

CURRICULUM VITAE

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Education

- 1965 B.S., Chemistry Wake Forest University, Winston-Salem, NC
- 1969 Embryology Course Marine Biological Library, Woods Hole, MA
- 1970 Ph.D., Biochemistry Wake Forest University Medical Center, Winston-Salem, NC
- 1970 Postdoctoral, Chemistry Florida State University, Tallahassee, FL
- 1973 NSF: Molecular Techniques UC-San Diego, La Jolla, CA
for Developmental Biologists

Professional Experience

- 1965, Summer Research Assistant (with Dr. R.W. Cowgill)
Dept. of Biochemistry, Bowman Gray School of Medicine
Winston-Salem, North Carolina
- 1965-1970 Graduate Assistant, Biochemistry (on fellowship, with Dr. C.F. Strittmatter)
Wake Forest University Medical Center
Winston-Salem, NC
- 1970-1972 Research Associate (with Dr. Earl Frieden)
Dept. of Chemistry
Florida State University
Tallahassee, FL
- 1972-1977 Assistant Professor & Graduate Faculty (Tenure, 1977)
Department of Zoology
Univ. of Wisconsin-Milwaukee
Milwaukee, WI
- 1975-1977 Member, Center for Great Lakes Studies,
Univ. of Wisconsin
Milwaukee and Madison, WI
- 1977-1985 Associate Professor (Tenure, 1979)
Department of Biochemistry and Molecular Biology
Univ. of Oklahoma Health Sciences Center (OUHSC)
Oklahoma City, OK

- 1977- Associate Professor of Dental ,Biochemistry
College of Dentistry, OUHSC
- 1977- Member of the Graduate Faculty,
University of Oklahoma
- 1983 Faculty (Lecturer)
Embryology Course, Marine Biological Laboratory
Woods Hole, MA
- 1985- Professor of Biochemistry and Molecular Biology
University of Oklahoma Health Sciences Center
- 1988- Adjunct Professor
Department of Pediatrics, College of Medicine
University of Oklahoma Health Sciences Center
- 1989, 1990 Senior Scientist, IPA
National Institutes of Health
NIDDK, Div.of Kidney, Urologic and Hematologic Diseases, Bethesda
- 1989-1997 Guest Worker/Senior Scientist
National Institutes of Health, Laboratory of Chemical Biology, NIDDK
Bethesda, MD
- 1991-1999 Assistant Director
M.D./Ph.D. Program, College of Medicine
University of Oklahoma Health Sciences Center
- 1999-2001 Visiting Scientist
Free Radical Biology & Aging Research Program
Oklahoma Medical Research Foundation
Oklahoma City, OK
- 2001-2008 Research Member/Adjunct
Free Radical Biology & Aging Research Program
Oklahoma Medical Research Foundation

Other Experience

- Sabbatical, Marine Biological Laboratory, Woods Hole,
Massachusetts, 6/83 - 11/83.
- Invited Participant, Gordon Conference on Red Cells, Plymouth State
College, Plymouth, New Hampshire, 1985, 1987, 1989.
- Invited Speaker, International Conference on *New Trends in the Treatment of
Hemoglobinopathies and Thalassemias*, Paris, France, September 8-12, 1994.
- Invited Session Chair, 10th NIH Conference on Hemoglobin Switching, 1996
- Invited Participant, NIH Hemoglobin Switching Conferences, Airlie House, Virginia, &
University of Washington, Seattle/Rosario Resort, Orcas Island, WA, 1978,
1980, 1982, 1984, 1986, 1988, 1990, 1992, 1994, 1996, 2000, 2004
- Invited Participant/Presenter, 13th NIH Conference on Hemoglobin Switching, St. John's
College, Oxford, England, September 11, 2002.

Invited Speaker, International Biolron Society World Congress, Prague, Czech Republic, Nov 2005

Invited Speaker, Presidential Symposium, IBIS World Congress, Kyoto, Japan, 2007

Invited Speaker, Novel Approaches/Therapeutics, IBIS Congress, Porto, Portugal, 2009

President, *The Sickle Cell Cure Foundation, Inc.*, 2006 – present.

Professional Societies

American Association for the Advancement of Science, 1965-present

American Association of Laboratory Animal Science, 1987

American Association for Cancer Research, 2004 -2006

American Chemical Society, 1966-1972

American Society of Biological Chemists, 1985-present (2003- Inactive)

American Society for Cell Biology, 1977-2001

American Society of Gene Therapy, 1998-present (2003- Inactive)

American Society of Hematology, 1986-present

American Society for Microbiology, 1986-1988

American Society of Zoologists, 1971-1994

International Biolron Society, 2003-

International Society of Differentiation, 2000-

International Society for Stem Cell Research, 2004-

New York Academy of Sciences, 1978-1980: 1990-1992

Oklahoma Academy of Sciences, 1981-1982

Oxygen Society, 2000-2001

Society for Developmental Biologists, 1973-present

Society for Free Radical Biology & Medicine, 2002-

Society for Experimental Biology and Medicine, 1978-1980

Society of Sigma Xi, 1973-present; Chapter President, 1991-92; Past Pres., 1992-

Awards and Honors (See list of Research Grants Received and Patents, below.)

Honorary Scholarship, Wake Forest College 1961-1963

Honorary Fraternities (undergraduate), chemistry and mathematics 1963-1965

NDEA Title IV Predoctoral Fellowship 1965-1968

Wilder Fellowship, Bowman Gray School of Medicine 1968-1970

NIH Postdoctoral Fellowship (Individual NRSA) 1970-1972

Elected to Sigma Xi (Marquette Chapter) 1973

Nominee, Aesculapian Award (for teaching), College of Medicine, Univ. of Oklahoma Health Sciences Center 1979

Distinguished Service Award, Dept. of Bioc. & Mol. Biol., Univ. of Oklahoma Health Sciences Center 1982

Elected to membership, American Society of Biological Chemists 1985

Elected to membership, American Society of Hematology 1986

MASUA (Mid-America State Universities Association) Honor Lecturer 1988-89

Honorary Biographical Listings:

American Men & Women of Science, 19th Edition

Who's Who in the South and Southwest, 24th Edition

Who's Who in American Education, 5th Edition

Who's Who in the World, 13th Edition

Who's Who in Science and Engineering, 2nd Edition
Intrntl. Directory of Distinguished Leadership, 6th Ed.(nominated)
Men of Achievement, 17th Edition (nominated)
Who's Who in America, 64th Edition

Areas of Primary Interest

Regulation of gene expression as applied to sickle cell disease, cancer, neuro- & cardiovascular diseases

Organ culture techniques, especially as applied to liver

Stem cell differentiation and molecular engineering by gene regulation therapy

Research Funding

Current

The Sickle Cell Cure Foundation, Inc.

Title: "Gene Regulation Therapy for SCD Utilizing Ferritin Heavy Chain"

Status: Current/On-going

Role: Principle Investigator

Pending/Contemplated

NIH, NHLBI/NIDDK

Title: "De-Repression of Gamma-Globin by a Beta-Globin Repressor"

Grant # 1 R01 HL073448-01 being reformatted for ongoing PA's

Status: Approved-but-not-funded/In revision.

Role: Principal Investigator

NIH, NIA

Title: "Aging and Parkinson's: Iron Chelation by Ferritin H"

Grant #: 1 R21 AG025395-01A2

Status: Approved-but-not-funded. (Possibly resubmit as new project.)

