

# ASA 2019

74th Annual  
Meeting

# EXPLORING CREATION

**Colossians 1:16**

All things were  
created by Him  
and for Him

**July 19–22, 2019**

Wheaton College  
Wheaton, IL



Gerald Gabrielse  
Northwestern University



Deborah Haarsma  
BioLogos



Jennifer Powell McNutt  
Wheaton College



Kenneth R. Miller  
Brown University



James L. Sherley  
Asymmetrix



Gayle E. Woloschak  
Northwestern University

**Leslie Wickman**, Executive Director  
**Vicki Best**, Director of Operations and Development  
**Lyn Berg**, Managing Editor  
**Chelsea Church**, Membership and Outreach Manager



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The **AAAS Dialogue on Science, Ethics, and Religion (DoSER) Program** facilitates communication between scientific and religious communities and relates scientific knowledge and technological development to the purposes and concerns of society at large. DoSER is pleased to have ASA as a consultant on projects and encourages ASA members to participate in the following ways:

- Sign up for the **DoSER Newsletter** and stay informed about the latest news
- Find **curriculum resources** for seminaries and educational videos to facilitate dialogue in the classroom
- Learn how scientists from diverse fields engage with religious communities through **videos of DoSER events**
- Download a free **booklet** on effective strategies for constructive public engagement
- **Donate** to support DoSER's work

**Learn more at [www.AAAS.org/DoSER](http://www.AAAS.org/DoSER)  
and [www.ScienceForSeminaries.org](http://www.ScienceForSeminaries.org)**

# GENERAL INFORMATION

**EXHIBIT AND BOOK TABLES** featuring books of interest to attendees are located in the Meyer Science Center Lobby.

Friday: 1:00 PM – 10:00 PM  
Saturday: 9:45 AM – 5:15 PM; 9:00 PM – 10:30 PM  
Sunday: 10:30 AM – 5:15 PM  
Monday: 9:45 AM – 11:45 AM

**PLENARY SESSIONS** are held in the Coray Alumni Gymnasium.

Friday: 7:30 PM **Deborah Haarsma**, “Exploring Many Worlds”  
Saturday: 8:45 AM **James L. Sherley**, “Living a Scientist’s Life”  
Saturday: 7:30 PM **Kenneth R. Miller**, “Darwin, God, and Design: Grandeur in an Evolutionary View of Life”  
Sunday: 11:00 AM **Gerald Gabrielse**, “God Decides, We Measure”  
Sunday: 3:00 PM **Gayle E. Woloschak**, “Perspectives on Life and Creation”  
Monday: 8:45 AM **Jennifer Powell McNutt**, “The Mirror of Creation: An Unfailing Witness in Scripture and in the Theology of John Calvin”

**POSTER SESSION AND VIEWING** are in the geology museum on the lower level of Meyer. Poster session is Saturday from 2:45 PM to 3:45 PM. Poster viewing is Saturday and Sunday.

## SPECIAL EVENTS

Friday: 5:15 PM Dinner Meetup: First-Time Attendees  
8:30 PM Fellowship Mixer  
Saturday: 6:00 AM Morning Walk  
10:00 AM Spouses’ Visit to the Billy Graham Center  
12:00 PM Lunch Meetups: Students and Early Career; Fellows  
5:30 PM Chicago-Style Pizza Party  
7:30 PM Kenneth R. Miller Public Lecture  
9:00 PM InterVarsity Reception  
Sunday: 6:30 AM Morning Walk  
7:30 AM Breakfast Meetup: Engineers  
9:30 AM Worship Service  
12:00 PM Lunch Meetups: CSCA; *Christianity Today*  
5:15 PM Dinner Meetup: Geologists  
5:30 PM Volleyball Tournament  
5:30 PM Softball Game  
8:00 PM State of the ASA – Last year’s highlights and exciting future initiatives  
9:30 PM Ice Cream Social  
Monday: 6:00 AM Morning Walk  
7:00 AM Breakfast Meetup: CWiS (Christian Women in Science)

**CAMPUS ATM MACHINE** is located in Anderson Commons.

**CAMPUS PARKING** is free, but parking passes are needed. Request one at lodging or ASA meeting registration.

**CAMPUS WI-FI NETWORK** connection is **WC-Conference** network (*not* WC-guest, WC-internet, or WC-manual). Enter password **gothunder**.

**MANY THANKS TO ...** Program Chairs **Raymond Lewis** and **Robin Rylaarsdam** and Local Arrangements Chairs **Darren Craig** and **Danilo Diedrichs** for their countless hours of preparation.

We are especially thankful for the **donors** who contributed to the **Student Scholarship Fund**.

**THE ASA SPIRIT** The ASA encourages thoughtful and provocative scientific presentations and discussions. Presenters and discussants are expected to maintain a humble and loving attitude toward individuals who have a different opinion.

# PRE-MEETING ACTIVITIES

## THURSDAY, 18 JULY 2019

3:00 PM–10:00 PM	ASA Meeting and Lodging Registration	Fischer Hall Lobby
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## FRIDAY, 19 JULY 2019

7:00 AM–8:00 AM	Breakfast	Anderson Commons
8:00 AM–8:30 PM	ASA Meeting Registration	Meyer 131
8:00 AM–5:00 PM	Exhibit and Book Tables Set-Up	Meyer Lobby
8:00 AM–8:30 PM	Poster Set-Up	Geology Museum on the Lower Level of Meyer
9:00 AM–5:00 PM	Field Trip: Geology *	Chase Circle outside Beamer
9:00 AM–12:00 PM	Workshop: Teaching High School Science from a Christian Worldview <b>April Maskiewicz Cordero</b> and <b>Kathryn Applegate</b> , facilitators	Meyer 133
9:00 AM–1:30 PM	Field Trip: Fermilab *	Chase Circle outside Beamer
11:30 AM–1:30 PM	Lunch	Anderson Commons
12:30 PM–5:00 PM	Field Trip: Chicago Architectural Boat Tour *	Chase Circle outside Beamer
2:00 PM–5:00 PM	Workshop: Incubator for Interdisciplinary Connections <b>Walter Rogero</b> , moderator	Meyer 133

\* Please arrive 15 minutes before departure time.

