller R. (2020). "Dynamic and self-regulatory interactions among gene regulatory networks control vertebrate limb bud morphogenesis." *Current Topics in Developmental Biology*. doi: 10.1016/bs.ctdb.2020.02.005
2. **Zuniga A.** (2015). "Next generation limb development and evolution: old questions, new perspectives." *Development* 142:3810-3820; doi:10.1242/dev.125757.
3. **Zuniga A.** and Zeller R. (2014). "In Turing's hands—the making of digits." *Science* 345(6196): 516-7.
4. **Zuniga A.**, Zeller, R. and Probst, S. (2012). "The molecular basis of human congenital limb malformations." *Wiley Interdisciplinary Reviews: Developmental Biology* 1(6): 803-822.
5. Zeller R., Lopez-Rios J. and **Zuniga A.** (2009). "Vertebrate limb bud development: moving towards integrative analysis of organogenesis." *Nature Reviews Genetics* 10, 845-858.
6. Zeller, R. and **Zuniga, A.** (2007). "*Shh* and *Gremlin1* chromosomal landscapes in development and disease." *Current Opinion in Genetics & Development* 17, 428-434.

LANGUAGES SPOKEN

French (mother tongue), English (excellent), German (fluent), Spanish (good)

HOBBIES

Argentine tango, Amateur theatre

COMPLETE PUBLICATION LIST

Links to publications can be found at [@orcid](#)

1. Losa M., Barozzi I., Osterwalder O., Hermosilla-Aguayo V., Morabito A., Chacon B., Zarrineh P., Girdziusaite A., Benazet JD, Zhu J., Mackem S., Capellini T., Dickel D., Bobola N., Zuniga A., Visel A., Zeller R., Selleri L. (Accepted). Spatio-temporally constrained gene regulatory network directed by PBX1/2 acquires limb patterning specificity via HAND2
2. Gamart, J., I. Barozzi, F. Laurent, R. Reinhardt, L. R. Martins, T. Oberholzer, A. Visel, R. Zeller and **A. Zuniga** (2021). "SMAD4 target genes are part of a transcriptional network that integrates the response to BMP and SHH signaling during early limb bud patterning." *Development* **148**(23): dev200182.
3. Malkmus, J., L. Ramos Martins, S. Jhanwar, B. Kircher, V. Palacio, R. Sheth, F. Leal, A. Duchesne, J. Lopez-Rios, K. A. Peterson, R. Reinhardt, K. Onimaru, M. J. Cohn, **A. Zuniga** and R. Zeller (2021). "Spatial regulation by multiple Gremlin1 enhancers provides digit development with cis-regulatory robustness and evolutionary plasticity." *Nature Communications* **12**(1): 5557.
4. Jhanwar, S., J. Malkmus, J. Stolte, O. Romashkina, **A. Zuniga** and R. Zeller (2021). "Conserved and species-specific chromatin remodeling and regulatory dynamics during mouse and chicken limb bud development." *Nature Communications* **12**(1): 1-17.
5. **Zuniga, A.** and R. Zeller (2020). "Dynamic and self-regulatory interactions among gene regulatory networks control vertebrate limb bud morphogenesis." *Current Topics in Developmental Biology* **139**: 61-88.
6. Elliott, K. H., X. Chen, J. Salomone, P. Chaturvedi, P. A. Schultz, S. K. Balchand, J. D. Servetas, **A. Zuniga**, R. Zeller and B. Gebelein (2020). "Gli3 utilizes Hand2 to synergistically regulate tissue-specific transcriptional networks." *ELife* **9**: e56450.
7. Reinhardt, R., F. Gullotta, G. Nusspaumer, E. Ünal, R. Ivanek, **A. Zuniga** and R. Zeller (2019). "Molecular signatures identify immature mesenchymal progenitors in early mouse limb buds that respond differentially to morphogen signaling." *Development* **146**(10): dev.173328.
8. Knickmeyer, M. D., J. L. Mateo, P. Eckert, E. Roussa, B. Rahhal, **A. Zuniga**, K. Kriegstein, J. Wittbrodt and S. Heermann (2018). "TGFβ-facilitated optic fissure fusion and the role of bone morphogenetic protein antagonism." *Open Biology* **8**(3).
9. Laurent, F., A. Girdziusaite, J. Gamart, I. Barozzi, M. Osterwalder, J. A. Akiyama, J. Lincoln, J. Lopez-Rios, A. Visel and **A. Zuniga** and R. Zeller (2017). "HAND2 target gene regulatory networks control atrioventricular canal and cardiac valve development." *Cell Reports* **19**(8): 1602-1613.
10. **Zuniga, A.** (2015). "Next generation limb development and evolution: old questions, new perspectives." *Development* **142**(22): 3810-3820.
11. Vaillant, C., P. Valdivieso, S. Nuciforo, M. Kool, A. Schwarzentruher-Schauerte, H. Méreau, E. Cabuy, J. A. Lobrinus, S. Pfister, **A. Zuniga**, S. Frank and R. Zeller (2015). "Serpine2/PN-1 is required for proliferative expansion of pre-neoplastic lesions and malignant progression to medulloblastoma." *PLoS One* **10**(4): e0124870.
12. Schmitz-Rohmer, D., S. Probst, Z.-Z. Yang, F. Laurent, M. B. Stadler, **A. Zuniga**, R. Zeller, D. Hynx, B. A. Hemmings and A. Hergovich (2015). "NDR kinases are essential for somitogenesis and cardiac looping during mouse embryonic development." *PLoS One* **10**(8): e0136566.
13. **Zuniga, A.** and R. Zeller (2014). "In Turing's hands--the making of digits." *Science* **345**(6196): 516-517.
14. Pignatti, E., R. Zeller and **A. Zuniga** (2014). "To BMP or not to BMP during vertebrate limb bud development." *Seminars in Cell & Developmental Biology* **32**: 119-127.
15. Probst, S., R. Zeller and **A. Zuniga** (2013). "The hedgehog target Vlk genetically interacts with Gli3 to regulate chondrocyte differentiation during mouse long bone development." *Differentiation* **85**(4-5): 121-130.
16. **Zuniga, A.**, R. Zeller and S. Probst (2012). "The molecular basis of human congenital limb malformations." *Wiley Interdisciplinary Reviews: Developmental Biology* **1**(6): 803-822.