Role: Principal Investigator

NIH, NIDDK/NCI

Title: "Nutritional Initiation and Inhibition of Carcinogenesis in Liver Organ Cultures"

Grant #: 1 R21 DK074393-01A1

Status: Approved-but-not-funded/In revision. Reviewed but not scored

Role: Principal Investigator

Previous/Completed Support

NIH, NCI

Title: "Free Radicals and Choline-Deficient Liver Carcinogenesis"

Grant #: 5 R01 CA082506-S2

Status: Funded Period: 02/01/2001 - 01/31/2008

Role: Co-Investigator

NIH, NCI

Title: "Organotypic Liver Cultures and Hepatocarcinogenesis"

Grant #: 3 R01 CA082506-02S

Status: Funded Period: 02/01/02-01/31/2005

Role: Co-Principal Investigator

American Heart Association

Title: "Elucidation of the Function and Regulation of Ferritin in Atherosclerotic Lesions"

Grant #: AHA 0110280Z (Fellowship for Visar Belegu)

Status: Funded Period: 07/01/01 - 6/30/03 Role: Principal Investigator

Center for Molecular Medicine, Oklahoma Center for the Advancement of Science and Technology; and the Presbyterian Health Foundation

Title: "Advanced Topics in Human Molecular Genetics"

Grant type: Educational grants

Status: Funded Period: 07/01/92 – 6/30/2000

Role: Principal Investigator/Course Director

These funds allowed 12 – 15 outside speakers to be brought to campus each spring semester to meet with our graduate students who had read and discussed their papers ahead of the visit. In 7 years, 100 nationally known experts were brought to Oklahoma including 12 Nobel Laureates, 35 National Academy members, and 14 HHMI Investigators.

NIH, NIDDK, 1976-1989

Grant Number	PI Name	Project Title
1R01AM019232-01	BROYLES, ROBERT	<u>DIFFERENTIATION OF RED BLOOD CELLS IN VITRO</u>
7R01AM021386-01	BROYLES, ROBERT	<u>DIFFERENTIATION OF RED BLOOD CELLS IN VITRO</u>
5R01AM021386-02	BROYLES, ROBERT	<u>DIFFERENTIATION OF RED BLOOD CELLS IN VITRO</u>
5R01AM021386-03	BROYLES, ROBERT	<u>DIFFERENTIATION OF RED BLOOD CELLS IN VITRO</u>
3R01AM021386-03S1	BROYLES, ROBERT	<u>DIFFERENTIATION OF RED BLOOD CELLS IN VITRO</u>
1R01AM021764-01	BROYLES, ROBERT	<u>REGULATION OF HB SWITCHING IN VIVO AND IN VITRO</u>
5R01AM021764-02	BROYLES, ROBERT	<u>REGULATION OF HB SWITCHING IN VIVO AND IN VITRO</u>
3R01AM021764-02S1	BROYLES, ROBERT	<u>REGULATION OF HB SWITCHING IN VIVO AND IN VITRO</u>
5R01AM021764-03	BROYLES, ROBERT	<u>REGULATION OF HB SWITCHING IN VIVO AND IN VITRO</u>
2R01AM021764-04A1	BROYLES, ROBERT	<u>REGULATION OF HB SWITCHING IN VIVO AND IN VITRO</u>
5R01AM021764-05	BROYLES, ROBERT	<u>REGULATION OF HB SWITCHING IN VIVO AND IN VITRO</u>
5R01DK021764-06	BROYLES, ROBERT	<u>REGULATION OF HB SWITCHING IN VIVO AND IN VITRO</u>

NOAA, U.S. Sea Grant Program

Title: "Effects of Polychlorinated Biphenyls on the Early Development of Lake Trout and Other Great Lakes Fishes"

Grant type: Project Grant

Status: Funded

Period: 7/01/75 – 6/31/77

Role: PI/Project Director

Research Corporation

Title: "Effect of Thyroid Hormones on the Metamorphic Hemoglobin Transition"

Grant type: Cottrell Grant

Status: Funded

Period: 10/01/73 – 9/30/75

Role: Principal Investigator

Wisconsin Alumni Research Foundation (WARF)

Title: "Regulation of Globin Gene Expression in the Developing Bullfrog *Rana catesbeiana*"

Grant type: Start-up Funding, UW-Milwaukee

Status: Funded

Period: 9/01/72 – 8/31/75

Role: Principal Investigator

Intramural Grants, 1974 – 1994

Graduate College, UW-Milwaukee, and
Center for Great Lakes Studies, UW

Title: "Effects of the Lampricide TFM on Red Blood Cell Differentiation of the Sea Lamprey
Petromyzon marinus and of Graet Lakes Fishes"

Grant type: Seed Grant

Status: Funded

Period: 7/01/74 – 6/30/76

Role: Principal Investigator

College of Medicine, University of Oklahoma Health Sciences Center

Title: "Regulation of Hemoglobin Synthesis in Red Blood Cells Differentiating *In Vitro*"

Grant type: Small Grant

Status: Funded

Period: 10/01/77 – 9/30/78

Role: Principal Investigator

Research Council, Univ. of Oklahoma Health Sciences Center

Title: "An *In vitro* Approach to Studying Hepatocarcinogenesis"

Grant type: Seed Grant

Status: Funded

Period: 07/01/81 – 06/30/82

Role: Principal Investigator

OU Associates Fund, Univ. of Oklahoma Health Sciences Center

Title: "Cloning of a Set of Developmentally-Regulated Genes: A Tool for Deciphering Gene
Control Mechanisms"

Grant type: Seed Grant

Status: Funded

Period: 07/01/82 - 06/30/83

Role: Principal Investigator

Presbyterian Health Foundation

Title: "Regulation of hemoglobin Switching *In vivo* and *In vitro*"

Grant type: Seed Grant

Status: Funded

Period: 07/01/86 – 6/30/88

Role: Principal Investigator

Presbyterian Health Foundation

Title: "Regulation of hemoglobin Switching *In vivo* and *In vitro*"

Grant type: Approved-but-not-funded

Status: Funded

Period: 07/01/88 – 06/30/89

Role: Principal Investigator

Presbyterian Health Foundation

Title: "Silencing Sickle Cell: A Repressor of the Human Beta Globin Gene"

Grant type: Seed Grant

Status: Funded

Period: 07/01/91 – 10/30/92

Role: Principal Investigator

Provost's Office, OUHSC

Title: "Silencing Sickle Cell: A Repressor of the Human Beta Globin Gene"