# PROGRAM SCHEDULE

## FRIDAY, 19 JULY 2019

5:15 PM 6:30 PM	Dinner	Anderson Commons
5:15 PM 6:30 PM	Dinner Meetup: First-Time Attendees	Anderson Commons/South Party Room
7:00 PM 7:30 PM	Welcome, Introductions, Announcements <ul style="list-style-type: none"> <li>• <b>Leslie Wickman</b>, ASA Executive Director</li> <li>• <b>Vicki Best</b>, ASA Director of Operations and Development</li> <li>• <b>Margaret Diddams</b>, Provost and Professor of Psychology, Wheaton College</li> <li>• <b>Dorothy F. Chappell</b>, Dean of Natural Sciences, Education and Applied Linguistics, Wheaton College</li> <li>• <b>Raymond Lewis</b> and <b>Robin Rylaarsdam</b>, Program Chairs</li> <li>• <b>Darren Craig</b> and <b>Danilo Diedrichs</b>, Local Arrangements Chairs</li> </ul>	Coray
7:30 PM 8:30 PM	<b>Plenary I</b> <b>Deborah Haarsma</b> , “Exploring Many Worlds” Moderator: <b>John Wood</b>	Coray (8)
8:30 PM 10:00 PM	Mixer	Lower Beamer and Keul Patio
10:00 PM	Lodging Registration closes	Fischer Hall Lobby

PLEASE NOTE: Abstracts are found on the page numbers within the parentheses.

SATURDAY, 20 JULY 2019				
6:00 AM	Morning walk; all are welcome		Southwest entrance to the Beamer Center (closest to Anderson Commons)	
7:00 AM	Breakfast		Anderson Commons	
8:15 AM	ASA Registration		Meyer 131	
8:20 AM	<b>Devotions.</b> Devotional: <b>Scott Buchanan</b> Worship Leader: <b>Joe Weinzettel</b>		Coray	
8:45 AM 9:45 AM	<b>Plenary II</b> <b>James L. Sherley</b> , "Living a Scientist's Life" Moderator: <b>Michael Everest</b>		Coray (8)	
9:45 AM 5:15 PM	Poster Viewing		Geology Museum on the Lower Level of Meyer	
9:45 AM	Exhibit and Book Tables		Meyer Lobby	
9:45 AM	Beverage Break		Meyer Lobby	
10:00 AM	Spouses' Visit to the Billy Graham Center		Meet in Meyer 131	
10:15 AM 11:45 AM	<b>I.A: Teaching Faith &amp; Science: Higher Ed Course-Based Projects 1</b> –Coray Moderator: <b>Dominic Halsmer</b>	<b>I.B: We Believe in Creation 1</b> –Meyer 145 Moderator: <b>Clarence Menninga</b>	<b>I.C: Science as Understanding Creation 1</b> –Meyer 133 Moderator: <b>Rodney Scott</b>	<b>I.D: Student/Early Career Track 1</b> –Meyer 021 Coordinator: <b>Hannah Eagleson</b>
10:15 AM	<b>Abbie Schrottenboer</b> (13) "Along the Creek: Where Conservation Science and Sense of Place Meet"	<b>Clarence Menninga</b> (13) "Introduction"	<b>Seth Hart</b> (13) "The Fifth Way: Teleological Language in Biology and a Thomistic Natural Theology"	(13) "Finding God in His World: How Working in Science Strengthens Our Faith"
10:45 AM	<b>Matthew Morris</b> (14) "How the Irish Elk Got Its Antlers: Phenotypic Plasticity and Objections to Evolution"	<b>Terry M. Gray</b> (14) "A Confusion of Categories: Theistic Evolution, Evolutionary Creation, Biblical Evolution, Fiat Creation, Intelligent Design, Methodological Naturalism ..."	<b>Larry Funck</b> (14) "The Nature and Origin of Biological Information and the Question of Agency"	(14) "What I Wish I'd Known: Best Practices for Thriving as an Early Career Science and Technology Professional"
11:15 AM	<b>Gayne John Anacker</b> (15) "Nursing Ethics, Ethical Theory, and Virtue Ethics"	<b>Jonathan Bryan</b> (15) "Divine Action and the Sacramental Principle in the Science-Faith Dialogue"	<b>Sy Garte</b> (15) "Evolution: The More Intelligent Design"	(15) "Speed Mentoring"
12:00 PM	Lunch		Anderson Commons	
12:00 PM	Lunch Meetups: Students and Early Career; Fellows		Anderson Commons/South Party Room	
1:15 PM 2:45 PM	<b>II.A: Teaching Faith &amp; Science: Higher Ed Course-Based Projects 2</b> –Coray Moderator: <b>Sara Tolsma</b>	<b>II.B: We Believe in Creation 2</b> –Meyer 145 Moderator: <b>Randy Isaac</b>	<b>II.C: Digital Technology 1</b> –Meyer 133 Moderator: <b>Tim Wallace</b>	<b>II.D: Student/Early Career Track 2</b> –Meyer 021 Coordinator: <b>Hannah Eagleson</b>
1:15 PM	<b>Daisy Savarirajan</b> (16) "Seeing the Invisible in the Light of the Bible: The Impact of Faith Integration on the Personal Faith of Students"	<b>John R. Wood</b> (16) "Immortality and the Necessity of Death"	<b>Timothy P. Wallace</b> (16) "The Cyber Problem: History, Outlook, and Responses"	(16) "Building Bridges with Secular Colleagues in Science and Technology"
1:45 PM	<b>Sarah M. Richart</b> (17) "Exploring Connections between Environmental Plastics and Microorganisms and Beyond"	<b>Alan Dickin</b> (17) "Un-Creation, Re-Creation, Creation: A New Theory for the Origins of Genesis 1"	<b>Heather Champion</b> (17) "Algorithms and Cosmos: Theological Reflections on the Freedom and Limit of Human Technology of the Mind"	(17) "Choosing the Best Path for You: Making Good Career Decisions at Moments of Transition"
2:15 PM	<b>Stan Zygmunt</b> (18) "The Scientific Endeavor and the Whole Person"	<b>Ian Clary and Julie Woodman</b> (18) "Fruit Flies and Human Origins: The Genetics and Theology of Molecular Homology"	<b>Michael J. Paulus Jr.</b> (18) "AI and the Apocalyptic Imagination: The Ends of Divine, Natural, and Artificial Agency"	(18) "Speed Mentoring"

