

Date: July 1, 2009

UNIVERSITY OF KANSAS SCHOOL OF MEDICINE
Faculty Curriculum Vitae

I. PERSONAL DATA

First Name Brenda
Last name Rongish
Current Academic Rank Associate Professor
Department(s) Anatomy and Cell Biology
Office Address 1008 Wahl Hall West
3901 Rainbow Boulevard
Kansas City, KS 66160
Phone 913/588-1878
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PROFESSIONAL DEVELOPMENT

Undergraduate and Graduate Education

Years (Inclusive)	Degree	Institution
1984--1988	B.S. Biology (Summa cum laude)	Kansas State University, Manhattan, KS
1984--1988	B.S. Secondary Education (Biology) (Summa cum laude)	Kansas State University, Manhattan, KS

Postgraduate Education

Years (Inclusive)	Degree	Institution
1988-1994	Ph.D. Anatomy Thesis advisor: Robert Tomanek, PhD	University of Iowa Iowa City, IA

Academic and Professional Appointments and Activities

(List in chronological order. Please explain any discontinuity in professional experience)

Month and Year	Position	Institution
May 1994 - July 1997	Postdoctoral Fellow ¹ Department of Cell Biology and Anatomy Mentor: Charles D. Little, PhD	Medical Univ. of South Carolina Charleston, SC
August 1997 - July 2000	Postdoctoral Trainee Department of Anatomy and Cell Biology Mentor: William Kinsey, PhD	University of Kansas Medical Center Kansas City, KS

August 2000 – December 2002	Research Assistant Professor Department of Anatomy and Cell Biology	University of Kansas Medical Center Kansas City, KS
January 2003 – June 2009	Assistant Professor Department of Anatomy and Cell Biology	University of Kansas Medical Center Kansas City, KS
July 2009 - current	Associate Professor Department of Anatomy and Cell Biology	University of Kansas Medical Center Kansas City, KS

¹Completed American Heart Association (South Carolina Affiliate) Fellowship at Vanderbilt University from July 1996 - July 1997, Nashville, TN. Dr. Joey Barnett (Department of Pharmacology) supervised training experience.

Professional Registration/Licensure

Year	Number	State
N/A		

Professional Certification(s)

Date	Board
N/A	

Professional Societies and Affiliations

Date	Organization (including offices held)
1993-1997	American Society for Cell Biology
2001 - 2007	American Society for Matrix Biology
2001	American Heart Association Basic Cardiovascular Science Council
2003 - current	American Association of Anatomists
2005 – 2006	American Association for the Advancement of Science
2006 - current	KU-SOM Women in Medicine and Science Organization
2008	SELAM (Society for Executive Leadership in Academic Medicine)

Honors and Awards (honorary societies, research awards, teaching and other awards)

Year	Award
1991, 1992, 1993	Scholarly Presentation Award Univ. of Iowa Student Associations
1991, 1993	Sigma Xi Grant-in-Aid of Research
July 1994 – May 1995	Medical University of South Carolina Health Sciences Foundation Postdoctoral Fellowship

May 1995 – August 1995	NIH National Research Service Award (NRSA) Postdoctoral Fellowship (declined remaining award to accept AHA Fellowship)
September 1995 – July 1997	American Heart Association (South Carolina Affiliate) Postdoctoral Fellowship
November 1999 – July 2000	Univ. of Kansas Medical Center Reproductive Biology Center NIH Postdoctoral Trainee Award
August 2003; May 2005; February 2008; February 2009	Univ. of Kansas Medical Center Faculty Travel Award

II. TEACHING ACTIVITIES

(Evaluations and other evidence of quality teaching must be attached; this represents the teacher's portfolio and should be accurately summarize ALL of your teaching activities.)

Brief statement of areas of teaching interest:

My medical teaching reflects my current and former research interests: embryology and female reproductive biology, respectively. My primary goal in the instruction of embryology is to convey the complex terminology and morphogenetic movements that comprise embryogenesis in a manner that showcases the developmental processes and relate them to events that are recapitulated in the adult in normal and disease processes. The goal of my instruction in female reproductive biology is to integrate instruction of anatomical structures at the gross and tissue level with the complex physiology of hormonal regulation. By providing a framework into which new information can be added, the hope is to promote understanding of core concepts; a framework that can be used throughout a student's career. Use of simulations and movies extends instruction and provides learners with alternatives to more traditional lecture and lab presentations.

An involvement in graduate teaching reflects my research interests of extracellular matrix and its role in cardiovascular and vertebrate axis morphogenesis. A major goal is to present the advantages of applying an interdisciplinary approach to addressing biological questions, and promoting studies of morphogenesis at the tissue and organ level. Students are encouraged to learn how to integrate information from multiple, diverse sources and build upon the body of known information when developing testable hypotheses. Trainees are encouraged to challenge the dogma and to look "outside of the box" for solutions to existing and future experimental problems.

1. Instruction:

Didactic (e.g.: lectures and formal presentations)

Academic Year	Course	Title	Instruction		Student	
			Type	Hours	No	Type
1990	unknown	Univ. of Iowa Elementary Anatomy	Lecture	2 x 1h	~ 100	Nursing
1991	unknown	Univ. of Iowa Elementary Anatomy	Lecture	3 x 1h	~ 100	Nursing
2003 - Current	ATMY 822	KUMC Human Anatomy and Embryology/ Reproduction and Sexuality Module	Lecture Topic: Female Reproductive Internal Organs	1 x 1h per year	175	Medical (M1)
2003 - 2006	ATMY 832	KUMC Cell and Tissue Biology/ Reproduction and Sexuality Module	Lecture Topic: Female	2 x 1h per year	175	Medical (M1)

		and Sexuality Module	Reproductive Cell Biology			
2004; 2006; 2009	ANAT 868	KUMC Advanced Developmental Biology	Lecture Topic: Cardio-vascular Development and ECM	1 x 2h	5-8	PhD
April 2005	ANAT 880	KUMC Advanced Topics Small Group	Lecture	1 x 1h	4	PhD
March 2006; May 2007; May 2008; 2009 (pending)	ANAT 894	KUMC IGPBS (Interdisciplinary Graduate Program in Biomedical Sciences) Module 4 Developmental Biology	Lecture Topic: Cardio-vascular Development	1 x 1h per year	20	PhD
September 2006	Core 800	KUMC Foundations in Medicine Module	Lecture Topic: Tissue innervation and vascularization	1 x 1h	175	Medical (M1)
August 2007; September 2008; September 2009 (pending)	Core 800	KUMC Foundations in Medicine Module	Lecture Topic: Embryology	3 x 1h; 4 x 1h beginning in 2009	175	Medical (M1)
April 2008	Core 830	KUMC Reproduction and Sexuality Module	Lecture Topic: Histology of Female Reproductive Organs	1 x 1h	175	Medical (M1)
June 2008		KU-SOM Health Careers Pathway/ Prematriculation Program	Lecture Topic: Embryology	3 x 1h	20	Pre-matriculating students entering KU-SOM Medical School

Nondidactic (e.g.: workshops, labs, and discussion groups)

Academic Year	Course	Title	Instruction		Student	
			Type	Hours	No	Type
1989	unknown	Univ. of Iowa Medical Gross Anatomy Human Dissection Lab	Teaching Assistant	1 semester	~ 75	Medical