Grant type: Postdoctoral Fellowship Award/Matching Funds

Status: Funded

Period: 05/01/92 - 04/30/93

Role: Principal Investigator

Invited Presentations

- | <u>Date</u> | <u>Institution/location/society</u> |
|----------------|--|
| 1. Mar.,1972 | Zoology, Univ.of Wisconsin-Milwaukee |
| 2. Feb.,1973 | Biochemistry, Medical College of Wisconsin |
| 3. Apr.,1974 | 17 th International Conference on Great Lakes Research, Hamilton, Ontario |
| 4. June,1975 | Biochemistry, Bowman Gray School of Medicine, Wake Forest Univ., Winston-Salem, NC |
| 5. Nov.,1975 | Biology, Carroll College, Waukesha, WI |
| 6. Nov.,1976 | Biochemistry and Molecular Biology, Univ. of Oklahoma Hlth. Sci. Ctr. |
| 7. Mar.,1977 | 20 th International Conference on Great Lakes Research, Ann Arbor, MI |
| 8. Mar.,1978 | ICN-UCLA Symposium, Hemopoietic Cell Differentiation, Keystone, Colorado |
| 9. June,1978 | 1 st NIH Conference on Hemoglobin Switching, Battelle Institute, Seattle,WA |
| 10. Apr.,1979 | Biochemistry, Texas Tech Univ. School of Medicine, Lubbock |
| 11. Nov.,1979 | Noble Foundation, Biomedical Branch, Ardmore, Oklahoma |
| 12. Mar.,1980 | Developmental Biology Group, Dept. of Zoology, Univ. of Texas at Austin |
| 13. June,1980 | 2 nd NIH Conference on Hemoglobin Switching, Airlie House, Virginia |
| 14. Feb.,1981 | Biology, Pennsylvania State Univ., University Park, PA |
| 15. Mar.,1981 | Oklahoma Medical Research Foundation, Oklahoma City |
| 16. July,1982 | Biochemistry, Bowman Gray School of Medicine, Wake Forest Univ., Winston-Salem, NC |
| 17. Sept.,1982 | 3 rd NIH Conference on Hemoglobin Switching, Rosario Resort, Orcas Is., WA |
| 18. Oct.,1982 | Anatomical Sciences, Univ. of Oklahoma Health Sciences Center, Oklahoma City |
| 19. Nov.,1982 | Immunology Discussion Group (Drs. Paul Kincaid and Robert A. Good), Oklahoma Medical Research Foundation (OMRF), Oklahoma City |
| 20. Aug.,1983 | Embryology Course, Marine Biological Laboratory, Woods Hole, Massachusetts
Two lectures |
| 21. Oct.,1983 | Hematology, Dept. of Medicine, Harvard Med.Sch., Brigham & Women's Hospitals, Boston, MA |
| 22. Oct.,1983 | Biology, Mt. Holyoke College, South Hadley, MA |
| 23. Nov.,1983 | Biological Sciences Division, Univ. of Connecticut, Storrs |
| 24. Oct.,1984 | 4 th NIH Conference on Hemoglobin Switching, Airlie House, Virginia |
| 25. Aug.,1985 | Gordon Conference on Red Cells, Plymouth State College, Plymouth, NH |
| 26. Nov.,1985 | Anatomical Sciences, Univ. of Oklahoma Health Sciences Center, Oklahoma City |
| 27. Dec.,1985 | Biochemistry & Molecular Biology, OUHSC |
| 28. Dec.,1985 | Hematology Section, Dept. of Medicine, OUHSC |
| 29. Sept.,1986 | Biological Sciences, Texas A & M Univ., College Station |
| 30. Oct.,1986 | 5 th NIH Conference on Hemoglobin Switching, Airlie House, Virginia |
| 31. Oct.,1986 | Zoology, Univ. of Oklahoma, Norman |
| 32. Oct.,1986 | Mid-America Molecular Biology Colloquium, OUHSC, Shangri-La Rst., Afton, OK |
| 33. Nov.,1986 | Biochemistry & Molecular Biology, OUHSC |
| 34. Aug.,1987 | Gordon Conference on Red Cells, Plymouth State College, Plymouth, NH |
| 35. Sept.,1987 | Physiology & Biophysics, OUHSC |
| 36. Oct.,1987 | 2 nd Mid-America Molecular Biology Colloquium, OUHSC, Waterford Hotel, Oklahoma City |
| 37. Feb.,1988 | Hematology/Oncology, Dept. of Medicine, OUHSC |
| 38. Feb.,1988 | Biomedical Research Symposium, Presbyterian Health Foundation, Oklahoma City
(<u>platform presentation</u>) |
| 39. Mar.,1988 | National Institutes of Health, NIDDK, Div. of Kidney,Urologic & Hematologic Diseases, Bethesda, MD |
| 40. Sept.,1988 | 6 th NIH Conference on Hemoglobin Switching, Airlie House, Virginia |
| 41. 1988-89 | MASUA (Mid-America State Universities Association) Honor Lecturer. Presentations on Developmental Regulation of Globin Genes. |
| 42. Nov.,1988 | Depts. of Anatomy and Biochemistry, Univ. of Nebraska Med. Ctr., Omaha |
| 43. Apr.,1989 | Anatomy and Cell Biology, Univ. of Kansas Med. 4Ctr., Kansas City |

44. Apr., 1989 Genetics Section, Dept. of Medicine, Johns Hopkins Univ. School of Medicine, Baltimore
45. May, 1989 Laboratory of Chemical Biology, NIDDK, NIH, Bethesda, MD
46. Aug., 1989 Gordon Conference on Red Cells, Plymouth State College, Plymouth, NH
47. Oct., 1989 Biochemistry, Bowman Gray School of Medicine, Wake Forest Univ., Winston-Salem, NC (In honor of the retirement of Dr. C.F. Strittmatter)
48. June, 1990 7th NIH Conference on Hemoglobin Switching, Airlie House, Virginia
49. Mar., 1992 Lady Davis Institute for Medical Research, McGill University, Montreal, Quebec
50. June, 1992 8th NIH Conference on Hemoglobin Switching, Rosario Resrt, Orcas Is., WA
51. July, 1992 Pediatrics, Univ. of Maryland at Baltimore
52. Nov., 1992 Laboratory of Chemical Biology, NIDDK, National Institutes of Hlth, Bethesda, MD
53. Feb., 1993 Genetics, Endocrinology and Metabolism Sections, Dept. of Pediatrics, OUHSC
54. Mar., 1993 Biology, Univ. of Tulsa, Tulsa, Oklahoma
55. Nov., 1993 Biochemistry & Molecular Biology, OUHSC
56. June, 1994 9th NIH Conference on Hemoglobin Switching, Rosario Resort, Orcas Is., WA
57. Sept., 1994 INSERM/NIH/WHO/Conference on Sickle Cell Disease & Thalassemias, Paris, France
58. Nov., 1994 Biochemistry, Oklahoma State Univ., Stillwater
59. Jan., 1995 Physiology & Biophysics, OUHSC
60. Sept., 1995 Grand Rounds, Dept. of Pediatrics, OUHSC
61. June, 1996 10th NIH Conf. on Hemoglobin Switching, Orcas Is., WA
62. Nov., 1996 Molec. & Cell. Biol. Prgm, Arizona State U., Tempe
63. Dec., 1996 Biochem. & Molec. Biol., Coll. of Med., OUHSC
64. Oct., 1998 11th NIH Conf. on Hemoglobin Switching, Rosario Resort, Orcas Is., WA
65. Nov., 1998 Free Radical Biol. & Aging Section, Oklahoma Medical Research Foundation
66. June, 2000 12th NIH Conf. on Hemoglobin Switching, Orcas Is., WA
67. Nov., 2000 Oxygen Society, San Diego, CA (platform presentation)
68. Dec., 2000 Free Radical Biology & Aging Section, Okla. Med. Res. Foundation
69. Feb., 2001 Biochemistry & Molecular Biology, Coll. Of Med., OUHSC
70. Nov., 2001 Soc. Free Radical Biol. & Med., Res. Triangle Park/UNC Chapel Hill, NC
71. Sept., 2002 Oklahoma Medical Research Foundation, Graduate Student Luncheon series
- 72- 74., Sept., 2002 13th NIH Conf. On Hemoglobin Switching, St. Johns Coll., Oxford, UK (3 present.)
75. Nov., 2002 East Coast Iron Club, Rockefeller University, New York, NY
76. Nov., 2003 East Coast Iron Club, University of Pennsylvania, Philadelphia, PA
77. Feb., 2003 Cell Cycle and Tumor Progression Group, OU Cancer Center
78. Nov., 2003 Chaired a session entitled "New (or Recent) Players in the Iron World: Hcpidin and Signaling between Liver, Gut and RE; Nuclear and Mitochondrial Ferritin," at the 13th annual meeting of the *East Coast Iron Club*, Univ Penn Med Center, Philadelphia.
79. Sept., 2004 14th NIH Conf. On Hemoglobin Switching, Rosario Resort, Orcas Is., WA
80. Feb., 2005 Free Radical Biology & Aging Monday Seminar, OMRF.
81. May, 2005 International Biolron Society (IBIS) World Congress, Prague, Czech Republic
82. Oct., 2005 Free Radical Biol. & Aging Section, Oklahoma Medical Research Foundation
83. Nov., 2005 East Coast Iron Club meeting, Johns Hopkins University School of Public Health, Baltimore, MD.
84. April, 2006 National Sickle Cell Disease Centers Pgm., St. Jude's, Memphis, Tennessee
85. April, 2006 Free Radical Biology & Aging Research Pgm., OMRF
86. Nov., 2006 Free Radical Biology & Aging Research Pgm., OMRF
87. Dec., 2006 Amer. Soc. of Hematology annual meeting, Orlando, Florida
88. Apr., 2007 Presidential Symposium, IBIS world Congress, Kyoto, Japan
89. Nov., 2007 Society Free Radical Biology & Medicine., Washington, D.C.
90. Sept., 2008 Sickle Cell Disease Association of America, New Orleans, LA
91. June, 2009 International Biolron (IBIS) World Congress, Porto, Portugal