2:45 PM 3:45 PM	<b>Poster Session</b>				Geology Museum on the Lower Level of Meyer
	<ol style="list-style-type: none"> <li><b>Karen L. Denzler</b>, "Extract from the Edible Plant, <i>Melissa officinalis</i>, Inhibits HSV-1 Binding to Cells via Glycoprotein B: A Segway for Use toward Inhibition of Poxviruses and Filoviruses" (30)</li> <li><b>Carl Fictorie</b>, "The Meaning of Measurement: On the Redefinition of the Fundamental Units of Measurement" (30)</li> <li><b>Emily Grace</b>, "Educating Ethnic Minority and Christian Fundamentalist Students: An Examination of Physical Science Textbook Rhetoric" (30)</li> <li><b>Michael Guebert</b>, "Preparing Students with Science and Faith Integration for Holistic Service to Humanity" (30)</li> <li><b>Tony Jelsma</b>, "The Limbic System and Christian Sanctification" (31)</li> <li><b>Lydia Marcus</b> and <b>Ashley Huizinga</b>, "Breast Cancer Epidemiology: A Case Study in Using Science for Social Justice" (31)</li> <li><b>Zachary Merhavy</b> and <b>Cheney Huls</b>, "Antibacterial Activity of Selected Plants from Southwest USA" (31)</li> <li><b>Rachel Miller</b>, "Paper-Immobilized Yeast-Based Biosensors for the Detection of Pharmaceuticals in Technology-Limited Settings" (31)</li> <li><b>Mark A. Parker</b>, "Collaborative and Cross-Disciplinary Undergraduate Research as a Tool to Improve Scientific Knowledge and Integration of Faith" (32)</li> <li><b>Carlos Pinkham</b>, "How the Gene, Selection, and Biosphere Genome Pools Could Be the Mechanism God Used to Ensure the Appearance of Humankind" (32)</li> <li><b>Stephen Reinbold</b>, "Abraham's Camels: Fact of Fiction?" (32)</li> <li><b>Heather L. Secker</b>, "Factors Affecting Nest Success of Shrubland Birds in a Fragmented, Urbanized Landscape" (32)</li> <li><b>Amber Shoberg</b> and <b>Abbie Schrotenboer</b>, "Effect of Winter Weather on Raccoon Activity near a Suburban College Campus" (33)</li> <li><b>Ramesh Velupillaimani</b>, "God's Solar Power Harvesting Cells: Excitation Energy Transfer in PSI-LHCI Supercomplexes from <i>Chlamydomonas reinhardtii</i> Cells Adapted to State 1 and State 2 Conditions" (33)</li> </ol>				
2:45 PM	Refreshment Break				Meyer Lobby
3:45 PM 5:15 PM	<b>III.A: Teaching Faith &amp; Science: Higher Ed Broader Approaches</b> –Coray Moderator: <b>Gale Ermer</b>	<b>III.B: We Believe in Creation 3</b> –Meyer 145 Moderator: <b>Robin Rylaarsdam</b>	<b>III.C: Digital Technology 2</b> –Meyer 133 Moderator: <b>Tim Wallace</b>	<b>III.D: Science as Understanding Creation 2</b> –Meyer 021 Moderator: <b>Robert Bishop</b>	
3:45 PM	<b>Michael Tenneson</b> (19) "Using Reconciliation Approaches to Teach Evolutionary Theory"	<b>George L. Murphy</b> (19) "The Beginning and End of Creation" <i>Please note: This talk ends at 4:25 PM</i>	<b>Michael J. Sleasman</b> (19) "Embodied Relations and Disembodied Presence: Ethical Reflections on Telepresence and Virtuality"	<b>Hugh Ross</b> (19) "Testing Biblical Creation Accounts with the Latest Science"	
4:15 PM	<b>Dominic Halsmer</b> (20) "How Oral Roberts's Views on Science and Faith Influenced the Character of Christian Higher Education in America's Bible Belt"	<b>Walter Bradley</b> and <b>Randy Isaac</b> (20, 21) "Fine-tuning of the Universe and Methodological Naturalism"	<b>Omololu Fagunwa</b> (20) "Information Communication Technology: The Devil's Playground or the Church's Harvest Tool?"	<b>Ronald T. Myers</b> (20) "Review of the Physical Basis of Fine Tuning"	
4:30 PM					
4:45 PM	<b>Dale Gentry</b> (21) "Education in the Twenty-First Century: Addressing the Intersection of Science and Faith on YouTube"		<b>Derek Schuurman</b> (21) "The Challenge of Transhumanism: Discerning a Christian Response"	<b>Robert Bishop</b> (21) "Randomness and Order in God's Creation"	
5:15 PM	Exhibit and Book Tables close				Meyer Lobby
5:15 PM	Parallel Session III ends				
5:30 PM	Chicago-Style Pizza Party • <b>Leslie Wickman</b> and <b>Vicki Best</b> — Welcome and Prayer				Anderson Commons
7:30 PM 9:00 PM	<b>Plenary III</b> Welcome and Introduction: <b>Vicki Best</b> and <b>Leslie Wickman</b> <b>Kenneth R. Miller</b> , "Darwin, God, and Design: Grandeur in an Evolutionary View of Life"				Coray (9)
9:00 PM 10:00 PM	InterVarsity Reception				Lower Beamer and Keul Patio