1990	60.112	Univ. of Iowa Dental General Histology Microscope Lab	Teaching Assistant	1 semester	~ 50	Dental
1990 , 1991, 1992	N/A	N/A	Univ. of Iowa Human Anatomical Specimen Presentations	6 x 1h per year	~ 6-20/ session	Postsecondary students
2001 - current	ATMY 822	KUMC Human Anatomy and Embryology Lab	Lab Instructor Male and Female Reproductive System	*4 x 3h per year *In 2008 3 x 3h	~ 58 per lab	Medical (M1)
2006 - current	ATMY 822 (Lab Review)	*KUMC Human Anatomy and Embryology Lab Review	Lab Instructor Anatomy Review Lab Session *(optional)	1 x 2h per year	~ 40	Medical (M1)
2003 - current	ATMY 832	KUMC Cell and Tissue Biology/Histopathology Reproduction and Sexuality Module	Microscope Lab Instructor Topic: Female reproductive system histology	2 x 2h per year	~ 22 per lab	Medical (M1)
August 2003 – December 2003	ANAT 900	KUMC Scientific Analysis of Papers	Discussion leader/ Facilitator for semester	8 x 1h	8	PhD
May 2004	ANAT 900	KUMC Scientific Analysis of Papers	Discussion leader/ Facilitator for one lecture	1 x 1h	4	PhD
December 2007 - Current	Core 815	KUMC Histopathology	Lab Instructor Topic: Cardiopulmonary - Vessels	2 x 2 h Note: New Format in 2008: Question and Answer/ Discussion Period	~22 per lab	Medical (M1)
September 12, 2008	Core 800	Foundations Module: Integrative Case	Fetal Alcohol Syndrome Clinical Presenter: John Delzell Basic Science Presenters: Brenda Rongish & Joseph Fontes	1 x 1h	175	Medical (M1)

January 2008	Core 815	KUMC Histopathology	Lab Instructor Topic: Cardiopulmonary – Respiratory System	2 x 2 h Format: Question and Answer/Discussion Period	~ 22 per lab	Medical (M1)
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****Total of 29 contact hours in 2008****

Clinical

Year	Hours	Student		Length of Service
		No	Type	
N/A				

Master's Theses and PhD Dissertations directed

Year	Student Name	Thesis Title	Degree (Completed/In process)
May 2008 - Current	Anastasiia Aleksandrova	Project: Computational imaging of avian heart morphogenesis: Fate Mapping of Cell and Tissue Displacements in Transgenic Quail	PhD, In progress

Supervision of Postdoctoral Fellows

Year	Fellow Name	Area of Study
January 2005 – December 2007	¹ Cheng Cui, PhD	Cell Fate-Mapping in Cardiovascular Developmental Biology; Tissue Motion Surrounding the Node and Establishment of Left-Right Asymmetry

¹ Dr. Cui was a joint hire and was jointly supervised with Dr. Charles Little. Dr. Cui's time was divided equally between Dr. Rongish's and Dr. Little's primary research projects.

Advising (Thesis or dissertation committees: student academic group/individual)

Date	Student or group name	Type of Student/group
June 2002 – August 2002	Carolle Bolnet, PhD	Visiting Scientist; Medgar Evers College/CUNY, Brooklyn, NY Supervised lab experience in embryology
October 2001 – December 2002	Julia Zach	Visiting Masters Student; Eotvos University, Budapest, Hungary

		Supervised lab experience in embryology
February 2003 – June 2003	Jingfeng Jiang	Visiting Student, KU Dept of Civil Engineering Supervised lab experience in mathematical modeling
June 2003 – August 2003	Nathan Powell	KUMC KBRIN Summer Research Undergraduate Scholar, Amherst, MA Supervised lab experience in digital and confocal imaging
September 2003 – March 2004	Mae DeLaCalzada	Visiting Health Sciences Univ. DO student Supervised lab experience in embryology
May 2008 (~ 1 week)	Wei Zeng	Visiting student, Univ. of Indiana Biocomplexity Institute Supervised lab experience: Time-lapse imaging of gastrulation
June 2004 – August 2004	Xuehui Zhang	Visiting high school graduate, preparing to enter undergraduate studies at the Univ. of Pennsylvania Supervised lab experience in embryology
August 2004 (~ 1 week)	Shannon Burns	Visiting MBA student Supervised lab experience in embryology
October 2004 (4 weeks)	Ethan Richard	Visiting Student of Osteopathic Medicine, Kansas City Supervised Lab Rotation in embryology and imaging
March 2005 – May 2005	Jennifer Crane	Rotating IGPBS (Interdisciplinary Graduate Program in Biomedical Sciences) PhD Student Supervised lab experience in embryology
November 2006 (~ 4 days)	Ubirajara (Bira) Agero	Visiting student, Univ. of Indiana Biocomplexity Institute Supervised lab experience: Segmentation embryology
March 2007 (~ 3 days)	Milan Makale	Visiting Scientist, Univ. of California San Diego Supervised lab experience learning computational techniques, including particle image velocimetry
October 2007 – December 2007	Ashleigh Fritz	Rotating IGPBS PhD Student Supervised lab experience in embryology and imaging
January 2008 – March 2008	Anastasiia Aleksandrova	Rotating IGPBS PhD Student Supervised lab experience in embryology and imaging
February 2008 (~ 3 days)	Abbas Shirinifard	Visiting Student Univ. of Indiana Biocomplexity Institute Supervised lab experience: Modeling Chemoattraction and the ECM
April 2004 – May 2008	Rachel Chennault	Anatomy PhD Dissertation Committee Contributions of the 3' HOX genes, HOXA1, HOXB1, and HOXB2, to patterning of the axial skeleton during development
December 2004 – August 2006	Erica Perryn	Anatomy PhD Dissertation Committee Time-lapse imaging of vasculogenesis
September 2005 - current	Jessica Copeland	Pathology and Laboratory Medicine PhD Comprehensive Exam and Dissertation Committees

November 2006	Mary-Lee Dequeant	Anatomy PhD Dissertation Defense Committee (replacement for member of thesis committee) Analysis of the transcriptional landscapes of the segmentation clock in mouse and chick
January 2008 - current	Binu Paul	Anatomy PhD Comprehensive Exam Committee
May 2008 - current	Rajprasad Loganathan, PhD	University of Kansas MS in Electrical Engineering Student (Thesis work: Use of laser ablation to disrupt ECM and vertebrate morphogenesis)
November 2008 – current	Naveen Neradugomma	Anatomy PhD Comprehensive Exam Committee
January 2009 (1 week)	Susan Hester	Visiting PhD Student Univ. of Indiana Biocomplexity Institute Supervised lab experience: Electroporation in avian embryos and Segmentation
May 18 - August 4, 2009	Sai Vinod Nagabhairava	Visiting Undergraduate Student from Indian Institute of Technology, Roorkee, India Supervised lab experience: Image processing and embryology
June 09 – current	Raul Diaz	Anatomy PhD Comprehensive Exam Committee

2. Development of Educational Materials

(Course materials e.g. syllabi, educational software packages, web sites, films, educational tapes and evaluation tools)

Year	Title Description	Intended Audience
2003 - current	Female Reproductive Internal Organs Lecture guide (ATMY 822). Comprehensive summary of lecture content and additional information organized for use as a study guide and aid. Contains anatomical images labeled for clarity of understanding that accompany the text. Updated and altered each year to reflect lecture content.	Medical (M1) Students
2003	Female Reproductive Lab Guide for use with microscope slides updated and reorganized to reflect current lab content (ATMY 832).	Medical (M1) Students
2003-current	Develop learning objectives for each lecture (CORE 800 and CORE 830). Identify key words/concepts for each lecture. Provide formative and summative questions for each lecture.	Medical (M1) Students
2006-2008	Female Reproductive Histopathology Lab Guide extensively revised for use with Aperio digital images (ATMY 832). Comprehensive description of material covered in lab, accompanied by additional cell biological and histological	Medical (M1) Students

	information pertaining to the female reproductive system. Distributed to students and lab instructors. Coordinated with faculty lecturing in Reproduction and Sexuality Module.	
2008 -	Time-lapse movies of development in avian embryos. Working with Pittsburgh Supercomputing Center Outreach Coordinator, Dr. Pallavi Ishwad, to demo movies to groups of secondary educators and offer them as instructional tools. This work is in progress.	PhD students, high school educators and students

3. Educational Leadership

(Responsibility for courses and other leadership activities including mentoring of junior faculty. Please list faculty members mentored – letters from mentorees may be provided.)

Course Development

In the fall of 2003, I planned content for and directed the course: ANAT 900, Scientific Analysis of Papers listed above. The class consisted of 8 PhD students, who met once per week for 1 hour to discuss published scientific papers and their relevance. I developed the objectives for the course and communicated to the students their responsibilities and my grading criteria. I moderated discussion of papers presented and made written and oral suggestions for improvement. I prepared the exam and was responsible for assigning course grades.