Postdoctoral Fellows and Research Students Mentored

	<u>degree date</u>	<u>subsequent appointments</u>
<u>Postdoctoral Fellows</u>		
Biji T. Kurien, Ph.D.	1992-1994	OMRF, Senior Scientist
Wei-Xing Guo, M.D.,Ph.D.	2002-2005,Sr.Sci.	OMRF -----> Nashville, TN
<u>Ph.D. Students</u>		
Haitham Abd-El Moaty Visar Belegu (co-advisor/mentor)	Ph.D. Cand., BioEngineer. 2004	Grad. Student, OUHSC Postdoc → Faculty, Johns Hopkins Univ. Sch. Med/Kennedy Krieger Institute
Christina DeWitt Bourne (co-advisor)	2003	Postdoc, OUHSC, Dr. Adam Zlotnik
David J. Smith	1990	Major, U.S. Army
Phillip B. Maples	1984	Postdoc, E.Goldwasser (NAS); Res., Baxter Hlth.Care; VP Research, Texas Health Care
Allan R. Dorn	1982	Postdoc, Robert Good (NAS) Fndr/Pres.,SeptraTek, OKC; Res.Sctst, SeraDyne;
<u>M.D. Students</u>		
Sandeep Shah	2002	Presb/Harris Schlr, 1999; Resident, Univ. of Chicago, Ophthalmology;
Frederick Blair	1997	Presb/Harris Schlr, 1992; Resident,UCLA;
Anna M. Likos	1995	Presb/Harris Schlr, 1992; Resident, Yale
Donna Sexton Jackson	1990	Presb/Harris Schlr, 1988; March of Dimes Schlr,1988; Resident, Pediatrics, OUHSC
Lorenz T.H. Ramseyer	1989	Presb/Harris Schlr,1986,1987 March of Dimes Schlr,1986; Resident, Radiology, OUHSC; Private Practice, Radiology, Enid, OK
Robert N. Jarman	1989	Presb/Harris Schlr, 1987; Resident, Radiology, OUHSC
Virginia Stark-Vancs	1987	March of Dimes Schlr, 1984 NIH/HHMR Schlr,1985-86 Intern/Res,Georgetown,1987-89 Fellow/Sr. Invest, NCI, 1989-96 Member, Texas Cancer Care, 1996-98 Arlington Cancer Ctr./Dallas/Ft.Worth Director of Clinical Research, Harris Methodist Oncol.
Gary R. Kindell	1984	Intern/Res, UT-SW, Dallas
<u>M.S. Students</u>		
Visar Belegu	2001	Ph.D. candidate
Christina DeWitt	2000	Ph.D. candidate
Kimberely D.Kyker	1995	Tech., Dr. Hurst, OUHSC
Donna Sexton(Mentor;advisor,Unger)	1987	M.D., OUHSC
David J. Smith	1985	Ph.D., OUHSC
Phillip B. Maples	1981	Ph.D., OUHSC
Allan R. Dorn,	1977 (Zool.) 1979	UW- Milwaukee Ph.D., OUHSC
Gary R. Kostlan	1977, UW-Milw.	Dir.,Qual.Cont.,Borden
Keith C. Meyer	1977, UW-Milw.	M.D., UW-Madison
Martin I. Noveck	1977, UW-Milw.	M.D., UW-Madison

Martin F. Messar	1977, UW-Milw.	Chair, Sci. Dept., Luck, WI
William J. Saucier	1976, UW-Milw.	M.D., UW-Madison
Michael J. Deutsch	1974, UW-Milw.	Astra Pharmaceuticals
<u>Undergraduates (incl. MORE and SURE students)</u>		
Emily Clarkson	2005, OU/Chem	Res., OMRF
Rebecca Craig-Schapiro Honors Thesis, OU	2005, OU Chem (Summa cum Laude)	MD/PhD, Washington Univ., St. Louis
Kathryn Harris	2002, U.Mass.	M.S., Chem., U.Mass, Amherst
Austin Roth	2002, U. Mass.	B.S., Chem., U. Mass, Amherst
Anthony Haney	1995	OU Med.Sch., 1996
Dana R. Stewart	1991-93	Univ. Central OK
Kari A. McBride	1987-88	Central State Univ
Gerda Breitwieser	1977	UW-Milw; Ph.D., Wash. Univ. Postdoc, UT-Galveston; Asst. & Assoc. Prof., Johns Hopkins Univ
Stuart Berger	1975	M.D., UW-Madison
Rita Pscheidt	1975	B.A., UW-Milw
Richard Reid	1974	B.A., UW-Milw.
Gintaris Dargis	1974-76	B.A., UW-Milw.

High School Students (incl. Minority Student Research Experience program)

John Wood	2008-2009	OSSM, Mentor Pgm.
Austin Roth	1999-2000	Classen Sch. Adv. Studies
Mairead Todd	1998	Classen Sch. Adv. Studies, Oklahoma City
Ashley Sides	1995	High Sch., Drumright, OK Ntl. Merit Scholar, OU-Norman
Jada Benn	1993-4	Notre Dame Univ.
Thuy H. Do	1986	B.S., Purdue Univ.
Kari A. McBride	1985-87	B.S., Nursing, Emory
Sherris A. Harris	1987, 1988	N.E. High Sch., OKC
Ha Do	1988	N.E. High Sch., OKC
Melba Moore (Jr. High Sch.)	1984	N.E. High Sch., OKC

Ph.D. Committee Membership (Other than Chair)

Haitham Ab Del Moaty	2007
Jason Larabee	2005
Scott Salsman	2005
Suresh Guruswamy	2003
Sheenan Lu	2001
Chris Brower	2001
Janis Lee	2000
Kent Robinson	1998
Taunia Lee (Pathology)	1997
Patti Benton (Microbiology & Immuno)	1996
Esther Kahn	1996
Martha Ogilvie	1995
Deepa Rungta	1995
Karl R. Hansen (Micro & Immuno)	1995
Chris Gaskins	1990
Tim Burn	1989
Kenneth Steadman (Anatomical Sci)	1988
Dania A. Yashanin (Micro & Immuno)	1988
Melanie L. Irwin Oakes	1983
Enriqueta R. Guinto	1983

Steven Demczuk	1982
Susan Gray (Pathology)	1981
Cydney L. Thorlton	1978
Steven Sikes	1976 (UW-Milw)

Ph.D. General Examination Committees

He, Feng	2008/2009
Kandice Tessneer	2008/2009
Yogesh Chuyake	2007/2008
Sara Katen	2006/2007
Andrea Parker	2005/2006
Alison Sismey	2005/2006
Jonathan Mine	2004/2005
Richard Longeras	2002/2004
Jean Elmendorf	1996/1997
Ki-Young Do	1993/1993
Sherri L. Smith	1984
Virginia Ann Dell	1982
Mike Azain	1982
Randy Nixon	1981

Ph.D. Initial Advisory Conference Committees

Ali Shilatifard	1991
Somi Cho	1991
Moonjae Cho	1991
Ki-Young Do	1991
Robert L. Brumley	1987
Jim Vigoreux	1983

M.S. Degree Committees (other than those chaired)

Donna Sexton Jackson	1988
Karen Carter	1981
Jeanene Handley	1981
David Vogt	1975 (UW-Milw)
Jim Igowsky	1975 (UW-Milw)

Laboratory Rotation Graduate Students (last 3 years, out of approx. 15 students total)

Monica Draper, 2005/2006 (with Dr. Robert Floyd)
 Beverly Holden, 2005/2006 (with Dr. Kenneth Hensley)

Teaching: Courses Originated/Directed/Taught

Approximately 13,800 students taught, 1972-2009.