SUNDAY, 21 JULY 2019				
6:30 AM	Morning walk; all are welcome			Southwest entrance to the Beamer Center (closest to Anderson Commons)
7:30 AM	Breakfast			Anderson Commons
7:30 AM	Breakfast Meetup: Engineers—All engineers are invited			Anderson Commons/South Party Room
9:30 AM 10:30 AM	<b>Worship Service</b> Worship Leader: <b>Joe Weinzettel</b> Minister: <b>Tom Stoner</b> , Head of School, Covenant Classical School Offering supports <b>Outreach Community Center</b>			Coray (11)
10:30 AM	ASA Registration			Meyer 131
10:30 AM 5:15 PM	Poster Viewing			
10:30 AM	Exhibit and Book Tables			Meyer Lobby
10:30 AM	Beverage Break			Meyer Lobby
11:00 AM 12:00 PM	<b>Plenary IV</b> <b>Gerald Gabrielse</b> , “God Decides, We Measure” Moderator: <b>Robin Rylaarsdam</b>			Coray (9)
12:00 PM	Lunch			Anderson Commons
12:00 PM	Lunch Meetups: CSCA and <i>Christianity Today</i>			Anderson Commons/South Party Room
1:15 PM 2:45 PM	<b>IV.A: Teaching Faith &amp; Science: High School and Youth</b> —Coray Moderator: <b>Abbie Schrotenboer</b>	<b>IV.B: Teaching Faith &amp; Science: Reading Genesis</b> —Meyer 145 Moderator: <b>Steven Moshier</b>	<b>IV.C: Local Chapters Seminar</b> —Meyer 133 Coordinators: <b>Leslie Wickman</b> and <b>Vicki Best</b>	<b>IV.D: Science as Understanding Creation 3</b> —Meyer 021 Moderator: <b>David Sikkenga</b>
1:15 PM	<b>Jason Lief</b> and <b>Sara Sybesma Tolsma</b> (22) “Jesus Loves You and Evolution Is True”	<b>Dick Fischer</b> (22) “Toward a Retranslation of the Genesis Text”	<b>Local Chapters Overview</b> (22)	<b>Fred S. Cannon</b> (22) “And God Made of One [Blood] Every Ethnos-Nation of Anthropon-Humans”
1:45 PM	<b>Denis O. Lamoureux</b> (23) “Online Science and Religion Materials for High School Students”	<b>Patrick S. Franklin</b> (23) “Learning from Bonhoeffer to Read Genesis Theologically”	<b>Chapter Leaders Panel Discussion</b> (23)	<b>Charles L. Webber Jr.</b> (23) “The Human Heart Speaks: Recurrence Analysis of Cardiac Electrical Events in Health and Disease”
2:15 PM	<b>Faith Tucker Stults</b> (24) “Cosmology & <i>Contact</i> in the High School Classroom”	<b>Nicolas Daffern</b> (24) “Adam, Darwin, and the Rest of Us: Assessing the Doctrine of Original Sin in Light of the Theory of Evolution”	<b>Chapter Planning Workshop</b> (24)	<b>J. Carroll Smith</b> (24) “Science and Charlotte Mason”
2:45 PM	Refreshment Break			Meyer Lobby
3:00 PM	<b>Plenary V</b> <b>Gayle E. Woloschak</b> , “Perspectives on Life and Creation” Moderator: <b>Bill Jordan</b>			Coray (10)
4:00 PM	Refreshment Break			Meyer Lobby
4:15 PM 5:15 PM	<b>No Session</b>	<b>V.B: Science and Technology: Working with Creation 1</b> —Meyer 145 Moderator: <b>Brian Isaac</b>	<b>V.C: Science and Technology: Serving Humanity</b> —Meyer 133 Moderator: <b>Judith Toronchuk</b>	<b>V.D: Science as Understanding Creation 4</b> —Meyer 021 Moderator: <b>Chuck Webber</b>
4:15 PM		<b>David A. Larrabee</b> (25) “Climate Change: Where Do We Place Our Hope?”	<b>Christopher Kawell</b> (25) “Artificial Creatures and Alternate Creations: Framing the Conversation about Virtual Reality and Robotics”	<b>Dillard Faries</b> (25) “Global/Local Explorers of God’s Creation: No Wheaton College Nobel Scientists, but Some Great Near-Misses”
4:45 PM		<b>Johnny Wei-Bing Lin</b> (26) “Environmental Problems as a Place for Compromise and Dialogue”	<b>Mark A. Strand</b> (26) “Science and Technology in Disservice of Humanity: Iatrogenic Contributions to the Opioid Epidemic in America and a Way Out”	<b>Bruce J. Hrivnak</b> (26) “An Observational Study of Evolving Stars”