Mentoring of Trainees and Junior Faculty

2004-2007: Mentored Evan Zamir, DSc (postdoctoral fellow in Anatomy) with respect to the transition from postdoctoral fellow to assistant professor. Assisted Dr. Zamir in preparation of an American Heart Association fellowship and a transition to faculty appointment (K99) grant application. Helped in the preparation of aims, content, and performed editing functions. Mentoring also included discussions of research projects, encouraging Dr. Zamir's participation at scientific meetings and working on publications. Helped him prepare for two job interviews. Dr. Zamir is now an assistant professor at Georgia Tech. Assisted Dr. Zamir in setting up a time-lapse imaging workstation in his new lab.

2005-2006: Assisted Andras Czirok, PhD (while a research assistant professor in Anatomy) in preparation of an American Heart Association Scientist Developmental Grant and a NIH RO1 grant application. Helped in the preparation of form pages, aims, content, and performed editing functions. Dr. Czirok is now a tenure-track assistant professor in Anatomy. Mentoring currently consists of providing advice on teaching goals and content; and understanding and adhering to university and School of Medicine policies.

III. SERVICE ACTIVITIES

See guidelines and instructions to applicants for definitions and suggested documentation of professional and academic service.

Professional Service:

The diverse area of professional service includes patient care. Applicants should select measures that most clearly and concisely document their accomplishments and the value of these activities to the Medical School and University. Measures of both quantity and quality of activities are required and if necessary, applicants should provide brief descriptions to assist reviewers. **Measures of patient care activities include numbers of patients, time allocation in clinical activity, procedures completed, Relative Value Units (RVUs), and value to the School of the clinical service.** If the primary quality evaluation is the subjective assessment of peers, this should be available in letters from departmental colleagues, chair, or referees.

The significance of professional service in the forms of task forces, committees and similar groups should be explained and the specific role of the applicant clarified.

Professional consulting services must have academic credibility and clear service intent and not be performed primarily for personal profit.

N/A

Academic Service:

In academic service the contribution of the candidate to the academic community should be clearly documented. Names and dates of committees, task forces, or working groups should be provided. A concise description of the significance of the group and explanation of the role of the applicant should be provided.

Activities related to Academic Societies should be documented in this section.

Academic Service at the University of Kansas Medical Center

04/02 – 04/07 Oral Presentation Judge, KUMC Student Research Forum (annual event; 1 day/year)

12/03 – 08/08 Member, Faculty Council, Univ. of Kansas School of Medicine (meets monthly)

(Departmental delegate through 08/2006; Chair of standing committee and Vice-chair elect in 2006-2007; Vice-chair of faculty council in 2007-2008)

09/04 – 08/07 Member, Elections Committee, Univ. of Kansas School of Medicine

02/05 Member, IGPBS Interview committee for prospective PhD students

- 04/05 Lab tour and demonstrations for junior and high school students (2 x 0.5h) at request of KUMC Alumni and Community Relations Office
- 6/05-8/05 Interim Vice Chair, Faculty Council, Univ. of Kansas School of Medicine (asked to serve as replacement)
- 10/05; 09/08 Member, nominating committee for Faculty Council annual election of chair-elect and vice-chair-elect
- 09/06 – 08/07 Chair, Elections Committee, Univ. of Kansas School of Medicine
Duties: Conduct elections of faculty council leadership each fall, and the annual School of Medicine elections each spring to fill open elected positions on the standing faculty committees. Determine the eligibility of each candidate on the ballot. Maintain rosters of faculty committees and departmental representation on faculty council. Determine level of departmental representation and notify department chairs of the number of delegates each department can have on faculty council. Fill positions on standing committees which appear over the course of the academic year and which can not be filled in a timely manner by the SOM spring elections.
- 09/06 – 08/08 Member, School of Medicine Executive Committee
(Chair of standing committee and Vice-chair elect in 2006-2007; Vice-chair in 2007-2008)
- 01/07 – 08/07 Vice-chair-elect, School of Medicine Faculty Council
Duties: Attend executive committee meetings and assist chair and vice-chair of faculty council
- 03/07 – 08/07 Member, Faculty Concerns Committee, ad hoc committee of Faculty Council
Duties: Receive concerns from faculty and identify resources to help address the concerns
- 07/07– 09/08 Ad hoc member of Faculty Bylaws Revisions Committee
Duties: Served in unofficial capacity at the request of Dr. Gary Doolittle, Chair of Revisions Committee to help revise bylaws due to past experience with Elections Committee business and general familiarity with the business of the standing committees. Attended regular meetings; suggested numerous revisions and edited multiple versions of the bylaws revisions.
- 09/07 – 08/08 Vice-chair, School of Medicine Faculty Council
Duties: Select topics for discussion at faculty council, plan and prepare agendas for Executive committee and faculty council meetings, attend monthly planning sessions held with the Chair of faculty council and the Executive Dean of the School of Medicine.
- 10/07 – 08/08 Chair, Faculty Liaison committee, ad hoc committee of Faculty Council
Duties: Receive suggestions/concerns from general faculty and decide what topics to take to faculty council for further action. Manage process through until completion. Prepare and maintain digital suggestion box. Pursue topics of interest to Dean by meeting with individuals/groups and gathering information to report back to faculty council and/or Dean.
- 01/08 – **Curr** Member, Academic Affairs Graduate Student Travel Committee
Duties: Review and rank graduate student travel applications 3x/year
- 09/08 – **Curr** Member, MD/PhD Program Admissions Committee
Duties: Review and recommend applications for SOM MD/PhD Program; Work to achieve Medical Scientist Training Program (MSTP) status in the School of Medicine.

Other Professional Service

- 2001- Manuscript Reviewer *Developmental Biology*
- 2001 Reviewer, KUMC Research Institute Lied Basic Science Pilot Grant application
- 2001 Involvement in mini-med school “post-doc” lab presentations and lab demonstrations for EVC Hagen and Board of Regents members (1/25/02) and KC Commissioner J. Mendez (2/27/02)
- 11/1/02 Ad hoc NIH dual study section reviewer, CDF instrument development RO1 and SBIR/STTR ZRG1 SSS-U10

10/20/03	Ad hoc NIH study section reviewer, ZRG1 F05 (20)L Fellowships (postdoctoral awards)
04/04	AHA Cardiovascular Development study section reviewer
05/04	Ad hoc NIH study section reviewer, PO1 application (reviewed multiple projects and core facilities)
2004--	Manuscript Reviewer <i>Developmental Dynamics</i>
11/4/04	NIH Study section reviewer, ZRG1 F05 (20)L Fellowships
01/05-	Manuscript Reviewer, <i>FEBS Letters</i>
07/05-	Manuscript Reviewer <i>Anatomical Record</i>
02/06-	Manuscript Reviewer <i>Development</i>
11/06-	Manuscript Reviewer <i>Cell Communication and Adhesion</i>
02/07-	Reviewer, MedEdPORTAL (web-based educational material)
04/07	Ad hoc reviewer, NSF Frontiers in Integrative Biological Research program grant proposals
02/09	Ad hoc reviewer, NSF, Division of Molecular and Cellular Biosciences

IV. RESEARCH and SCHOLARLY ACTIVITIES:

Brief statement of areas of research and scholarly interest, including current projects:

My research focuses on elucidating the complex and varied roles of the extracellular matrix (ECM) during morphogenesis. The ECM has both biophysical (structural) and signaling (instructive) roles in morphogenesis. Two areas of major investigation in my group are: 1) ECM patterning during cardiovascular development — the focus of my current and past NIH awards and 2) cell and tissue movements that accompany gastrulation/early vertebral axis patterning — the focus of an earlier award to Drs Little, Czirok and I from the Mathers Foundation as well as a pending application. In order to accomplish my experimental goals, my colleagues and I had to develop the following tools: 1) in vivo dynamic imaging, 2) embryo culture methods to allow long-term imaging of live specimens, and 3) computational tools to analyze the resulting image data sets with respect to the motion of cells. The resulting dynamic wide field imaging spans four orders of magnitude: from 1 micrometer to 1 centimeter — and allows unprecedented analysis of embryonic cellular and tissue motion. Further, by tracking both cellular and ECM motion it is possible to examine tissue motion separate from individual cellular motion. To date, our movies of embryogenesis have revealed that several key assumptions of developmental biology relating to how cells gastrulate and move to contribute to tissues and organ systems are untrue, and need to be revisited with newly developed technology.