<u>Courses taught</u>	<u>Years</u>	<u>University</u>
*Animal Biology (Zool.101,lect/lab)	1972-76	UW-Milwaukee
Biology of Man (Biol.102,guest lect.)	1974-76	UW-Milwaukee
History of Biology (Bot.414, one lect.) UW-Milwaukee	1973	
**Pblms in Developmental Biol.(Biol.420)	1974-76	UW-Milwaukee
**Cell Biology (Zool.211/lect. & lab.)	1976	UW-Milwaukee
**Cell Physiology (Zool.470/lect. & lab)	1973-77	UW-Milwaukee
Undergrad.Seminar in Biol.(Zool. 670)	1972-73	UW-Milwaukee
*Independ. Study, Undergrad.(Zool. 699)	1973-77	UW-Milwaukee
**Adv. Independ. Study, Grad.(Zool, 899)	1973-77	UW-Milwaukee
*Biology Colloquium (Zool. 900)	1973	UW-Milwaukee
**Adv. Gene Regulation (Zool, 925)	1973	UW-Milwaukee
**Cell Differentiation (Zool. 925)	1974	UW-Milwaukee
**Nobel Prizes,Cell/Molec.Biol.(Zool.925)	1977	UW-Milwaukee
**Molec./Cell.Aspects, Develop.(Zool.926)	1973	UW-Milwaukee
<u>*Research (Zool. 990)</u>	<u>1973-77</u>	<u>UW-Milwaukee</u>
Intro.Biochem.(BIOC 4104)	1977-86	OUHSC
*MSI Biochemistry	1977-82,1984-98	OUHSC
MS Review Course in Biochemistry	1978-81	OUHSC
MSI, Medical Molecular Genetics	1996-2009	OUHSC
*Clinical Correlations(sickle cell disease)	1991-2009	OUHSC
*Clinical Correlations (carcinogenesis)	1979	OUHSC
Dental Biochemistry	1977-82,1984-88	OUHSC
Gen.Biochem.,grad.students(BIOC 5215/8)	1979-95	OUHSC
Biochem. Lab (BIOC 5224)	1986-88;1992-96	OUHSC
Molecular Biol.& Genetics(BIOC/MI 5243)	1991-98	OUHSC
*Grad. Seminar (BIOC 5971/5970)	1977-99	OUHSC
*Adv. Biochem. Lab (BIOC 6224)	1979-94;1996	OUHSC
Human Biochemical Genetics(BIOC 6244)	1979-82	OUHSC
Molecular Oncology(BIOC 6312)	1977-78	OUHSC
*Cell Biology (BIOC 6223)	1986-88,1992-99	OUHSC
**Adv.Topics,Human Molec.Genetics(BIOC 6205)	1993-99	OUHSC
Macromolec.Struct.& Fnctn.(BIOC 6215/6214)	1980-82,92-98	OUHSC
*Molec.Biol.& Biochem. Genetics(BIOC 6235/6234)	1977-1999	OUHSC
*Research/Doctoral Dissert.(BIOC 6980)	1977-2007	OUHSC
Transcription Regulation (Module BIOC 6430/6431)	2004-2008	OUHSC
Free Radical Biology (PHSC 5213)	2005-	OUHSC
*Spec.Pblms.Biochem.(BIOC 6990)	1979,1987-88,1994-98	OUHSC
*Spec.Studies,Med. Students(BIOC/MED 9980)	1984-88;92	OUHSC

*Team-taught courses coordinated one or more times.

**Courses designed, coordinated and taught.

Bold print = courses currently offered

Service

National Service

National Institutes of Health (NIH), NIDDK, IPA 1989-91

Senior Scientist, Extramural Programs, Division of Kidney,
Urologic & Hematologic Diseases

- Program Representative, NIDDK National Advisory Council
- Program Representative, Hematology Study Sections
- Organizer, NIDDK 40th Anniversary Symposium
- Organizer, PCR Workshop for Urologists & Nephrologists

NIH/AHA Study Section Service:

AHA, OK Affiliate, Scientific Merit Review Comm., 1979-84; Chair, '83-84/Memb., Merit Review Committee

NIH, NIDDK:

SBIR Grants Panel, 1989-91

NIH, DRG, Hematology Study Sections, Program Representative, 1989-91

NIDDK, National Advisory Council, Program Representative, 1989-91

NIH, NHLBI:

Comprehensive Sickle Cell Centers (3 Site Visit Panels), 1992

Comprehensive Sickle Cell Centers, Main Review Panel, 1997

Research Training Grant Review Committee (Ad hoc), 1993, 1994

RFA, Gene Therapy for Sickle Cell Disease, 1994, 1995

RFA, New Sickle Cell Disease Treatments, 1996

National (NIH-type) Reviews:Canada, Israel, & The Netherlands, 1998-2001

Reviews for International Journals (three or more per year, total)

Science

Proceedings of the National Academy of Sciences, U.S.A.

Journal of Clinical Investigation

Developmental Biology

Analytical Biochemistry

Others (including Canadian and British journals)

University/College Service

#	Ph.D. Program Proposal Committee, Uw-Milwaukee	1972-75
	Graduate Course Comm., Grad.Coll., UW-Milwaukee	1973-75
	Faculty Senate UW-Milwaukee	1973-75
#	Committee, Joint Grad. Studies, UW-Milw/Med.Coll.Wis.	1973-76
#	Biological Sciences Ph.D. Prgm Steering Comm., UW-Milw.	1975-77
	Dean's Faculty Advisory Comm., Coll.of Letters & Sci., UW-Milw	1974-77
	IRB (Inst. Review Brd. Protection Human Subjects), UW-Milw.	1975-77#
	Amer. Soc. Zoologists, Campus Rep., UW-Milwaukee	1975-77
	Graduate Education Research Day (GERD):	
	• Prize Paper Committee	1979-80
	• Judge, Basic Sciences	1992
#	Faculty Appeals Board, OUHSC/University	1981-82, 1997-98, 2008
	Graduate Council, OUHSC	1981-84
	Research Council, OUHSC	1982 (declined)
#	Res. & Sci. Affairs Comm., Faculty Senate OUHSC	1982-84
	Search Committee, Dir. of Animal Resources & Facilities, OUHSC	1984-85
	Promotions Committee, College of medicine	2004-2006, 2008-9

Committees chaired one or more years.