5:15 PM 10:00 PM	Posters taken down	Geology Museum on the Lower Level of Meyer
5:15 PM	Exhibit and Book Tables close	Meyer Lobby
5:15 PM	Dinner	Anderson Commons
5:15 PM	Dinner Meetup: Geologists—All geologists are invited	Anderson Commons/South Party Room
5:30 PM	Volleyball Tournament	Volleyball Lawn Court
5:30 PM	Softball Game	Softball Field
8:00 PM	State of the ASA Presenters: <b>Leslie Wickman, John Wood, and Vicki Best</b> Offering supports the <b>Student Scholarship Fund</b>	Meyer 145
9:30 PM	Ice Cream Social	Meyer Lobby
9:30 PM 10:30 PM	Exhibit and Book Tables	Meyer Lobby

**Congratulations to our VIPs,  
Long-Time Member Attendees!**

*We appreciate your faithful commitment to the ASA.*

**68 years**

Raymond H. Brand

**50 or more years**

Stanley E. Anderson  
Dwight H. Klaassen  
Clarence Menninga  
J. Terence Morrison  
David A. Saunders  
Kenell J. Touryan  
L. William Yoder

**45 or more years**

Paul T. Arveson  
Walter L. Bradley  
Dorothy F. Chappell  
Dillard W. Faries  
Larry L. Funck  
Ronald T. Myers  
Martin L. Price  
Willard H. Roundy Jr.  
Robert E. Sundell  
Stuart Swenson  
Alan E. Van Antwerp  
John R. Wood

**40 or more years**

Paul A. Adams  
Bryce A. Babcock  
Del L. Coon  
David E. Fisher  
Fred J. Hickernell  
Ronald V. Hodges  
Bruce J. Hrivnak  
Randall D. Isaac  
William M. Jordan  
George L. Murphy  
David L. Sikkenga  
Nolan A. Van Gaalen  
Timothy P. Wallace

MONDAY, 22 JULY 2019				
6:00 AM	Morning walk; all are welcome		Southwest entrance to the Beamer Center (closest to Anderson Commons)	
7:00 AM	Breakfast		Anderson Commons	
7:00 AM	Breakfast Meetup: Christian Women in Science—All women are invited		Anderson Commons/South Party Room	
8:20 AM	<b>Devotions.</b> Devotional: <b>Gayle Ermer</b> Worship Leader: <b>Joe Weinzettel</b>			Coray
8:45 AM 9:45 AM	<b>Plenary VI</b> <b>Jennifer Powell McNutt</b> , “The Mirror of Creation: An Unfailing Witness in Scripture and in the Theology of John Calvin” Moderator: <b>Ray Lewis</b>			Coray (10)
9:45 AM	Exhibit and Book Tables			Meyer Lobby
9:45 AM	Beverage Break			Meyer Lobby
10:15 AM 11:45 AM	<b>VI.A: Teaching Faith &amp; Science: In Church</b> —Coray Moderator: <b>Denis Lamoureux</b>	<b>VI.B: Science and Technology: Working with Creation 2</b> —Meyer 145 Moderator: <b>Johnny Lin</b>	<b>VI.C: CWiS Special Session</b> —Meyer 021 Moderator: <b>Loryn Phillips</b>	<b>VI.D: Science as Understanding Creation 5</b> —Meyer 133 Coordinator: <b>Sy Garte</b>
10:15 AM	<b>Joel Duff</b> and <b>Gregg Davidson</b> (27) “Young-Earth Evolutionists? Adaptation of Young Earth Creationist Models, and Implications for the Church”	<b>William Jordan</b> (27) “Creating a Class in Sustainable Metallurgy”	<b>Loryn Phillips</b> (27) “The Past, The Present, and the Future: Women Breaking Barriers As Scientists Backed by Faith”	<b>Kenell J. Touryan</b> (27) “The Quest for the Meaning of Quantum Physics”
10:45 AM	<b>Luke J. Janssen</b> (28) “The Bible Tells Me Otherwise; Besides Even Scientists Don’t Believe This Stuff, and It’s Not My Problem Anyway”	<b>Glenn A. Marsch</b> (28) “Exploring Extraterrestrial Creation: Theology and Ethics of Space Exploration”	<b>Panel</b> (28) “How Women in Their Communities (Church and Career) Have Thrived and Glorified God”	<b>Roger Stork</b> (28) “Beyond Nature, Naturalism, and Natural Theology: To What Extent Can Design Arguments for the Existence of God Support Christian Beliefs?”
11:15 AM			<b>Loryn Phillips</b> (29) “What Women Are Called to Do: How This Impacts Our Science and Our Faith”	<b>Adam Wright</b> (29) “Explore Material Creation on Its Terms and the Creator on His Terms: The Confusion behind Sean Carroll’s Scientific Investigation of God’s Existence”
11:45 AM	Parallel Session VI ends			
11:45 AM	Exhibit and Book Tables close			Meyer Lobby
11:45 AM	Lunch			Anderson Commons

\* You must be checked out of the residence hall by 1:00 PM

## POST-MEETING ACTIVITY

MONDAY, 22 JULY 2019	
12:30 PM 3:30 PM	Morton Arboretum * Chase Circle outside Beamer

\* Please arrive 10 minutes before departure time.

## Exploring Many Worlds

Deborah Haarsma

The Bible's claims are cosmic in scope: "In the beginning God created the heavens and the earth." "In the beginning was the Word." "All things were created through him and for him." Our biblical worldview frames our investigation of the cosmos; God called Adam to name the animals and calls us to curious exploration of the world around us.