Following time-lapse imaging, we apply computational methods to quantify cell and ECM motion, and distinguish between active autonomous cell motility (cell motion relative to the ECM) and cell motion attributable to passive tissue (cell sheet) motion. Our work is indicating that much of the motion of cells responsible for early morphogenesis is passive. This work has implications for thinking about how and when cell fate is determined, the positional cues that influence gene expression, and how chemical gradients can be set up and maintained on moving substrates.

Several years ago the NIH presented a set of “Roadmap Initiatives”, which included a vision for “research teams of the future”. The NIH identified interdisciplinary research as a major goal, while recognizing that a team approach to conducting science required changes to existing NIH policies with respect to awarding grants to a single investigator. When working with an interdisciplinary team, there are challenges in maintaining one’s scientific independence; plus there is the need to devote efforts to group goals. Nevertheless, I find that working with a multidisciplinary team of biologists, engineers, and physicists in our Computational Imaging Group has provided me with a more complete understanding of biomechanical patterning events in the vertebrate embryo. Together with my colleagues, I hope to “re-write the book” with respect to how vertebrate morphogenesis proceeds.

1. Grants and contracts

(Information must include whether the nominee is the principal investigator or a co-investigator, names of all investigators, title of grant, funding source, dollar amount in direct costs, and years during which grant applies. Co-investigators must specify role). Provide four copies of abstracts and award notice or renewal for all grants or contracts awarded in last five years.

Grants and contracts awarded:

(List in chronological order)

Principal Investigator	Investigators	Title of Grant	Funding Source	Direct Costs **to B. Rongish*	Years	Status
B. Rongish	C. Little KUMC A. Czirok KUMC	Fibrillins in Cardiovascular Development: Dynamic Imaging of Microfibril Assembly	KUMC RI Lied Basic Science Pilot Research Award	\$35,000	04/2001-03/2002	Past
B. Rongish	A. Czirok KUMC	Fibrillins in Cardiovascular Development: Dynamic Imaging of Microfibril Assembly	American Heart Association Heartland Affiliate (Beginning Grant-in-Aid)	\$100,000	07/2001 – 06/2003	Past
B. Rongish	N. Powell Student	N/A	Kansas Biomedical Research Infrastructure Network (K-BRIN) Summer Research Support)	\$3,000	06/2003-08/2003	Past
B. Rongish	C. Little (co-PI) KUMC Role: Assist with computational analyses following time-lapse data acquisition A. Czirok KUMC R. Mecham (consortium director) Washington Univ. School of Medicine	Computational Study of Fibrillins in CV Morphogenesis	NIH National Heart, Lung and Blood Institute RFA	\$525,000	09/2002-08/2005	Past

P. Sivakumar UMKC Oral Biology	B. Rongish (Co-investigator) Role: Direct in vitro time-lapse imaging studies of collagen and fibronectin assembly in osteoblast cultures and assist in computational analyses of ECM	Dynamic Computational Imaging of Collagen Assembly in Living Osteoblasts and its Interaction with Fibronectin	Kansas City Area Life Sciences Initiative (KCALSI)	\$9,000	01/2005-12/2005	Past
B. Rongish		ECM Dynamics during Embryonic Axis Patterning	Kansas Idea Network of Biomedical Research Excellence (K-INBRE)	\$25,000	07/2005-07/2006	Past
B. Rongish		Computational Imaging of the ECM during Avian Heart Morphogenesis	Univ. of Kansas Medical Center Research Institute	\$35,000	07/2006-07/2007	Past
S. Dallas UMKC Oral Biology	B. Rongish (Consortium Director) Role: Direct in vitro time-lapse imaging studies of fibronectin assembly in osteoblasts and analyses of ECM motion	Dynamics of Assembly of Bone Matrix Proteins	NIAMS	~\$27,000	09/2004- *06/2007	Past *Dr. Rongish ended the award early since Dr. Dallas started her own imaging
B. Rongish	N/A	Start-Up Funds	University of Kansas Endowment	\$300,000	01/2003 -	Active

<p>B. Rongish (PI)</p> <p>Role: Perform time lapse imaging studies of cell and ECM motion in normal and perturbed embryos</p>	<p>Please note this is a multi-investigator proposal and each PI has equivalent funds. (Please see letter; James Handelman; Mathers)</p>	<p>Early Vertebrate Morphogenesis: A Systems Approach</p>	<p>G. Harold and Leila Y. Mathers Charitable Foundation</p>	<p>\$150,000 (equal to 1/3 of the total directs)</p>	<p>03/2005-02/2008</p>	<p>Active (no cost extension)</p>
<p>C. Little (PI)</p> <p>KUMC</p> <p>Role:</p> <p>Design experiments aimed at mechanically perturbing the embryonic tension fields</p>	<p>Drs. Little and Czirok are fellow PIs in the Computational Imaging Group. Dr. Little is a developmental biologist and Dr. Czirok is a biological physicist.</p>			<p>(1/3 of the total directs)</p>		
<p>A. Czirok (PI)</p> <p>KUMC</p> <p>Role: Perform computational analyses of cell and ECM motion. To prepare strain maps.</p>				<p>(1/3 of the total directs)</p>		
<p>B. Rongish</p>	<p>A. Czirok (co-investigator)</p> <p>KUMC</p> <p>Role: Direct computational analyses of ECM motion</p> <p>J. Stiles</p> <p>Pittsburgh</p> <p>Super-computing Center</p>	<p>Computational Imaging of the ECM during Avian Heart Morphogenesis</p>	<p>NIH National Heart, Lung and Blood Institute</p> <p>Peer reviewed by Cardiovascular Differentiation and Development</p> <p>Review panel</p> <p>8.1 percentile ranking</p>	<p>\$948,500</p>	<p>04/2008 – 03/2012</p>	<p>Active</p>

Grants and contracts submitted:

Principal Investigator	Investigators	Title of Grant	Funding Source	Direct Costs	Years	Status
B. Rongish (PI: Aim 2) Role: Direct time-lapse imaging studies of tissue rotation and left-right asymmetry	Please note this is a renewal of a multi-investigator proposal and each PI will have equivalent funds. (Please see letter; J. Handelman; Mathers)	Deciphering the Biomechanical Morphogenetic Code	G. Harold and Leila Y. Mathers Charitable Foundation	\$162,315 (equal to 1/3 of the total directs)	2009-2012	Active
C. Little KUMC (PI: Aim 1) Role: Direct time-lapse studies of gastrulation-related cell movements.	Drs. Little and Czirok are fellow PIs in the Computational Imaging Group. Dr. Little is a developmental biologist and Dr. Czirok is a biological physicist.			(1/3 of the total directs)		
A. Czirok KUMC (PI: Aim 3) Role: Direct mathematical modeling and construction of computer simulations of early embryogenesis				(1/3 of the total directs)		

2. Scholarly Publications

Full length, peer-reviewed articles in scientific journals: (Provide names of all authors, year, title, journal, volume, and inclusive pages. List in chronological order.)

Articles published: (Provide 4 copies of each peer-reviewed article published within the last five years. Other articles may be provided at the applicant's discretion.)

1. Torry, R.J., and **B.J. Rongish**. Angiogenesis in the uterus: potential regulation and relation to tumor angiogenesis. (Review) *American Journal of Reproductive Immunology* 27:171-179, 1992.
2. **Rongish, B.J.**, Torry, R.J., Tucker, D.C., and R.J. Tomanek. Neovascularization of embryonic rat hearts cultured in oculo closely mimics in utero coronary vessel development. *Journal of Vascular Research* 31(4):205-215, 1994.