Departmental Committee Service

#	Course and Curriculum Committee, Zoology, UW-Milw.	1973-75
	Electron Microscope Committee, Zoology, UW-Milw.	1973-77
	Capital Equipment Committee, Zoology, UW-Milw.	1972-73,1975-76
	Ph.D. Program Proposal Committee, Zoology, UW-Milw.	1972-75
	Zoology 101 Course Committee, UW-Milw.	1972-76
	Graduate Affairs Committee, Zoology, UW-Milw.	1972-73
	Biology Colloquim, UW-Milw.	1973-74
	Faculty Salary Committee, Zoology, UW-Milw.	1976-77
	Public Relations Committee, Zoology, UW-Milw.	1976-77

Dept. of Biochem.& Molec.Biol.Committees, OUHSC:

#	MS I Biochem. Course Committee	1977-81; 1984-2009
	Pharm/Dent Biochem Course Committee	2008
#	Graduate Admissions and Recruitment	1977-83, 1992
	Department Head's Advisory Committee	1978-79
###	General Exam Comm.	1978-79,1981-82,1986-88,1992-93,1995-2003
#	BIOC 6235 Course Committee	1978-87
#	Comm.to Formulate Guidelines,Tenure/Promotions	1979-80
	Tenure/Promotions/Joint Appointments Comm.	1979-80; 81-83
#	Search Committee for Molecular Biologist (1)	1982
#	Search Committee for Molecular Biologist (1)	1984-85
#	Search Committee for Biochem.Faculty (3)	1984-85
#	Qualifications Comm.for Biochem.Grad.Facul.	1985-87
#	BIOC 6223 Course Committee	1991-92
#	BIOC 6502 Course Committee	1991-99
	BioTech MS Degree Task Force	1995-97
	Joint Faculty Review & Evaluation Committee	1995-2003
#	Fred & Marie Gray Research Award Comm.	1992-2003
#	Graduate Student Travel Awards Comm.	1996-2003
	Graduate Student Awards Committee	2004-2009
	Adjunct Faculty Appointments Committee	2004-2007
	Departmental Advisory Committee	2008-
	Appointments/Promotions/Awards Committee	2008-

Committees chaired one or more years.

Patents Filed/Issued:

(1) “Gene Regulation Therapy Involving Ferritin” USA

a . 2002-004-002 Patent application # 20020128133/US Utility Patent – Filed.

Approved, Dec. 2008/Issued, March 2009

Also filed in

b. Canada

c. Japan

d. Australia – **Issued 2006**

e. Europe –**Issued 2006** in UK, Germany, France, Luxembourg, Spain, Portugal, Italy, Greece, Turkey, Albania

(2) “Abscisic Acid and Derivatives Thereof for the Treatment of Diseases”

Provisional Patent Application # EV 603378685 US filed March 4, 2005

PUBLICATIONS

Major Reviews/Books/Book Chapters/Video Tapes

1. Broyles, R.H. "Hormones." In **Laboratory Manual for Animal Biology**, D. B. Mooren, ed., Kendall, Hunt Publ. Co., Dubuque, Iowa, pp. 87-89 (all editions, 1974-1977).
2. Broyles, R.H. **A Laboratory Guide to Techniques Used in Cell Physiology**, Univ. of Wisconsin-Milwaukee, 68 pages, 1974-77.
3. Broyles, R. H. "Changes in the Blood during Amphibian Metamorphosis." In **Metamorphosis: A Problem in Developmental Biology**, 2nd ed. (L. I. Gilbert & E. Frieden, eds.), Chap. 14, Plenum Publ. Co., New York, pp. 461-490 (1981).
4. Broyles, R. H., Dorn, A. R., Maples, P. B., Johnson, G. M., Kindell, G. R., and Parkinson, A. M. "Choice of hemoglobin type in erythroid cells of Rana catesbeiana." In **Hemoglobins in Development and Differentiation** (G. Stamatoyannopoulos & A. W. Nienhuis, eds.), Alan R. Liss, Inc., New York, pp. 179-191 (1981).
5. Kyker, K.D., Likos, A.M., Blair, F.C., Kurien, B.T., Hala'sz, H., Benn, J., and Broyles, R.H. "Hemoglobin switching in heterokaryons: Conservation of trans-acting factors that mediate developmental gene regulation." In **Molecular Biology of Hemoglobin Switching** (G. Stamatoyannopoulos, ed.) Intercept Ltd., Andover, Hampshire, UK, Chap. 26, pp. 313-329 (1995).
6. Broyles, R.H. (ed.) **Advances in Human Molecular Genetics**. A series of 12 videotapes of lectures by distinguished scientists from the 1995 series at the Univ. of Oklahoma Health Sciences Center, Dept. of Biochemistry and Molecular Biology. (Produced by the College of Continuing Education, Univ. of Oklahoma; David Stamps, producer. Copyright 1996, Univ. of Oklahoma.)
7. Broyles, R.H. "Hemoglobin Switching and Developmental Changes in Erythropoietic Sites and Red Blood Cell Populations of Non-mammalian Vertebrates." In **Hematopoiesis: A Developmental Approach** (L.I. Zon, ed.). Oxford Univ. Press, New York, Chap. 53, pp. 617-637 (2000).
8. Broyles, R. H. **From Mendel to Monod: The First 100 Years with Genes** (1865-1965). A historical perspective with descriptions of key experiments from the primary literature. (Written; being prep. for pub.)

Full Papers in Refereed Journals

1. Broyles, R. H., and Strittmatter, C. F. Hexose monophosphate shunt dehydrogenases during sea urchin development. ***Expt. Cell Res.* 67**, 471-474 (1971).
2. Broyles, R. H., and Strittmatter, C. F. Hexose monophosphate shunt dehydrogenases in the developing frog. ***Compar. Bioc. Physiol.* 44B**, 667-676 (1973).
3. Broyles, R. H., and Frieden, E. Sites of haemoglobin synthesis in amphibian tadpoles. ***Nature* 241**, 207-209 (1973).
4. Broyles, R. H., and Deutsch, M. J. Differentiation of red blood cells in vitro. ***Science* 190**, 471-473 (1975).

5. Deutsch, M. J., and Broyles, R. H. Effect of phenylhydrazine on the multiple hemoglobins of Rana catesbeiana tadpoles. *Devel. Biol.* **46**, 277-231 (1975).
6. Broyles, R. H., and Strittmatter, C. F. Hexose monophosphate shunt dehydrogenases in the sea urchin and the frog: Comparison of some functional properties of the enzymes in vitro. *Compar. Bioc. Physiol.* **57B**, 249-255 (1977).
7. Broyles, R. H., and Noveck, M. I. Uptake and distribution of, 4,5,2',4',5'-hexachlorobiphenyl in fry of lake trout and Chinook salmon and its effects on viability. *Toxicol. Appl. Pharmacol.* **50**, 299-308 (1979).
8. Broyles, R. H., and Noveck, M. I. Uptake and distribution of 2,5,2',5'-tetrachlorobiphenyl in developing lake trout. *Toxicol. Appl. Pharmacol.* **50**, 291-298 (1979).
9. Broyles, R. H., Pack, B. M., Berger, S., and Dorn, A. R. Quantification of small amounts of hemoglobin in polyacrylamide gels with benzidine. *Anal. Biochem.* **94**, 211-219 (1979).
10. Parkinson, A. M., Dorn, A. R., Maples, P.B., and Broyles, R. H. Improved polyacrylamide gel electrophoresis with different amino acids as the trailing constituent. *Anal. Biochem.* **117**, 6-11 (1981).
11. Broyles, R. H., Johnson, G. M., Maples, P. B., and Kindell, G. R. Two erythropoietic microenvironments and two larval red cell lines in bullfrog tadpoles. *Devel. Biol.* **81**, 299-314 (1981).
12. Dorn, A. R., and Broyles, R. H. Erythrocyte differentiation during the metamorphic hemoglobin switch of Rana catesbeiana. *Proc. Natl. Acad. Sci. USA* **79**, 5592-5596 (1982).
13. Maples, P. B., Dorn, A. R., and Broyles, R. H. Embryonic and larval hemoglobins during the early development of the bullfrog Rana catesbeiana. *Devel. Biol.* **96**, 515-519 (1983).
14. Maples, P. B., Palmer, J. C., and Broyles, R. H. In vivo regulation of hemoglobin phenotypes of developing Rana catesbeiana. *Devel. Biol.* **117**, 337-341 (1986).
15. Broyles, R.H., Palmer, J.C., Ramseyer, L.T.H., Smith, D.J., Jarman, R.N., Do, T.H., and McBride, K.A. Hemoglobin switching across vertebrate classes: Exchange of developmental signals by cell fusion. *Prog. Clin. Biol. Res.* **251**, 285-294 (1987).
16. Maples, P.B., Palmer, J.C., and Broyles, R.H. Determination of hemoglobin expression patterns in erythrocytes of Rana catesbeiana tadpoles. *Compar. Biochem. Physiol.* **91B**, 755-762 (1988).
17. Palakodety, R., Griffin, M.J., and Broyles, R.H. Circulating epoxide hydrolase immunodeterminants in rats bearing hyperplastic nodules induced by 2-acetylaminofluorene. *Cancer Letters* **38**, 347-358 (1988).
18. Barker-Harrel, J., McBride, K.A., and Broyles, R.H. Formation of transient polykaryons by fusion of erythrocytes of different developmental programs. *Exptl. Cell Res.* **178**, 435-448 (1988).
19. Ramseyer, L.T.H., Barker-Harrel, J., Smith, D.J., McBride, K.A., Jarman, R.N., and Broyles, R.H. Intracellular signals for developmental hemoglobin switching. *Devel. Biol.* **133**, 262-271 (1989).
20. Broyles, R.H., Barker-Harrel, J., Ramseyer, L.T.H., McBride, K.A., and Sexton, D.L. Erythroid heterokaryons: a system for investigating the functional role of trans-acting factors in developmental hemoglobin switching. *Prog. Clin. Biol. Res.* **316B**, 83-96 (1989).

