

Francis Joel Smith, PhD

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EDUCATION

2007-2012 **University of California San Francisco**, San Francisco, CA, USA
--Doctor of Philosophy, Oral & Craniofacial Sciences
--Advisor: Ralph Marcucio, PhD
--Dissertation: *Understanding the Basis of Hypoxia Induced Craniofacial Malformations in Chick Embryos*
2004-2007 **King's College London**, London, UK
--Bachelor of Science, Biomedical Science (Craniofacial Science)
1999-2001 **Purdue University-Fort Wayne**, Fort Wayne, IN, USA
--Master of Science, Biology
1994-1998 **Purdue University-Fort Wayne**, Fort Wayne, IN, USA
Bachelor of Science, Biology

AWARDS AND HONORS

2019 **Honorary degree:** Doctor of Laws *honoris causa*, in recognition of my life's work in craniofacial research and public engagement, University of Dundee Dental School, Dundee, UK, June 20, 2019

RESEARCH EXPERIENCE

2019-current **Independent research consultant in craniofacial sciences**
--3-D microCT imaging of bone and tooth specimens for assessment of density, and other craniofacial 3-D imaging and analyses as needed
--Have assisted craniofacial and dental colleagues including Clifton Carey, PhD, in restorative dentistry at UC Anschutz Medical Campus
--Outreach for craniofacial anomalies awareness and scientific engagement in community and globally
--Medical illustration
--Writing (including review articles, textbook chapters, etc. as needed)
--Speaking, lecturing, guest teaching
--Website: <https://treacher-collins.com/>
2015-2018 **University of Colorado Denver Anschutz Medical Campus**, Aurora, CO, USA
--Postdoctoral fellowship, craniofacial biology
--Principal investigator: Trevor Williams, PhD
--Bioinformatics/genomics analysis of gene expression in mouse embryonic craniofacial development
--Training in pre-award research grants and contracts administration
--Training in public outreach and advocacy for awareness of craniofacial anomalies and dissemination of craniofacial research advances to public via media and other resources
2012-2015 **University of Calgary Cumming School of Medicine**, Calgary, AB, Canada
--Postdoctoral fellowship, craniofacial 3-D imaging and morphometrics
--Principal investigator: Benedikt Hallgrímsson, PhD
--3-D imaging via micro-CT scanning, and morphometric analysis of craniofacial morphological variation in mouse and avian embryos for multiple independent and collaborative projects including comparative avian craniofacial ontogeny and comparative craniofacial morphometric analysis of normal vs. abnormal craniofacial development in embryonic and adult mice

--3-D imaging via 3-D camera and morphometric analysis of craniofacial morphological variation in children and adults with craniofacial conditions for collaborative clinical research projects

2009-2012

University of California San Francisco, San Francisco, CA, USA

--Doctor of Philosophy, Oral & Craniofacial Sciences

--Advisor: Ralph Marcucio, PhD

--Dissertation research project: *Understanding the Basis of Hypoxia Induced Craniofacial Malformations in Chick Embryos*

--Uncovering mechanisms of craniofacial anomalies previously seen in hypoxic chick embryos (in second lab rotation project), including morphometric analysis for significant facial shape changes, and analysis of cell proliferation, apoptosis, and metabolic stress under hypoxic conditions

2008

University of California San Francisco, San Francisco, CA, USA

--Doctor of Philosophy, Oral & Craniofacial Sciences

--Third laboratory rotation project

--Principal investigator: Richard Schneider, PhD

--Effect of alendronate, OPG, and RANKL on osteoclast activity in remodelling of mandible in duck and quail (and chimeric “quck”) embryos

2008

University of California San Francisco, San Francisco, CA, USA

--Doctor of Philosophy, Oral & Craniofacial Sciences

--Second laboratory rotation project

--Principal investigator: Ralph Marcucio, PhD

--Exposure of chicken embryos, *in ovo*, to hypoxia to examine whether hypoxia causes facial and forebrain anomalies characteristic of holoprosencephaly; analysis of mortality, developmental delay, and abnormal morphology including craniofacial defects and microforms of holoprosencephaly; later continued as dissertation project