3. Schraeger, J.A., Canby, C.A., **Rongish, B.J.**, Kawai, M., and R.J. Tomanek. Normal left ventricular diastolic compliance following regression of hypertrophy. *Journal of Cardiovascular Pharmacology* 23:349-357, 1994.
4. **Rongish, B.J.**, Torry, R.J., and R.J. Tomanek. Coronary neovascularization of embryonic rat hearts cultured in oculo is independent of thyroid hormones. *American Journal of Physiology* 268:(Heart Circ. Physiol. 37)H811-H816, 1995.
5. Torry, R.J., **Rongish, B.J.**, Tucker, D.C., Kostreva, D., and R.J. Tomanek. Influence of graft innervation on neovascularization of embryonic heart tissue grafted in oculo. *American Journal of Physiology* 270:(Heart Circ. Physiol. 39)H33-H37, 1996.
6. **Rongish, B.J.**, Hinchman, G., Doty, M.K., Baldwin, H.S., and R.J. Tomanek. Relationship of the extracellular matrix to coronary neovascularization during development. *Journal of Molecular and Cellular Cardiology*. 28:2203-2215, 1996.
7. **Rongish, B.J.**, Drake, C.J., Argraves, W.S., and C.D. Little. Identification of the developmental marker: JB3-antigen, as fibrillin-2 and its de novo organization into embryonic microfibrillar arrays. *Developmental Dynamics* 212:461-471, 1998.
8. **Rongish, B.J.**, Wu, W. and W.H. Kinsey. Fertilization-induced activation of phospholipase C in the sea urchin egg. *Developmental Biology* 215:147-154, 1999.
9. **Rongish, B.J.** and Kinsey, W.H. Transient nuclear localization of fyn kinase during development in zebrafish. *The Anatomical Record* 260:115-123, 2000.
10. Czirok, A., Rupp, P.A., **Rongish, B.J.**, and Little, C.D. Multi-field 3D scanning light microscopy of early embryogenesis. *J of Microscopy* 206:209-217, 2002.
11. Rupp, P.A., **Rongish, B.J.**, Czirok, A., and Little, C.D. Culturing of avian embryos for time-lapse imaging. *BioTechniques* 34:274-278, 2003.
12. Czirok, A., **Rongish, B.J.**, and Little C.D. Extracellular matrix dynamics during vertebrate axis formation. *Developmental Biology* 268:111-122, 2004.
13. Zamir, E.A., Czirok, A., **Rongish, B.J.**, and Little, C.D. A digital image-based method for computational tissue fate mapping during early avian morphogenesis. *Annals of Biomedical Engineering* 33:854-865, 2005.
14. Kozel, B.A., **Rongish, B.J.**, Czirok, A., Zach, J., Little, C.D., Davis, E.C., Knutsen, R.H., Wagenseil, J.E., Levy, M.A., and Mecham, R.P. Elastic fiber formation: a dynamic view of extracellular matrix assembly using timer reporters. *Journal of Cellular Physiology* 207:87-96, 2006.
15. Czirok, A., Zach, J., Kozel, B.A., Mecham, R.P., Davis, E.C., and **Rongish, B.J.*** Elastic fiber macro-assembly is a hierarchical, cell motion-mediated process. *Journal of Cell Physiology* 207:97-106, 2006.
16. Sivakumar, P., Czirok, A., **Rongish, B.J.**, Divakara, V.P., Wang, Y. and Dallas, S.L. New insights into extracellular matrix assembly and reorganization from dynamic imaging of extracellular matrix proteins in living osteoblasts. *Journal of Cell Science* 119:1350-1360, 2006
17. Cui, C., Lansford, R., Filla, M.B., Little, C.D., Chevront, T.J. and **Rongish, B.J.*** Electroporation and EGFP labeling of gastrulating quail embryos. *Developmental Dynamics* 235:2802-2810, 2006.
18. Zamir, E.A., Czirok, A., Cui, C., Little, C.D., and **Rongish, B.J.*** Mesodermal cell displacements during avian gastrulation are due to both individual cell-autonomous and convective tissue movements. *Proc Natl Acad Sci U SA* 103(52):19806-19811, 2006. Epub 2006 Dec 18.
(Evaluated by the Faculty of 1000, Biology: <http://www.f1000biology.com/article/id/1066905/evaluation>)
19. Zamir, E., **Rongish, B.** and Little, C. The ECM Moves during Primitive Streak Formation – Computation of ECM Versus Cellular Motion. *PLoS Biol* October 14; 6(10): e247, 2008

Selected by *PLoS* (Impact factor 14.1) as one of a few papers per month for “highlighting”. A synopsis was been prepared by the journal for the “non-expert” reader summarizing the importance of the work which is posted online.

(Evaluated by the Faculty of 1000, Biology: <http://www.f1000biology.com/article/id/1124585/evaluation>)
20. Cui, C., Little, CD., and **B.J. Rongish***. Rotation of organizer tissue contributes to left-right asymmetry.

Anatomical Record 292:557-561, 2009

Manuscripts accepted pending revisions:

1. Cui, C., Chevront, T.J., Lansford, R.D., Moreno-Rodriguez, R.A., Schultheiss, T.M., and **B.J. Rongish***. Dynamic Positional Fate Map of the Primary Heart-Forming Region. Accepted with minor revision, *Developmental Biology*.

Manuscripts in Preparation:

1. Sato, Y., Poynter G., Huss, D., Filla, M.B., **Rongish, B.J.**, Little, C.D., Fraser, S.E. and Lansford, R. Dynamic analysis of embryonic vascular development in transgenic quail
2. Aleksandrova, A., Lansford, R., Filla, M., **Rongish, B.J.*** Dynamic imaging of extracellular matrix motion in Tie1 transgenic quail reveals the extent of tissue motion in formation of the heart tube.
3. Cheng, C., Filla, M., **Rongish, B.J.**, and Little, C.D. Blocking the physical rotation of Hensen's node in avian embryos results in symmetrical gene expression of FGF8 and Shh: the biomechanics of left-right sidedness.
4. Sivakumar, P., Zamir, E.A., Czirok, A. **Rongish, B.J.**, Thiyagarajan, N., and Dallas, S.L. Dynamics of fibronectin assembly and reorganization in de novo versus established ECM in living osteoblasts.

Invited or non-peer-reviewed articles or reviews: (**Provide names of all authors, year, title, journal, volume, and pages. If in press, provide documentation and 4 photocopies if published within the last five years.**)

Invited Reviews (Peer-Reviewed)

1. Little, C.D., and **B.J. Rongish**. The extracellular matrix during heart development. *Experientia* 51:873-882, 1995.
2. Filla, M.B., Czirok, A., Zamir, E.A., Little, C.D., Chevront, T.J., and **Rongish, B.J.*** Dynamic imaging of cell, ECM, and tissue movements during avian vertebral axis patterning. *Birth Defects Research Part C Embryo Today* 72:267-276, 2004.

Note: This invited review contains new, previously unpublished, empirical data.

3. Czirok, A., Zamir, E., Filla, M.B., Little, C.D., and **Rongish, B.J.*** Extracellular matrix macro-assembly dynamics in vertebrate embryos. *Current Topics in Developmental Biology* Volume 73, p238-258 (G. Schatten, ed.), Elsevier Inc., 2006

Note: This invited review contains new, previously unpublished, empirical data. Figure selected for cover.

Non peer-reviewed article

- Cui, C., **Rongish, B.**, Little, C., and Lansford, R. (2007) Electroporation of DNA vectors pre-gastrulation avian embryos. Cold Spring Harbor Laboratory Press (online methods journal in molecular and cell biology) doi:10.1101/pdb.prot4894.

*** B. Rongish is senior and corresponding author on the above (*) designated papers/manuscripts**

Books and book chapters: (**Provide names of all authors, year, book title, chapter title, edition, publisher, and pages. If in press, provide documentation and 4 photocopies if published the last five years.**)

N/A

Published abstracts: (Provide names of all authors, year, title, where published, volume, and pages.)

Rongish, B.J. and R.J. Tomanek. The effect of age on left ventricular compliance in Fischer 344 male rats. *The Physiologist* 32(4):183, August 1989.

Rongish, B.J., Torry, R.J., Tucker, D.C., and R.J. Tomanek. Progression of angiogenesis in fetal hearts cultured in oculo. *FASEB J.* 5:A695, 1991.

Rongish, B.J., Torry, R.J., Connell, P.M., and R.J. Tomanek. Thyroxine does not influence neovascularization of unloaded fetal rat hearts cultured in oculo. *FASEB J.* 6:A2037, 1992.