17. **Zuniga, A.**, F. Laurent, J. Lopez-Rios, C. Klasen, N. Matt and R. Zeller (2012). "Conserved cis-regulatory regions in a large genomic landscape control SHH and BMP-regulated Gremlin1 expression in mouse limb buds." *BMC Developmental Biology* **12**(1): 23.
18. Probst, S., C. Kraemer, P. Demougin, R. Sheth, G. R. Martin, H. Shiratori, H. Hamada, D. Iber, R. Zeller and **A. Zuniga** (2011). "SHH propagates distal limb bud development by enhancing CYP26B1-mediated retinoic acid clearance via AER-FGF signalling." *Development* **138**(10): 1913-1923.
19. Lagna, M., T. Sato, B. Regnault, A. Cumano, **A. Zuniga**, J. Licht, F. Relaix and M. Buckingham (2010). "Transcriptome analyses based on genetic screens for Pax3 myogenic targets in the mouse embryo." *BMC Genomics* **11**: 696.
20. Bénazet, J.-D., M. Bischofberger, E. Tiecke, A. Gonçalves, J. F. Martin, **A. Zuniga**, F. Naef and R. Zeller (2009). "A self-regulatory system of interlinked signaling feedback loops controls mouse limb patterning." *Science* **323**(5917): 1050-1053.
21. Zeller, R., J. López-Ríos and **A. Zuniga** (2009). "Vertebrate limb bud development: moving towards integrative analysis of organogenesis." *Nature Reviews Genetics* **10**(12): 845-858.
22. Zhou, F., P. Leder, **A. Zuniga** and M. Dettenhofer (2009). "Formin1 disruption confers oligodactylism and alters Bmp signaling." *Human Molecular Genetics* **18**(13): 2472-2482.
23. Zeller, R. and **A. Zuniga** (2007). "Shh and Gremlin1 chromosomal landscapes in development and disease." *Current Opinion in Genetics & Development* **17**(5): 428-434.
24. **Zuniga, A.** and A. Galli (2006). Upstream and downstream of Shh signalling. Shh and Gli signalling and development.
25. Panman, L., A. Galli, N. Lagarde, O. Michos, G. Soete, **A. Zuniga**[#] and R. Zeller[#] (2006). "Differential regulation of gene expression in the digit forming area of the mouse limb bud by SHH and gremlin 1/FGF-mediated epithelial-mesenchymal signalling." *Development* **133**(17): 3419-3428.
26. **Zuniga, A.** (2005). "Globalisation reaches gene regulation: the case for vertebrate limb development." *Current Opinion in Genetics & Development* **15**(4): 403-409.
27. **Zuniga, A.**, O. Michos, F. Spitz, A.-P. G. Haramis, L. Panman, A. Galli, K. Vintersten, C. Klasen, W. Mansfield, S. Kuc, D. Duboule, R. Dono and R. Zeller (2004). "Mouse limb deformity mutations disrupt a global control region within the large regulatory landscape required for Gremlin expression." *Genes & Development* **18**(13): 1553-1564.
28. Panman, L., T. Drenth, P. Tewelscher, **A. Zuniga** and R. Zeller (2004). "Genetic interaction of Gli3 and Alx4 during limb development." *International Journal of Developmental Biology* **49**(4): 443-448.
29. Michos, O., L. Panman, K. Vintersten, K. Beier, R. Zeller and **A. Zuniga** (2004). "Gremlin-mediated BMP antagonism induces the epithelial-mesenchymal feedback signaling controlling metanephric kidney and limb organogenesis." *Development* **131**(14): 3401-3410.
30. Deller, T., M. Korte, S. Chabanis, A. Drakew, H. Schwegler, G. G. Stefani, **A. Zuniga**, K. Schwarz, T. Bonhoeffer and R. Zeller (2003). "Synaptopodin-deficient mice lack a spine apparatus and show deficits in synaptic plasticity." *Proceedings of the National Academy of Sciences USA* **100**(18): 10494-10499.
31. **Zuniga, A.**, R. Quillet, F. Perrin-Schmitt and R. Zeller (2002). "Mouse Twist is required for fibroblast growth factor-mediated epithelial-mesenchymal signalling and cell survival during limb morphogenesis." *Mechanisms of development* **114**(1-2): 51-59.
32. Welscher, P. t., **A. Zuniga**, S. Kuijper, T. Drenth, H. J. Goedemans, F. Meijlink and R. Zeller (2002). "Progression of Vertebrate Limb Development Through SHH-Mediated Counteraction of GLI3." *Science* **298**(5594): 827-830.
33. Dono, R., Faulhaber, A. Galli, **A. Zuniga**, T. Volk, G. Texido, R. Zeller and H. Ehmke (2002). "FGF2 signaling is required for the development of neuronal circuits regulating blood pressure." *Circulation Research* **90**(1): e5-e10.
34. Clement-Jones, M., S. Schiller, E. Rao, R. J. Blaschke, **A. Zuniga**, R. Zeller, S. C. Robson, G. Binder, I. Glass and T. Strachan (2000). "The short stature homeobox gene SHOX is involved in skeletal abnormalities in Turner syndrome." *Human Molecular Genetics* **9**(5): 695-702.