In the last century, scientific exploration has revealed a universe with millions of years of animals, billions of years of cosmic history, and now ... trillions of planets. How do we understand Christ as the Creator of this universe? What would intelligent life on other planets mean for our understanding of Christ as our Incarnate Savior?

Scripture doesn't speak about life on other planets, but it does assure us of the character of the Creator and our value as his beloved children. As we follow God's call to explore and name, we are sometimes amazed, sometimes puzzled, but we need never be afraid.

**Deborah Haarsma** is President of BioLogos and a frequent speaker at churches, universities, and schools on the harmony between modern science and Christian faith. She wrote *Origins: Christian Perspectives on Creation, Evolution, and Intelligent Design* with her husband and fellow physicist, Loren Haarsma, a book presenting the agreements and disagreements of Christians regarding the history of life and the universe. She also edited the anthology *Delight in Creation: Scientists Share Their Work with the Church* with Rev. Scott Hoezee. Previously, she served as professor and chair in the Department of Physics and Astronomy at Calvin College, with several publications on extragalactic astronomy and cosmology. Haarsma earned a PhD in physics at the Massachusetts Institute of Technology. While she and Loren both enjoy science fiction and classical music, only Deb enjoys gardening.



## Living a Scientist's Life

James L. Sherley

Though there are millions of persons in America and the world trained in the sciences, being a scientist remains an exclusive profession. Many who want to become a member are not invited or are rejected when they apply; and the excluded are disproportionately women and people of color. Scientists are unique, and some might even say special members of society. As a group and as individual professionals, scientists evoke varied reactions from others, including fear, reverence, derision, bemusement, disgust, awe, and bewilderment.

Scientists not only claim the providence of the natural world, they are often accorded dominion over and judgment of such knowledge. Though others often approach science and scientists as uniform and monolithic in their practices, principles, and mores, scientists are quite human in their range of distinct individuality. Superficially, the lives of scientists can appear quite ordinary or quite extraordinary, depending on the measure applied. Most scientists' lives reflect in some way the unique quality of their discipline, science; but the manifestation of that quality is informed by the particular aspects of their personal backgrounds, in terms of socioeconomics, heritage, demographics, religious belief, worldview, and politics.

Because scientists' lives are lived and expressed within the body of science of their time, every scientist's life contributes in some way to the advance of science, some with more impact than others. The narrative of the life of one scientist can be instructive both to those pursuing their own lives as scientists and to the continued collective advance of science itself.

With this aim in mind, Sherley will provide a brief narrative of his life as an African American of Christian faith from the rural South, who was born a scientist. He will highlight significant career and professional challenges, civil service for science education, and contributions to the body of science that characterize his life as a scientist.

**James L. Sherley, MD, PhD** is the founder and director of Massachusetts stem cell biotechnology company Asymmetrex, LLC. Asymmetrex develops and markets technologies for advancing stem cell medicine, including the first-in-kind technology for specific counting of adult tissue stem cells. This technology is also applied to design optimized procedures for more effective manufacturing of therapeutic adult tissue stem cells at greatly reduced cost.



Sherley is a graduate of Harvard College, with a BA in biology, and the Johns Hopkins University School of Medicine, earning joint MD and PhD. Prior to founding Asymmetrex, he held academic research appointments at the Fox Chase Cancer Center, Massachusetts Institute of Technology, and Boston Biomedical Research Institute. Sherley's professional awards include Pew Biomedical Research Scholar, Ellison Medical Foundation Senior Scholar in Aging Research, and NIH Director's Pioneer Award.

PLENARY III  
SATURDAY, 20 JULY 2019

CORAY ALUMNI GYMNASIUM  
7:30 PM

## Darwin, God, and Design: Grandeur in an Evolutionary View of Life

Kenneth R. Miller

Modern science has its roots in western religious thought, was nurtured in universities established for religious reasons, and owes some of its greatest discoveries to scientists who themselves were people of faith. Nonetheless, on critical issues from evolution to the “big bang,” religion seems to be at loggerheads with scientific thought. Disturbed by what they see as the implications of evolution, many believers have embraced ideas such as “scientific creationism” or “intelligent design” to justify narrow interpretations of scripture or to support specific religious claims. On the other side, nonbelievers have used evolution to label faith a “delusion” and to declare that “religion poisons everything.”

In fact, evidence supporting the theory of evolution is pervasive in all fields of biology, and enables us to place the origin of our species in its proper historical context. I will address the aspects of evolution that seem to provoke such controversy, and will suggest that the science of evolution can be understood in a way that should lead to a reduction in the conflicts between science and faith. Properly understood, evolution confirms Charles Darwin’s claim that there is indeed “grandeur” in this view of life, a grandeur consistent with a Christian understanding of the glory of God’s creative power.

**Kenneth R. Miller** is Professor of Biology at Brown University. He serves as an advisor on life sciences to The NewsHour, a daily PBS television program on news and public affairs, and is a Fellow of the American Association for the Advancement of Science (AAAS). Miller is coauthor, with Joseph S. Levine, of a series of high school and college biology textbooks used by millions of students nationwide. In 2005 he served as lead witness in the *Kitzmiller v. Dover* trial on evolution and intelligent design in Pennsylvania.



He is the author of several popular books, including *Finding Darwin’s God: A Scientist’s Search for Common Ground between God and Evolution*, and most recently, *The Human Instinct: How We Evolved to Have Reason, Consciousness, and Free Will*. His honors include the Public Service Award of the American Society for Cell Biology, the Public Engagement with Science award from AAAS, the Stephen Jay Gould Prize from the Society for the Study of Evolution, the Gregor Mendel Medal from Villanova University, and the Laetare Medal from Notre Dame University.