21. Kurien, B.T., and Broyles, R.H. Plasmid DNA preparation by heat treatment of *Escherichia coli* lysates. ***Anal. Biochem.* 213**, 174-176 (1993).
22. Smith, D.J., Zhu, H., Kolatkar, P.R., Tam, L.-T., Baldwin, T.O., Riggs, A., Roe, B.A., and Broyles, R.H. The hemoglobins of the bullfrog, *Rana catesbeiana*. The cDNA-derived amino acid sequences of the alpha chain of adult hemoglobins B and C: Their roles in deoxygenation-induced aggregations. ***J. Biol. Chem.* 268**, 26961-26971 (1993).
23. Broyles, R.H., Ramseyer, L.T.H., Do, J.H., McBride, K.A., and Barker, J.C. Hemoglobin switching in *Rana/Xenopus* erythroid heterokaryons: Factors mediating the metamorphic hemoglobin switch are conserved. ***Devel. Genetics* 15**, 347-355 (1994).
25. Broyles, R.H., Blair, F.C., Kyker, K.D., Kurien, B.T., Stewart, D.R., Hala'sz, H., Berg, P.E., and Schechter, A.N. A ferritin-like protein binds to a highly conserved CAGTGC sequence in the β -globin promoter. ***Sickle Cell Disease and Thalassemias: New Trends in Therapy*** (Y. Beuzard, B. Lubin, and J. Rosa, eds.) John Libbey Eurotext Ltd., ***Colloque INSERM* 234**, 43-51 (1995).
26. Kurien, B.T., Scofield, R.H., and Broyles, R.H. Efficient 5' End Labeling of Dephosphorylated DNA. ***Anal. Biochem.* 245**, 123-126 (1997).
27. Broyles, R.H. Use of somatic cell fusion to reprogram globin genes. ***Sem. Cell Devel. Biol.* 10**, 259-265 (1999).
28. Broyles, R.H., Belegu, V., DeWitt, C. R., Shah, S.N., Stewart, C.A., Pye, Q.N., and Floyd, R.A. Specific repression of β -globin promoter activity by nuclear ferritin. ***Proc. Natl. Acad. Sci., USA* 98**, 9145-9150 (2001).
29. Guo W-X, Pye QN, Williamson KS, Stewart CA, Hensley KL, Kotake Y, Floyd RA, Broyles, R.H. Reactive oxygen species in choline deficiency-induced apoptosis in rat hepatocytes. ***Free Radic. Biol. & Med.* 37**, 1081-1089 (2004).
35. Scofield RH, Kurien BT, Ganick S, McClain MT, Pye Q, James JA, Schneider RI, Broyles RH, Bachmann M, Hensley K. Modification of lupus-associated 60-kDa Ro protein with the lipid oxidation product 4-hydroxy-2-nonenal increases antigenicity and facilitates epitope spreading. ***Free Radic. Biol. & Med.* 38**, 719-728 (2005).
36. Guo W-X, Pye QN, Williamson KS, Stewart CA, Hensley KL, Kotake Y, Floyd RA, Broyles RH. Mitochondrial dysfunction in choline deficiency-induced apoptosis in cultured rat hepatocytes. ***Free Radic. Biol. Med.* 39**, 641-650 (2005).
37. Broyles RH, Roth, AC, Todd, M, Belegu, V. Nuclear reprogramming by cell fusion. In ***Meth. Molec. Biol.* 325: Nuclear Reprogramming: Methods and Protocols** (S. Pells, ed.), Humana Press, Totowa, NJ. Chap. 5, pp. 47-57 (2006).
38. Asada K, Kotake Y, Asada R, Saunders D, **Broyles, RH**, Towner RA, Fukui H, Floyd RA. LINE-1 hypomethylation in a choline-deficiency- induced liver cancer in rats: Dependence on feeding period. ***J. Biomed. Biotechnol.* 2006/ID 17142**, 1-6 (2006).
39. Guo W-X, Pye QN, Williamson KS, Stewart CA, Hensley KL, Kotake Y, Floyd RA, and Broyles RH. Effect of PBN (α -phenyl-N-tert-butyl nitron) on choline deficiency-induced oxidative stress in

- cultured rat hepatocytes. *Free Rad Biol & Med* (in revision).
40. Abdelmoaty H, Pye Q, Broyles RH. Therapeutic Perspectives Involving Ferritin Heavy Chain in Parkinson's Disease. In "New Research on Parkinson's Disease." Ed. Timothy F. Hahn and Julian Werner. New York: Nova Publishers, pp. 43-58 (2008).

Published Abstracts of Oral and Poster Presentations

1. Broyles, R. H., and Strittmatter, C. F. Hexose monophosphate shunt dehydrogenases during development. *J. Elisha Mitchell Sci. Soc.* **86** (4), 167 (1970). (Oral presentation.)
2. Broyles, R. H. Hemoglobin synthesis in vitro by amphibian kidney and liver. *Fed. Proc.* **31**, 844 (1972).
3. Deutsch, M. J., and Broyles, R. H. Erythropoiesis and hemoglobin synthesis in young bullfrog tadpoles: Multiple hemoglobins, red cell lines and erythropoietic sites. *Fed.Proc.* **33** (#5,pt.II), 1343 (1974).
4. Broyles, R. H., and Dorn, A. R. Erythropoietic microenvironment-specific hemoglobin synthesis in larval bullfrogs. *J. Supramolec. Struct., suppl.* **2**, 164 (1978). (Presented at the ICN-UCLA Symposium on Hemopoietic Cell Differentiation, Keystone, Colorado, April, 1978.)
5. Dorn, A. R., and Broyles, R. H. Density-gradient separation of RBC's of different hemoglobin types. *J. Supramolec. Struct., suppl.* **2**, 164 (1978). (Presented at the ICN-UCLA Symposium on Hemopoietic Cell Differentiation, Keystone, Colorado, April, 1978.)
6. Broyles, R. H. Switching of erythropoietic organ-specific larval hemoglobins in organ cultures. (Presented at the 1st Conference on Hemoglobin Switching, co-spon. by NIH and the Univ. of Washington, Seattle, WA, 1978.)
7. Broyles, R. H., and Dorn, A. R. Cross-induction of erythropoietic organ-specific larval bullfrog hemoglobins in organ cultures. *J. Cell Biol.* **79** (#2, pt.2), 26a (1978).
8. Dorn, A. R., and Broyles, R. H. Density gradient separation of differentiating red blood cells. *Fed. Proc.* **39**, 1601 (1980).
9. Broyles, R. H., Johnson, G. M., Maples, P. B., Kindell, G.R., and Dorn, A. R. Simultaneous differentiation of two morphological red cell types expressing different globin genes. *Fed.Proc.* **39**,1749 (1980)
10. Dorn, A. R., and Broyles, R. H. Hemoglobin switching during development in Rana catesbeiana. *Fed.Proc.* **40** (6), 1629 (1981).
11. Broyles, R. H., Maples, P. B., and Dorn, A. R. Developmental changes in the hemoglobins of the bullfrog Rana catesbeiana. (Presented to the Oklahoma Academy of Science, Enid, OK, Nov. 13, 1981.)
12. Dorn, A. R., and Broyles, R. H. Purification and characterization of adult and tadpole erythroid cells during the metamorphic hemoglobin switch of bullfrogs. (Presented to the Oklahoma Academy of Science, Enid, OK, Nov. 1, 1981.)
13. Maples, P. B., and Broyles, R. H. Antibodies against individual tadpole and adult bullfrog hemoglobins. (Presented to the Oklahoma Academy of Science, Enid, OK, Nov. 13, 1981.)