2007

University of California San Francisco, San Francisco, CA, USA

--Doctor of Philosophy, Oral & Craniofacial Sciences

--First laboratory rotation project

--Principal investigator: Daniel Ramos, DDS, PhD

--Immunofluorescence of human oral squamous cell carcinoma (SCC) cells for cytoskeletal proteins keratin and vimentin, comparing expression of said filaments between SCC cells overexpressing emmprin and control cells expressing no emmprin or beta6 integrin, to examine role of emmprin in differentiation of oral cancer cells

2007

King’s College London, GKT Dental Institute, London, UK

--Bachelor of Science, Biomedical Science (Craniofacial Science)

--BSc thesis research project

--Principal investigator: Philippa Francis-West, PhD

--Differential regulation of craniofacial myogenesis in 1st and 2nd branchial arches of chick embryos, and determination of the expression pattern of *Tbx18* in chick embryonic head

2006

King’s College London, GKT Dental Institute, London, UK

--Bachelor of Science, Biomedical Science (Craniofacial Science)

--Wellcome Trust UK student summer research project

--Principal investigator: Martyn Cobourne, BDS, FDSOrthRCS, MSc, PhD

--Determination of expression pattern of gene *Scube3* in mouse embryos via whole-mount *in situ* hybridisation.

VISITING RESEARCH EXPERIENCE

2017

Hospital de Reabilitacao de Anomalias Craniofaciais (HRAC), Bauru; and Universidade de Sao Paulo, Faculdade de Odontologia (USP-FO), Sao Paulo, Brazil

--Visiting research experience at HRAC in Bauru

--Principal investigator: Professor Ivy Kiemle Trindade Suedam

--3-D volumetric analysis of upper airway volume in patients with Treacher Collins syndrome, using CT images of airways, comparing internal volume of airway in Treacher Collins syndrome vs. normal airway volume

--Visit to HRAC in Bauru and USP-FO in Sao Paulo included invited lectures, talks, and seminars to faculty and students in both locations, and clinical observation of craniofacial cases in clinic and operating theatre

PUBLICATIONS

Peer-Reviewed Papers

1. Hooper, J., Jones, K., **Smith, F.**, Williams, T., and Li, H. (2020) An alternative splicing program for mouse craniofacial development. *Front Physiol* 11: 1099.
2. Ribeiro, A., **Smith, F.**, Nary Filho, H., Trindade, I., Tonello, C., and Trindade-Suedam, I. (2020) Three-dimensional upper airway assessment in Treacher Collins syndrome. *Cleft Palate Craniofac J* 57(3): 371-377.
3. Green, R., Fish, J., Young, N., **Smith, F.**, Roberts, B., Dolan, K., Choi, I., Cheverud, J., Leach, C., Gordon, P., Roseman, C., Williams, T., Marcucio, R., and Hallgrímsson, B. (2017) Developmental nonlinearity drives phenotypic robustness. *Nat Comm* 8: 1970.
4. **Smith, F.**, Percival, C., Young, N., Hu, D., Schneider, R., Marcucio, R., Hallgrímsson, B. (2015) Divergence of craniofacial developmental trajectories among avian embryos. *Dev Dyn* 244(9): 1158-1167.
5. Manyama, M., Larson, J. R., Liberton, D. K., Rolian, C., **Smith, F.**, Kimwaga, E., Gilyoma, J., Lukowiak, K. D., Spritz, R. A., Hallgrímsson, B. (2014) Facial morphometrics of children with NON-syndromic orofacial clefts in Tanzania. *BMC Oral Health* 14: 93-101.
6. Young, N. M., Hu, D., Lainoff, A. J., **Smith, F.**, Diaz, R., Tucker, A. S., Trainor, P., Schneider, R. A., Hallgrímsson, B., Marcucio, R. (2014) Embryonic bauplans and the developmental origins of facial diversity and constraint. *Development* 141: 1059-1063.
7. **Smith, F.**, Hu, D., Young, N., Lainoff, A., Jamniczky, H., Maltepe, E., Hallgrímsson, B., Marcucio, R. (2013) The effect of hypoxia on facial shape variation and disease phenotypes in chicken embryos. *Disease Models & Mechanisms* 6: 915-924.
8. Haworth, K., **Smith, F.**, Zoupa, M., Seppala, M., Sharpe, P. T., Cobourne, M. T. (2007) Expression of the *Scube3* epidermal growth factor-related gene during early embryonic development in the mouse. *Gene Expression Patterns* 7: 630-634.