Torry, R.J., Rongish, B.J., Connell, P.M., Tucker D.C., and R.J. Tomanek. Role of sympathetic innervation in neovascularization of fetal hearts cultured in oculo. *FASEB J.* 6:A2036, 1992.

Rongish, B.J., Torry, R.J., McCarthy, C.M., and R.J. Tomanek. Mammalian coronary microvessel formation in utero and in oculo. *FASEB J.* 7:A126, 1993.

Rongish, B.J., and R.J. Tomanek. Potential roles for laminin and fibronectin in hearts developing in vitro and coronary neovascularization of embryonic rat hearts developing in vitro and in oculo. *FASEB J.*, 1994.

Rongish, B.J., Drake, C.J., Argraves, W.S., and Little, C.D. Purification and characterization of embryonal avian fibrillin-2. *Molec. Biol. of Cell Suppl.*, Vol. 7, Dec. 1996, p.64a.

Czirok, A., Rongish, B.J., and Little, C.D. Dynamic imaging of fibrillin filament assembly during segmentation. *Molec. Biol. Cell Suppl.* Vol. 12, Nov. 2001, p. 186a

Czirok, A., Rupp, P.A., Rongish, B.J., and Little, C.D. Multi-field 3D scanning light microscopy of early avian embryogenesis at cellular resolution. *Molec. Biol. Cell Suppl.* Vol 13, Nov. 2002, p. 551a.

Czirok, A., Rongish, B.J., and Little, C.D. Dynamics of in situ fibrillin filament assembly during vertebrate segmentation. *Molec. Biol. Cell Suppl.* Vol 13, Nov. 2002, p. 487a.

Sivakumar P, Czirok A, Rongish BJ, Peters DM, Dallas SL. (2003). Dynamic Imaging of Extracellular Matrix Molecules in Osteoblasts and Role of Fibronectin as an Orchestrator of Extracellular Matrix Assembly. *J. Bone Miner. Res.* 18(2): S39 –American Society for Bone and Mineral Research 25th meeting, Sept. 2003, Minneapolis, MN.

Rongish, B., Czirok, A., and Handford, P. Disrupting fibrillin assembly leads to cardiovascular malformations: a computational, time-lapse imaging approach. (abstract published) *Een Geslaagd Jubileum!* The 10th Weinstein Developmental Cardiovascular Conference, Leiden, Netherlands, May 13, 2004.

Sivakumar, P. Rongish, BJ, Czirok A, Divakara V, Dallas SL (2004). New Insights into Bone Extracellular Matrix Assembly from Dynamic Computational Imaging in Living Osteoblasts. American Society for Bone and Mineral Research (ASBMR) meeting, *J. Bone Miner. Res.* 19(suppl1): S20

Chen Q, Sivakumar P, Zhao J, Rongish, BJ, Czirok A, Dusevich V, Dallas MR, Peters DM, Mosher DF, Dallas SL (2005). Fibronectin Serves as an Essential Template for Assembly of Multiple Bone Matrix Proteins and is Essential for TGFbeta Deposition, Matrix Stability and Normal Mineralization. American Society for Bone and Mineral Research (ASBMR) annual meeting, *J. Bone Miner Res* 20(suppl 1): S15.

Sivakumar, P., Chen, Q., Rongish, B.J., Czirok, A., Divakara, V., Dusevich, V. and Dallas, S.L. Assembly and Reorganization of Bone Extracellular Matrix Proteins Imaged in Living Osteoblasts. American Society for Bone and Mineral Research (ASBMR) meeting (2005) *J. Bone Miner Res* 20(suppl 1): S206

Zamir, E.A., Czirok, A., Cui, C., Little, C.D., and Rongish, B.J. Kinematic analysis of the effects of finite morphogenetic tissue deformations on mesodermal cell migration and patterning during early avian gastrulation. 2006 Bioengineering Conference, Amelia Island, Florida, *Proceedings of BIO2006*.

Zamir, E.A., Rongish, B.J., and Little, C.D. Dynamic movement of sub-epiblastic ECM during primitive streak formation. Oral presentation; 2008 Bioengineering Conference, Marco Island, Florida, June 2008; Published in the *Proceedings of BIO2008*. <http://www.x-cd.com/sbc08/prof508.html>

Other scholarly publications

Rongish, B.J. Report on scientific session at International Anatomical Conference meeting in Kyoto, Japan "Member Research Well Represented at Anatomy International Congress; AAA Newsletter Vol. 13(4) Dec. 2004.

3. Presentations and posters

Oral paper presentations: (Provide names of all authors, title, sponsoring organization, extent of peer-review, and location and date of presentation.)

Scientific papers presented at national and international meetings by Dr. Rongish:

- 07/97 Invited Speaker, Elastin and Elastic Fibers Gordon Conference, Meriden, NH. Talk title: Fibrillin-2 and embryonic morphogenesis.
- 04/12/03 Invited Speaker, Experimental Biology (formerly called FASEB) '03 [Turning Bioinformation into Biounderstanding] San Diego, CA. Talk title: Dynamic imaging of fibrillin 2 in embryogenesis.
- 06/02/03 Invited speaker, Tissue Repair and Regeneration Gordon Conference, Il Ciocco, Italy
- 08/03 Invited speaker, Gordon Conference on Elastin and Elastic Fibers, Meriden, NH. Talk title: Time-lapse computational analysis of fibrillin-2 during axis formation in the bird.
- 04/04 Invited speaker, Experimental Biology 04, Washington, D.C. Talk title: Measuring ECM dynamics in vitro and in vivo using a time-lapse imaging approach.
- 05/04 Invited speaker, Weinstein Cardiovascular Developmental Biology Meeting 2004, Leiden, Netherlands. Talk title: Disrupting fibrillin assembly leads to cardiovascular malformations: a computational, time-lapse imaging approach.
- 06/04 Invited speaker, Third European Symposium on Elastin, 2004, Manchester, UK. Talk title: Dynamic analysis of fibrillin organization and function during avian development.
- 08/04 Invited speaker, International Anatomical Congress, Kyoto, Japan. Talk title: Dynamic analysis of fibrillin organization and function in avian gastrulae.
- 11/04 Invited speaker, American Society for Matrix Biology, San Diego, CA. Talk title: Dynamic analysis of fibrillin organization and function during avian embryogenesis.
- 04/05 Session chair, Experimental Biology (EB) 2005, San Diego, CA
- 07/05 Session co-chair (Microfibril and Elastic Fibers Assembly & Organization), Elastin and Elastic Fibers Gordon Research Conference, New Hampshire
- 09/05 Invited speaker, First International Congress of the Spanish Society of Histology and Tissue Engineering, Madrid, Spain. Talk title: Extracellular matrix dynamics during embryogenesis: A time-lapse imaging approach
- 02/06 Session co-chair and moderator (Dynamic Imaging of the Extracellular Matrix), AAAS meeting in St. Louis, MO (February 18, 2006)
- 04/07 Session chair, "Morphogenesis meets Mathematics", Experimental Biology (EB) 07, Washington D.C.

- 03/08 Invited speaker, 7th Annual Spring Symposium of the Medical University of South Carolina (MUSC) Cardiovascular Developmental Biology Center. Talk title: "Computational imaging of early avian heart development"
- 04/08 Invited speaker, Cell and tissue dynamics during gastrulation. Symposium: Novel Applications of Anatomical Data. Experimental Biology (EB) 08, San Diego, CA
- 04/08 Invited speaker, Computational imaging of heart morphogenesis in vivo. Session: Cardiac Biology. Experimental Biology 08, San Diego, CA
- 07/08 Invited speaker, BEST (Better Educators of Science for Tomorrow) Workshop, Pittsburgh Supercomputing Center, Pittsburgh, PA. Talk title: Educational applications of studying cell and tissue dynamics.
- 07/08 Invited speaker, MARC (Minority Access to Research Careers) Bioinformatics Workshop, Pittsburgh Supercomputing Center, Pittsburgh, PA. Talk title: Computational imaging of fluorescent protein markers in avian embryos reveals cell and tissue dynamics.
- 04/09 Invited speaker, Experimental Biology 09, New Orleans, LA. Talk title: "Rotation of organizer tissue contributes to left-right asymmetry in avian embryos". American Association of Anatomists Session: Asymmetries in Development
- 06/09 Invited speaker, TeraGrid09, Arlington, VA. Talk title: Use of time-lapse movies of embryonic development for multidiscipline research training and classroom instruction (pending)