PLENARY IV  
SUNDAY, 21 JULY 2019

CORAY ALUMNI GYMNASIUM  
11:00 AM

## God Decides, We Measure

Gerald Gabrielse

A physicist reflects upon science and faith.

Physicist **Gerald Gabrielse** is a leader in super-precise measurements of fundamental particles and the study of anti-matter. Past chair of the Harvard University physics department, he is Trustees Professor and Director of the Center for Fundamental Physics at Northwestern University. His application of the techniques of atomic physics to make super-precise measurements of the electron plays an important role in particle physics. Gabrielse started the low-energy anti-proton and anti-hydrogen research program at the CERN laboratory in Europe, involving hundreds of researchers in studies of anti-matter. Gabrielse’s studies of the anti-proton and anti-hydrogen atom test a very fundamental law of physics. This law, known as “CPT invariance,” relates charge, parity, and time. If Gabrielse were to find the law to be violated, even at the tiniest level, then theoretical physics would face a huge challenge.



Gabrielse is a member of the U.S. National Academy of Sciences (NAS), a Fellow of the American Physical Society (APS), and a member of the American Academy of Arts and Sciences. He has received many distinguished awards, including the Julius Lilienfeld Prize and the Davisson-Germer Prize, both from the APS; Italy’s Tomassoni Prize; the Humboldt Research Award from Germany’s Alexander von Humboldt Foundation; the Trotter Prize from Texas A&M University, and the George Ledlie Prize for exceptional research from Harvard. Of his many prestigious awards, he is most proud of Harvard’s Levenson Memorial Teaching Prize for excellence in undergraduate teaching. He is a regular speaker to church audiences on the intersection of science and faith.

PLENARY V  
SUNDAY, 21 JULY 2019

CORAY ALUMNI GYMNASIUM  
3:15 PM

## Perspectives on Life and Creation

Gayle E. Woloschak

Biology is not so much concerned with life's origins (i.e., the chemistry that lead to the building blocks of life such as proteins and DNA) but is more concerned with the question of once life is here, what does it do, what makes it life. These questions are complicated and difficult to address. I have chosen to take the view that life (at least on Planet Earth) can be defined in part least by the fact that it evolves. Life is perhaps about isolated cells but more often about whole organisms (which may in fact be isolated cells for bacteria, for example). Organisms reproduce but that reproduction is in part contingent on evolution (selection of the reproductively fittest organism for that environment). How do we understand creation (the actual origins of life) in relation to the changing and existence of life driven by evolution? How can this be done in a religious context?

Several key issues are important: (1) Life on earth is united by the fact that it evolves, and this evolutionary process is the same (and different) for each organism. (2) Life and Earth are co-related and co-evolved and life outside of the context of Earth may look very different and may even have different definitions. (3) Because of the link between life and Earth (and Earth is related to environment) there is a distinct relationship between evolution and ecology.

**Gayle E. Woloschak** is Professor of Radiation Oncology, Radiology, and Cell and Molecular Biology in the Feinberg School of Medicine, Northwestern University. Gayle received her BS in biological sciences, from Youngstown State University and a PhD in medical sciences from the University of Toledo (Medical College of Ohio). She did her postdoctoral training at the Mayo Clinic, and then moved to Argonne National Laboratory until 2001. Her scientific interests are predominantly in the areas of molecular biology, radiation biology, and nanotechnology studies. She has authored over 200 papers. She is editor-in-chief for the International Journal of Radiation Biology, is past-president of the



Radiation Research Society, is a member of the Board of the National Council of Radiation Protection and Measurements, and serves on a committee examining low dose-rate effects for the International Commission on Radiation Protection. She is a member of the US delegation to the United Nations Scientific Committee on the Effects of Atomic Radiation.

She also holds a DMin from Pittsburgh Theological Seminary in Eastern Christian Studies and is adjunct faculty at Lutheran School of Theology, Pittsburgh Theological Seminary, and St. Vladimir's Orthodox Seminary. Her area of interest is science-religion dialogue. She is president of the Orthodox Christian Association of Medicine Psychology and Religion, past president of the Orthodox Theological Society of America, vice president of the Orthodox Christian Mission Center Board, and a member of the Board of Orthodox Christian Laity.

PLENARY VI  
MONDAY, 22 JULY 2019

CORAY ALUMNI GYMNASIUM  
8:45 AM

## The Mirror of Creation: An Unfailing Witness in Scripture and in the Theology of John Calvin

Jennifer Powell McNutt

This presentation will explore the way in which creation functions in scripture and in the theology of John Calvin as a witness to the nature and work of God and to the reality of the human predicament. Within the Gospel accounts, creation functions as no mere backdrop to the story of Christ's incarnation, death, and resurrection but as a witness in itself to the person and work of Christ.

In the history of Reformation Theology, creation's role as a witness was developed in the work of Calvin through the metaphor of a mirror that does not fail to bear witness to the truth of God's glory even as humanity struggles to see and understand the witness of creation correctly. Calvin's theological engagement with scripture regarding creation in relation to the scientific understandings of his time offers a helpful model of faith-driven humility for current-day engagement with the scriptural and theological understandings of creation.

**Jennifer Powell McNutt** is a tenured, Associate Professor of Theology and History of Christianity at Wheaton College, a Fellow in the Royal Historical Society, and director of Wheaton's MA programs in Theology and History of Christianity. She received her PhD in history from the University of St. Andrews (Reformation Studies Institute, 2008), MDiv from Princeton Theological Seminary (2003), and BA in Religious Studies from Westmont College (2000). She specializes in the history of the Reformed church and clergy from the sixteenth through the eighteenth centuries.