Published Meeting Abstracts

1. Artz J, France M, Barigayomwe A, Miu K, and **Smith F.** Patient to provider: About the journey. Abstract for panel presentation, American Cleft Palate-Craniofacial Association (ACPA) Annual Meeting, 2018, Pittsburgh, PA [*The Cleft Palate-Craniofacial Journal* 2018 55 (S1): 7.19]
2. **Smith FJ**, Young NM, Percival C, Green R, Fish JL, Jamniczky HE, Marcucio RS, and Hallgrímsson B. Comparative analysis of craniofacial morphogenesis: Implications for developmental constraints and the origin of variation in craniofacial shape. Abstract for invited poster presentation, American Association of Physical Anthropologists (AAPA) Annual Meeting, 2014, Calgary, AB, Canada [*American J Physical Anthropology* 2014 153 (S58): page 242 (no abstract number)]
3. **Smith FJ**, Marcucio RS, Hu D, and Hallgrímsson B. The cellular basis of hypoxia induced craniofacial malformations. Abstract for oral platform presentation, Federation of American Societies for Experimental Biology (FASEB) Annual Meeting, 2011, Washington, DC [*FASEB J.* 2011 25: 307.6]
4. **Smith FJ** and Marcucio RS. Hypoxia as an environmental cause of holoprosencephaly. Abstract for poster presentation; finalist. Federation of American Societies for Experimental Biology (FASEB) Annual Meeting, 2009. New Orleans, LA. [*FASEB J.* 2009 23: 472.3.]

CONFERENCE PRESENTATIONS

- 2019** **Invited talk:** 1st European Cleft Palate-Craniofacial Association (ECPCA) Congress, Utrecht, Netherlands, June 13, 2019
- 2018** **Invited talk:** 12th Australasian Cleft Lip and Palate (ACLAPA) Conference, Sydney, Australia, May 4, 2018
- 2018** **Panel presentation:** “Patient to Provider” panel discussion, American Cleft Palate-Craniofacial Association (ACPA) Annual Meeting, Pittsburgh, PA, April 11, 2018
- 2017** **Oral presentations:** V Simposio Internacional de Fissuras Orofaciais e Anomalias Relacionadas, Faculdade de Odontologia, Universidade de Sao Paulo, Centrinho/HRAC, Bauru, SP, Brazil, November 10-11, 2017
- 2017** **Oral presentation:** 6th Annual Craniofacial and Skin Sciences Research Symposium, Cincinnati Children’s Hospital, Cincinnati, OH, June 23, 2017
- 2016** **Poster presentation:** Gordon Research Seminar and Gordon Research Conference on Craniofacial Morphogenesis and Tissue Regeneration, Ventura, CA, March 12-18, 2016