Scientific papers presented by Dr. Rongish's trainees at national and international meetings:

- 04/09 Invited speaker, Anastasiia Aleksandrova (PhD student of Dr. Rongish) Experimental Biology 09, New Orleans, LA. Talk title: "Time-lapse imaging reveals an extra-cardiac contribution to the endocardium and cardiac jelly in avian embryos". Joint North American Vascular Biology Organization and American Association of Anatomists Session: Specialized Functions of the Vasculature

Scientific papers presented at local and regional meetings

- 10/19/01 Invited speaker, Midwest Connective Tissue Workshop, Rush Univ., Chicago
- 6/03/02 Invited speaker, Midwest Developmental Biology Meeting and Singer Symposium. Univ. of Missouri, Columbia, MO. Talk title: Dynamic imaging of fibrillin filament assembly during segmentation.
- 9/11/08 Invited speaker, Advanced Imaging Workshop, Stowers Institute for Medical Research, Kansas City, MO Talk title: Computational imaging reveals unexpected embryonic cell dynamics: What's "really" moving and where is it going?

Poster presentations: (Provide names of all authors, title, sponsoring organization, extent of peer-review and location and date of presentation.)

Poster presentations (Rongish, presenting author) at national and international meetings:

- Rongish, B.J. and R.J. Tomanek. The effect of age on left ventricular compliance in Fischer 344 male rats. The Federation of American Societies for Experimental Biology (FASEB), 1989.
- Rongish, B.J., Torry, R.J., Tucker, D.C., and R.J. Tomanek. Progression of angiogenesis in fetal hearts cultured in oculo. The Federation of American Societies for Experimental Biology (FASEB), 1991.
- Rongish, B.J., Torry, R.J., Connell, P.M., and R.J. Tomanek. Thyroxine does not influence neovascularization of unloaded fetal rat hearts cultured in oculo. The Federation of American Societies for Experimental Biology (FASEB), 1992.

- Rongish, B.J., Torry, R.J., McCarthy, C.M., and R.J. Tomanek. Mammalian coronary microvessel formation in utero and in oculo. The Federation of American Societies for Experimental Biology (FASEB), 1993.
- Rongish, B.J., and R.J. Tomanek. Potential roles for laminin and fibronectin in hearts developing in vitro and coronary neovascularization of embryonic rat hearts developing in vitro and in oculo. The Federation of American Societies for Experimental Biology (FASEB), 1994.
- Rongish, B.J., Bouchey, D., Drake, C.J., and C.D. Little. Purification of the JB3 antigen, a putative avian fibrillin, and its involvement in valvuloseptal morphogenesis. American Society for Cell Biology (ASCB) Meeting, December, 1995.
- Rongish, B.J., Drake, C.J., Argraves, W.S., and Little, C.D. Purification and characterization of embryonic avian fibrillin-2. American Society for Cell Biology (ASCB) Meeting, 1996
- Rongish, B.J. and W.H. Kinsey. Biphasic activation of phospholipase C following fertilization in the sea urchin. American Society for Cell Biology (ASCB) Meeting, Dec. 1998.
- Rongish, B.J., Czirok, A., and Little, C.D. Computational biology of fibrillin assembly during primary axis formation. American Society for Matrix Biology (ASMB) meeting, November, 2002, Houston.
- Rongish, B., Czirok, A., and Handford, P. Disrupting fibrillin assembly leads to cardiovascular malformations: a computational, time-lapse imaging approach. Weinstein Cardiovascular Development Meeting, Leiden, Netherlands, May 13, 2004.
- Rongish, B.J., Czirok, A., Filla, M.B., Richard, E.C., Chevront, T.J., Handford, P. The dynamics of ECM assembly in early avian heart morphogenesis. 2005 Weinstein Cardiovascular Development Meeting, Tucson, AZ
- Zamir, E.A., Czirok, A., Cui, C., Little, C.D., and Rongish, B.J. Dynamics of ECM rearrangements during embryonic axis patterning. Theoretical Biology and Mathematics Gordon Research Conference, Lucca, Italy, June 22-27th, 2008.

Poster presentations (by collaborators and trainees) at national and international meetings:

- Czirok, A., Rupp, P.A., Rongish, B.J., and Little, C.D. Vasculogenesis in avian embryos: endothelial cell behavior and pattern formation. LXVII Cold Spring Harbor symposium on Quantitative Biology (May 29 – June 3, 2002)
- Czirok, A., Rupp, P.A., Rongish, B.J., and Little, C.D. Multi-field 3D Scanning light microscopy of early avian embryogenesis at cellular resolution. American Society for Cell Biology (ASCB) meeting, December 14-18, 2002.
- Czirok, A., Rongish, B.J., and Little, C.D. Dynamics of in situ fibrillin filament assembly during vertebrate segmentation. American Society for Cell Biology (ASCB) meeting, December 14-18, 2002.
- Sivakumar, P., Rongish, B.J., Czirok, A., Divakara, V., Peters, D.M., Mosher, D.F., Humphries, M.J., Dallas, S.L. Dynamic Imaging of Interactions between LTBP1 and Fibronectin in Bone Cells. Gordon Conference on Elastin and Elastic Fibers. July 2003, Meriden, NH.
- Sivakumar, P. Rongish, B.J., Czirok, A., Divakara, V., Peters, D.M., Dallas, S.L. (2004). Dynamic Imaging of Bone Extracellular Matrix Proteins in Living Osteoblasts. Abstract#2978. IADR/AADR meeting, March 2004, Honolulu. Hawaii
- Kozel, B.A., Rongish, B.J., Little, C.D., Czirok, A., and Mecham, R.P. Elastin Self-Assembly: A New Model for Elastic Fiber Formation. Federation of European Connective Tissue Societies (FECTS) meeting, Italy, Summer 2004
- Mecham, R.P., Kozel, B.A., Rongish, B.J., and Czirok, A.C. Time-lapse imaging of elastic fiber formation: developing a paradigm for matrix assembly. ASMB, San Diego, November, 2004.
- Dallas, S.L., Sivakumar, P., Divakara, V., Czirok, A., and Rongish, B.J. New insights into bone extracellular matrix assembly from dynamic computational imaging in living osteoblasts. ASMB, San Diego, November 2004.