35. **Zuniga**, A. and R. Zeller (1999). "Gli3 (Xt) and formin (Id) participate in the positioning of the polarising region and control of posterior limb-bud identity." *Development* **126**(1): 13.
36. **Zuniga**, A., A.-P. G. Haramis, A. P. McMahon and R. Zeller (1999). "Signal relay by BMP antagonism controls the SHH/FGF4 feedback loop in vertebrate limb buds." *Nature* **401**(6753): 598-602.
37. Zeller, R., A. G. Haramis, **A. Zuniga**, C. McGuigan, R. Dono, G. Davidson, S. Chabanis and T. Gibson (1999). "Formin defines a large family of morphoregulatory genes and functions in establishment of the polarising region." *Cell and Tissue Research* **296**(1): 85-93.
38. Monaghan, A., P. Kioschis, W. Wu, **A. Zuniga**, D. Bock, A. Poustka, H. Delius and C. Niehrs (1999). "Dickkopf genes are co-ordinately expressed in mesodermal lineages." *Mechanisms of development* **87**(1-2): 45—56.
39. Lindsay, S., T. Strachan, S. Robson, M. Clement-Jones, E. Rao, R. Blaschke, **A. Zuniga**, R. Zeller and G. Rappold (1999). "Expression of the short stature homeobox gene, SHOX, correlates with skeletal abnormalities in Turner syndrome." *American Journal of Human Genetics*.
40. Mundel, P., J. Reiser, **A. Zuniga** Mejia Borja, H. Pavenstädt, G. R. Davidson, W. Kriz and R. Zeller (1997). "Rearrangements of the cytoskeleton and cell contacts induce process formation during differentiation of conditionally immortalized mouse podocyte cell lines." *Experimental Cell Research* **236**(1): 248-258.
41. **Zuniga** Mejia Borja, A., C. Murphy and R. Zeller (1996). "AltFGF-2, a novel ER-associated FGF-2 protein isoform: its embryonic distribution and functional analysis during neural tube development." *Developmental Biology* **180**(2): 680-692.
42. **Zuniga** Mejia Borja, A. (1994). Identification et caractérisation d'une nouvelle isoforme du fibroblast growth factor-2 et de ses rôles possibles au cours de l'embryogenèse aviaire. PhD thesis (University Paris XI-Orsay).
43. **Zuniga** Mejia Borja, A., C. Meijers and R. Zeller (1993). "Expression of alternatively spliced bFGF first coding exons and antisense mRNAs during chicken embryogenesis." *Developmental Biology* **157**(1): 110-118.