- 2016** **Oral presentation:** 28th Head Group Meeting, University College London, Institute of Child Health, London, UK, January 15, 2016
- 2014** **Invited Poster Symposium presentation:** 83rd Annual Meeting of the American Association of Physical Anthropologists, Calgary, AB, Canada, April 9-12, 2014
- 2012** **Poster presentation:** Gordon Research Seminar and Gordon Research Conference on Craniofacial Morphogenesis and Tissue Regeneration, Ventura, CA, March 17-23, 2012
- 2011** **Platform talk:** Experimental Biology 2011 (American Association of Anatomists) annual meeting, Washington, DC, April 12, 2011
- 2010** **Invited keynote lecture:** University of Otago, Faculty of Dentistry, Sir John Walsh Research Institute, Research Day, Dunedin, New Zealand, April 1, 2010
- 2009** **Poster presentation:** Society for Developmental Biology annual meeting, San Francisco, CA, July 2009
- 2009** **Poster presentation:** Experimental Biology 2009 (American Association of Anatomists) annual meeting, New Orleans, LA, April 2009
- 2008** **Oral presentation:** University of California San Francisco School of Dentistry Research and Clinical Excellence Day, October 16, 2008

OTHER PRESENTATIONS

- 2019** **Invited seminar:** Invited seminar to faculty and students at University of Dundee Dental School, Dundee, UK, June 21, 2019
- 2019** **Invited seminars:** Invited seminars to faculty and students at University of Washington School of Dentistry and Seattle Children's Research Institute, Seattle, WA, May 6-7, 2019
- 2019** **Invited talk:** Invited lecture to dental study group of the Colorado Dental Association, Peebles Prosthetics, Denver, CO, April 25, 2019
- 2018** **Special teaching experience:** Invited lecture and journal article discussion with undergraduate students in developmental biology, University of Colorado Boulder, November 27, 2018
- 2018** **Invited lecture:** University of Dundee Dental School, Dundee, UK, October 26, 2018
- 2018** **Invited lecture:** GKT Dental Institute, Department of Craniofacial Development, Guy's Campus, King's College London, London, UK, October 17, 2018
- 2018** **Invited lecture:** Pre-Health Club, Pre-Health Program, University of Denver, Denver, CO, October 11, 2018
- 2018** **Invited lecture:** Department of Biology, Regis University, Denver, CO, September 24, 2018
- 2018** **Craniofacial Grand Rounds:** St. Louis Children's Hospital, Washington University Medical Center, St. Louis, MO, August 17, 2018
- 2018** **Invited talk:** Postdoctoral Research Day, School of Dental Medicine, University of Colorado Denver Anschutz Medical Campus, July 12, 2018
- 2018** **Special teaching experience:** Invited lecture to graduate students in communication disorders, University of Wyoming, Laramie, WY, June 15, 2018
- 2018** **Special teaching experience:** Invited lecture to dental students, University of Otago, Faculty of Dentistry, Dunedin, New Zealand, May 8, 2018
- 2018** **Special teaching experience:** Invited lecture to dental students, University of Pittsburgh, School of Dental Medicine, Pittsburgh, PA, April 13, 2018
- 2017** **Special teaching experience:** Invited lecture, Modern Human Anatomy Seminar Series for MS students in anatomy, School of Medicine, University of Colorado Denver Anschutz Medical Campus, November 30, 2017
- 2017** **Special teaching experience:** Invited lecture on upper airway in Treacher Collins syndrome, to dental students of Drs. Inge Trindade and Ivy Suedam, Faculdade de Odontologia, Universidade de Sao Paulo, Centrinho/HRAC, Bauru, SP, Brazil, November 22, 2017
- 2017** **Invited lecture:** Faculdade de Odontologia, Universidade de Sao Paulo, Sao Paulo, SP, Brazil, November 7, 2017
- 2017** **Invited lecture:** School of Biological Sciences, University of East Anglia, Norwich, UK, September 21, 2017
- 2017** **Invited lecture:** GKT Dental Institute, Department of Craniofacial Development, Guy's Campus, King's College London, London, UK, September 19, 2017
- 2017** **Invited talk:** Geneticists' meeting, King Edward Hospital, Perth, Australia, September 4, 2017
- 2017** **Invited talk:** Clinicians' and scientists' meeting, Craniofacial Clinic, Princess Margaret Hospital for Children, Perth, Australia, September 1, 2017
- 2016** **Special teaching experience:** Invited mini-lecture on surgical and dental aspects of Treacher