- Sivakumar, P., Rongish, B.J., Czirok, A., Divakara, V., Peters, D.M., Dallas, S.L. (2005). Dynamic Interactions of Fibronectin with Latent Transforming Growth Factor Beta Binding Protein-1. American Association of Anatomists/Experimental Biology Meeting, 2005. San Diego, April 1-5, 2005
- Czirok, A., Richard, E.C., Filla, M.B., Chevront, T.J., Reinhardt, D.P., Handford, P. and Rongish, B.J. The dynamics of ECM assembly in early avian embryos. Experimental Biology meeting, San Diego, April, 2005
- Wagenseil, J.E, Kozel, B.A., Rongish, B.J., Czirok, A., Mecham, R.P. Real-time imaging of elastic fiber assembly. Experimental Biology meeting, San Diego, April, 2005
- Zamir, E.A., Czirok, A., Rongish, B.J., and Little, C.D. A digital image based method for computational tissue fate mapping during early avian morphogenesis. 2005 Summer Bioengineering Conference, Vail, Colorado, June 2005.
- Zamir, E.A., Czirok, A., Rongish, B.J., and Little, C.D. Image-based computational tissue fate mapping during avian development. The Second USNCB Symposium on Frontiers in Biomechanics, Vail, Colorado (2005).
- Zamir, E.A., Czirok, A., Rongish, B.J., Little, C.D. Endothelial cell dynamics and tissue biomechanics during vasculogenesis. September 2005, XXI Latinorum Investigatorum de Arteriis Colloquium, Abbazia Di Rosazzo, Udine, Italy.
- Zamir, E.A., Cui, C., Czirok, A., Rongish, B.J., and Little, C.D. Image-based computational tissue fate mapping during avian gastrulation. Oral presentation, AAAS meeting, St. Louis, MO, February 18, 2006.
- Wagenseil, J.E., Kozel, B.A., Mecham, R.P., Czirok, A., and Rongish, B.J. Elastic fiber formation: a dynamic view. Oral presentation, AAAS meeting, St. Louis, MO, February 18, 2006.
- Dallas, S.L., Sivakumar, P., Divakara, V.P., Thiyagarajan, N., Rongish, B.J., and Czirok, A. Dynamic imaging of matrix assembly and reorganization in living osteoblasts. Oral presentation, AAAS meeting, St. Louis, MO, February 18, 2006.
- Cui, C., Rongish, B., Lansford, R., and Little, C. New empirical cell motion data from avian gastrulae reveal striking exceptions to "classical" concepts of gastrulation. Oral presentations in Presley-Zeiss Postdoctoral Award Platform Presentation and the Growth and Development Session, EB2006, San Francisco, April 2006.
- Zamir, E.A., Czirok, A., Cui, C., Rongish, B.J., and Little, C.D. The effects of tissue deformations on mesodermal cell migration and vascular patterning during early embryogenesis. Workshop on Angiogenesis, NeoVascularization and Morphogenesis, Institute for Pure and Applied Mathematics, UCLA, May 8, 2006
- Zamir, E.A., Czirok, A., Cui, C., Little, C.D., and Rongish, B.J. Dynamics of ECM rearrangements during embryonic axis patterning. Institutional Development Award (IdeA) symposium, Washington, D.C., July 20-22nd, 2006
- Sivakumar, P., Zamir, E., Rongish, B.J., Czirok, A., Thiyagarajan, N., and Dallas, S.L. Time lapse imaging of fibronectin assembly dynamics in living osteoblasts and calvarial explants. ASBMR 2006
- Cui, C., Little, C.D., and Rongish, B.J. Positional fate map reveals a unified heart forming region. EB2007. Dr. Cui was selected as a finalist for the Presley-Zeiss Postdoctoral Fellow Presentation Award and as a platform speaker in the Session "Patterning in Development", April 2007
- Zamir, E.A., Rongish, B.J., and Little, C.D. Time-lapse microscopy of epiblast cell sheet and sub-epiblastic ECM reveals correlated morphogenetic motion patterns during avian primitive streak formation. Southeast Regional Society for Developmental Biology, Atlanta, GA, April 2008.
- Aleksandrova, A., Cui, C., Lansford, R.D., Little, C.D. and Rongish, B.J. Computational imaging of heart morphogenesis in vivo. Cardiac Development and Regeneration Meeting, Boston, MA, October 10-11, 2008. Ms. Aleksandrova received a Student Travel Scholarship from the KUMC Office of Academic Affairs (\$474.00)

Poster presentations at local and regional meetings

Rongish, B.J., Czirok, A., and Little, C.D. ECM Dynamics In Vivo: A Time-Lapse Computational Approach. Midwest Developmental Biology (MWDB) meeting, Kansas City, MO 2004

Poster presentations (by collaborators and trainees) at local and regional meetings:

Sivakumar, P., Rongish, B.J., Czirok, A., Divakara, V., Peters, D.M., Dallas, S.L. Dynamic imaging of bone extracellular matrix proteins in living osteoblasts. Kansas City Area Life Sciences Institute (KCALSI) Research Day, Kansas City, April 2004.

Sivakumar, P., Rongish, B.J., Czirok, A., Divakara, V., Dallas, S.L. New Insights into Bone Extracellular Matrix Assembly from Dynamic Computational Imaging in Living Osteoblasts. KCALSI Research Day, Kansas City, April 2005.

Invited seminars at other universities: (Provide title, sponsoring organization or institution, and date of presentation.)

- 07/24/02 Oral Biology Department, School of Dentistry, University of Missouri, Kansas City. Title: Dynamic imaging of fibrillin fibril assembly during embryogenesis.
- 10/12/04 Biology Department, Eotvos University, Budapest, Hungary. Title: Dynamic analysis of ECM organization and function in avian gastrulae.
- 12/01/04 Department of Anatomy, McGill University, Montreal, Quebec. Title: Dynamic analysis of fibrillin organization and function in avian embryos.
- 05/06/05 Department of Cell Biology and Anatomy, Washington University School of Medicine. Title: Dynamic imaging of ECM assembly and avian embryogenesis.”
- 10/11/06 Department of Biochemistry, Kansas State University, Manhattan, KS. Title: Extracellular matrix dynamics in vivo
- 05/14/07 Department of Anatomy, University of South Carolina, Columbia, SC. Title: Computational imaging of avian heart development
- 11/12/08 Department of Oral Biology, University of Missouri – Kansas City School of Dentistry Title: Computational imaging reveals unexpected embryonic cell dynamics: What’s “really” moving and where is it going?
- 2/25/09 Center for Biological Physics, Arizona State University, Tempe, AZ. Title: Deciphering the Embryo’s Biomechanical Morphogenetic Code
- 06/04/09 Children’s Memorial Research Center, Northwestern University Feinberg School of Medicine, Chicago, IL. CMRC Distinguished Lecturer seminar series. (pending)

KUMC invited seminars:

- 9/25/06 Department of Physiology, University of Kansas Medical Center, Kansas City, KS. Title “Extracellular matrix dynamics in vivo.”
- 9/04/08 Tenure Review Seminar: Department of Anatomy and Cell Biology, University of Kansas Medical Center, Kansas City, KS. Title: Computational imaging reveals unexpected embryonic cell dynamics: What’s “really” moving and where is it going?

4. Other evidence of scholarship

(includes clinical guidelines, policy documents, contributions to significant position statements by professional organizations, and development of national examinations)

Development and Sharing of Research Resources

For the past eight years, my colleagues in the Department of Anatomy and Cell Biology (C. Little; A. Czirok) and I have worked to develop software to permit widefield time-lapse imaging of embryogenesis in vivo. We have formed what we term the “Computational Imaging Group”. Wide-field imaging refers to our custom software’s ability to resolve objects over four orders of magnitude – from the cell to the tissue level. The software package includes custom code for image acquisition and image processing. Custom code is currently being written for semi-automated cell tracking. This code is superior to commercial packages in that it specifically addresses the unique and complex challenges of imaging a moving, growing embryo – which is changing from a two-layered disk to a three dimensional organism.

The original command line code was conceptualized by Dr. Czirok, a biological physicist and postdoctoral fellow in Dr. Little’s lab; in response to the vision of Dr. Little to perform in vivo time-lapse imaging of avian embryos. When I joined the team as a research assistant professor in 2000, we continued to develop and use Andras’ code to make preliminary time-lapse movies. After I received NIH level funding, Dr. Little and I decided to hire a systems analyst to develop the original command line code into a software package that would work across platforms; and be accessible to the “average” person. The systems analyst worked with Dr. Little and I to develop a more streamlined and robust package, with graphical user interfaces; yet which maintained the flexibility for advanced users. This effort represented a major focus of time, effort, and the combined funds of Dr Little and I. The Mathers Charitable Foundation has been a major stakeholder in this process, providing additional funds for the expensive time-lapse workstations (automated microscopes), data servers, computational computer nodes, and salary for the systems analyst. Dr. Czirok has since become an assistant professor and is concentrating on establishing his own lab, while continuing to use the imaging workstations in the Little and Rongish labs.

The intent of Dr. Czirok, Little and I is to advance available technology with respect to in vivo imaging, and to share open source code with any interested member of the scientific community. To date, there are four other groups using this software: Olivier Pourquie (Stowers Institute for Medical Research), Evan Zamir (a former postdoc in the group and currently an assistant professor at Georgia Tech), Rusty Lansford (Caltech Beckman Institute) and Robert Mecham (Washington University School of Medicine). For these colleagues, we have provided advice on purchasing equipment, and have installed and tested the software on the purchased equipment - writing additional code as needed. Testing includes conduction of several in vivo imaging runs over 48 hour periods of time. After imaging was established at our colleague’s home institutions, we and our team members have provided continuing maintenance of these systems. Despite the amount of time required (several weeks per installation); we strongly feel this may be one of the most important contributions we can make to the scientific community – the empowerment of other investigators to direct their own imaging studies of the processes and events important to their own research programs.