14. Smith, D. J., Maples, P. B., Dorn, A. R., Saucier, W. J., Vigoreaux, J., and Broyles, R. H. Hemoglobin types, red blood cell classes and erythropoietic loci of the bullfrog, Rana catesbeiana. *Devel. Biol.* **91**, suppl. (1982). (Presented at the 41st Annual Symposium of the Society for developmental Biology, Harvard Univ., Cambridge, MA, June 13-17, 1982.)
15. Maples, P. B., Dorn, A. R., and Broyles, R. H. Erythropoiesis during the embryonic and larval periods of development of Rana catesbeiana. *Devel. Biol.* **91**, suppl. (1982). (Presented at the 41st Annual Symposium of the Society for Developmental Biology, Harvard Univ., Cambridge, MA, June 13-17, 1982.)
16. Dorn, A. R., and Broyles, R. H. Developmental changes in purified tadpole and adult erythroid cells during metamorphosis of Rana catesbeiana. *Devel. Biol.* **91**, suppl. (1982). (Presented at the 41st Annual Symposium of the Society for Developmental Biology, Harvard Univ., Cambridge, MA, June 13-17, 1982.)
17. Maples, P. B., Smith, D. J., Dorn, A. R., Saucier, W. J., and Broyles, R. H. Erythropoietic sites, hemoglobin types, and red blood cell classes during development of the bullfrog Rana catesbeiana. (Presented at the 3rd Conference on Hemoglobin Switching, co-spon. by NIH & the U.of Washington-Seattle, Orcas Island, WA, Sept. 12-16,1982.)
18. Dorn, A. R., and Broyles, R. H. Differentiation of erythrocytes during the metamorphic hemoglobin switch of Rana catesbeiana. (Presented at the 3rd Conference on Hemoglobin Switching, co-sponsored by NIH and the Univ. of Washington-Seattle, Orcas Island, WA, Sept. 12-16,1982.)
19. Maples, P. B., and Broyles, R. H. Embryonic and larval erythropoiesis of Rana catesbeiana. (Presented at the First Annual Southwestern Developmental Biology Conference, Univ. of Texas at Arlington, March 24-26, 1983.)
20. Maples, P. B., and Broyles, R. H. Early erythropoiesis of thebullfrog Rana catesbeiana. *J. Cell Biol.* **97** (#5, pt.2), 56a (1983). (Presented at the 23rd Annual Meeting of the American Society for Cell Biology, San Antonio, Texas, Nov. 29 - Dec. 3, 1983.)
21. Maples, P. B., and Broyles, R. H. In vivo regulation of hemoglobin profile of Rana catesbeiana tadpoles. (Presented at the 4th Conference on Hemoglobin Switching, co-sponsored by NIH and the Univ. of Washington-Seattle, Airlie House, Virginia, Sept. 30- Oct. 3, 1984.)
22. Maples, P. B., and Broyles, R. H. In vivo regulation of hemoglobin types expressed in Rana catesbeiana tadpoles. *J. Cell Biol.* **99** #4, pt.2), 407a (1984). (Presented at 24th Annual meeting of the American Society for Cell Biology, Kansas City, Missouri, November 12-16, 1984.)
23. Broyles, R. H., Palmer, J. C., Smith, D. J., Ramseyer, L. T., and Pohlman, J. K. (intro. by S. S. Bottomley). Hemoglobin switching in polykaryons created by fusion of normal erythroid cells from Rana catesbeiana of different developmental stages. *Blood* **66** (#5,suppl.1), 126a (1985). (Presented at the 27th Annual Meeting of the American Society of Hematology, New Orleans, Louisiana, December 7-10, 1985.)
24. Broyles, R.H., Palmer, J.C., Smith, D.J., and Ramseyer, L.T.H. Detection of trans-acting factors for hemoglobin switching by cell fusions. *Fed. Proc.* **45** (6), 1577 (1986). (Presented at the joint meeting of the American Society of Biological Chemists and the American Chemical Society, Washington, D.C., June 7-12, 1986.)
25. Broyles, R.H., Palmer, J.C., Ramseyer, L.T.H., Smith, D.J., Jarman, R.N., Do, T.H., and McBride, K.A. Hemoglobin switching in short-lived, heterospecific polykaryons created by fusing erythroid cells of different developmental programs. (Poster and short talk, presented at the 5th Conference

on Hemoglobin Switching, co-sponsored by NIH and the Univ. of Washington, Seattle; Airlie, Virginia, Sept. 28 through Oct. 1, 1986.)

26. Broyles, R.H., Palmer, J.C., Ramseyer, L.T.H., Smith, D.J., Jarman, R.N., Do, T.H., and McBride, K.A. Developmental regulation of globin gene expression: Hemoglobin and globin mRNA switching in heterospecific erythroid cell hybrids. (Minisymposium talk presented at the Mid-America Molecular Biology Colloquium, organized by the Dept. of Biochemistry & Molecular Biology, College of Medicine, Univ. of Oklahoma at Oklahoma City; Shangri-La Resort, Afton, Oklahoma, Oct. 14 through 17, 1986.)
27. Palmer, J.C., Stark-Vancs, V.I., McBride, K.A., Coalson, R.E., and Broyles, R.H. The cell biology of developmental hemoglobin switching in the amphibian Rana catesbeiana. (Poster presented at the Mid-America Molecular Biology Colloquium, Shangri-La Resort, Afton, Oklahoma, Oct. 14-17, 1986.)
28. Broyles, R.H., Palmer, J.C., and Maples, P.B. Developmental regulation of hemoglobin types in Rana catesbeiana: Anemia induces a precocious metamorphic switch in gene expression. (Poster presented at the Mid-America Molecular Biology Colloquium, Shangri-La Resort, Afton, Oklahoma, Oct. 14-17, 1986.)
29. Do, T.H., Ramseyer, L.T.H., Jarman, R.N., Broyles, R.H., and Smith, D.J. Globin gene-specific cDNA probes for measuring gene expression in heterospecific, amphibian erythroid cell hybrids. (Poster presented at the Mid-America Molecular Biology Colloquium, Shangri-La Resort, Afton, Oklahoma, Oct. 14-17, 1986.)
30. Broyles, R.H., Palmer, J.C., Ramseyer, L.T.H., and Smith, D.J. Hemoglobin switching in heterospecific polykaryons made by fusing amphibian and mammalian erythroid cells that have different developmental programs. **Blood** **68** (#5, suppl. 1), 138a (1986). (Oral presentation at the 28th Annual Meeting of the American Society of Hematology, San Francisco, California, Dec. 6-9, 1986.)
31. Broyles, Robert H. Developmental hemoglobin switching: Exchange of regulatory signals by cell fusion. (Platform presentation at the Fifth Annual Southwestern Developmental Biology Conference, University of Oklahoma, Norman, March 26-28, 1987.)
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