Collins syndrome, first year dental students of Dr. Trevor Williams, School of Dental Medicine, University of Colorado Denver Anschutz Medical Campus, Aurora, CO, December 2016

2016 **Invited lecture:** GKT Dental Institute, Department of Craniofacial Development, Guy's Campus, King's College London, London, UK, January 14, 2016

GRANT SUPPORT

2015-2018 **3U01DE024429 (Williams, PI)** **07/03/14-04/30/19**
NIH/NIDCR
--RNA dynamics in the developing mouse face
--The major goals of this project are to study the steady-state level of mRNA, miRNA, and other small RNA species in the separate tissue layers of the ectoderm and mesenchyme during critical periods of wild-type mouse face development.
--Role: Postdoctoral trainee under Diversity Supplement (2015-2018)

2012-2015 **5R01DE021708-05 (Hallgrímsson, PI)** **04/27/11-03/31/16**
NIH/NIDCR
--Developmental mechanisms underlying genotype-phenotype correlations
--The goals of this project were to study the correlation between genotype and phenotype using three-dimensional microCT imaging and geometric morphometrics.
--Role: Postdoctoral trainee (2012-2015)

2011-2012 **F31 DE021964-01 (Smith, PI)** **07/01/11-06/30/12**
NIH/NIDCR
--Effects of hypoxia on craniofacial morphology and molecular signaling
--The major goals of this project were to examine the effects of early embryonic hypoxia on craniofacial morphology in chick embryos, as well as cell proliferation and apoptosis and cellular metabolic stress in response to hypoxia.
--Role: PI for PhD dissertation (2011-2012)

2007-2011 **T32 DE007306-15 (Den Besten, PI)** **08/01/96-05/31/12**
NIH/NIDCR
--Comprehensive Oral Health Training Program
--Institutional training grant for pre-doctoral trainees in the Oral and Craniofacial Sciences graduate program at UCSF
--Role: Predoctoral trainee (2007-2011)

PROFESSIONAL MEMBERSHIPS

2008-present American Association of Anatomists (AAA)
2009-present Society for Developmental Biology (SDB)
2016-present American Cleft Palate-Craniofacial Association (ACPA)
2016-present Society for Craniofacial Genetics and Developmental Biology (SCGDB)

PUBLIC ENGAGEMENT FOR CRANIOFACIAL RESEARCH/AWARENESS

Associations --Children's Craniofacial Association (CCA) since 1994
--Courageous Faces Foundation (board member since 2015)
--Treacher Collins Foundation (member, board of directors, since 2020)

Public speaking --Schools in USA and abroad since 2012
--Other venues of all types in USA and abroad since early 1990s

Media interviews --CBS TV Denver: December 2017, October 2018
--TEM TV in Bauru, Brazil: November 2017
--Canadian Broadcasting Corporation (CBC) TV and radio: St. John's, Newfoundland (2012) and Calgary, AB (2013)

Blog --"From the Bench with Francis", a regular feature on CCAKids Blog

Books --Contributed a chapter in *How it Feels to Live with a Physical Disability*, by Jill Krementz, 1992
--Memoir: *Wonderfully Made: The Dr. Francis Joel Smith, PhD Story*, by Francis Smith and Michele DuBroy, 2018

Video interview project --With craniofacial research colleagues and mentors at King's College London, University of Dundee Dental School, University of Manchester, University of

California San Francisco, and University of California at Berkeley, since 2016

--To educate public and craniofacial community on advances and benefits of craniofacial research

Advocacy to Policymakers

--Lobbied two state representatives in 2011 for NIH funding for craniofacial research and for insurance coverage for craniofacial care

Craniofacial Cruise

--Hosted a craniofacial group on a cruise in 2016, Fabulous Faces at Sea Craniofacial Cruise; intend to offer cruise program again in future

Future Initiatives

--Increase media exposure for craniofacial awareness in USA and globally

--Increase interaction with craniofacial organizations and scientific societies

--Foster translational interaction between craniofacial scientists and clinicians