McNutt is the recipient of several academic awards including the American Society of Church History's Sidney E. Mead Prize for her article on the Protestant response to the Gregorian Calendar reform and the Frank S. and Elizabeth D. Brewer Prize for her monograph, *Calvin Meets Voltaire: The Clergy of Geneva in the Age of Enlightenment, 1685–1798* (Ashgate, 2017). Her recent publications on the history of science include a chapter on Protestant interpretations of Genesis 1–2 during the Reformation, which was published in the multicontributor volume, *Since the Beginning: Interpreting Genesis 1 and 2 through the Ages*, ed. Kyle R. Greenwood (Baker, 2018).



In 2017, she was awarded first place out of 200 entries by Christianity Today's Science Writing Contest, for her essay, "Forgotten Figures: How Pastors of the Enlightenment Helped Advance Modern Science." She is currently coediting *The Oxford Handbook of the Bible and the Reformation* (OUP) with Prof. Herman Selderhuis as well as writing a monograph on the history of the French Bible and a biography of John Calvin for Oxford University Press.

WORSHIP  
SUNDAY, 21 JULY 2019

CORAY ALUMNI GYMNASIUM  
9:30 AM

**Sunday Minister**  
**Tom Stoner**

**Tom Stoner** grew up in Wheaton and moved to New England for graduate school. He has spent his career leading Christian schools in Boston, St. Louis, and now Chicago. He holds degrees from Wheaton College (BA in Christian Education, '89), Gordon-Conwell Theological Seminary (M.Div., '96), and Boston University (EdD, Educational Leadership and Development, '12). Tom's passion is helping Christian schools be the best they can be through specialized teacher training and by addressing bad ideas that undermine their flourishing in the twenty-first century. Tom and his wife, Carrie, have four kids, and they currently live in Naperville, Illinois, where he is head of school at Covenant Classical School.



**Worship Leader**  
**Joe Weinkettel**

Joe lives in Wheaton, IL with his wife, Leslie, and their two daughters and currently works as a full-time software designer. They are members of Church of the Resurrection where they serve with the church's vibrant worship ministry. Over the years, he has led worship in many different settings including eight years as the Worship and Communications Director at First Baptist Church of Wheaton. Joe loves to see different streams of the church come together to glorify God and experience the grace of his presence.



WORSHIP MINISTRY  
SUNDAY, 21 JULY 2019

CORAY ALUMNI GYMNASIUM  
9:30 AM

**Outreach Community Center  
in Carol Stream**

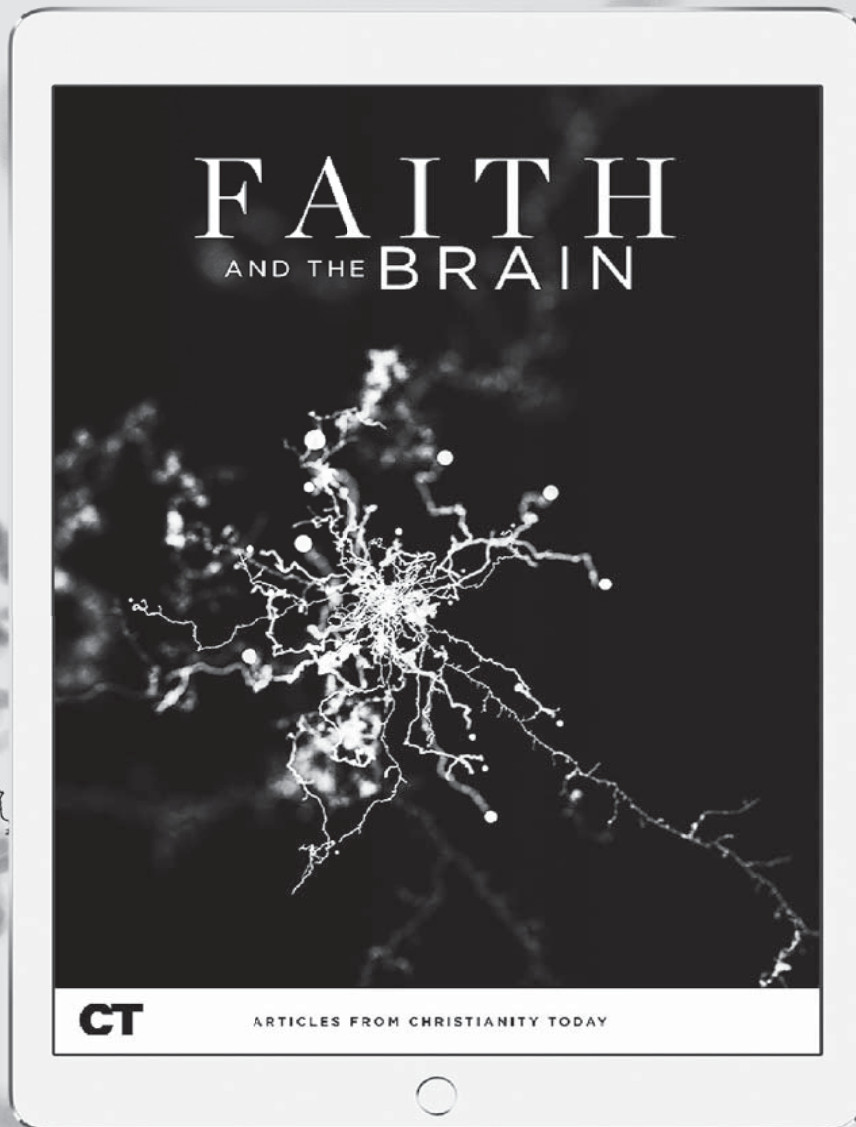


The Sunday offering will support the Outreach Community Center in Carol Stream (OCC). OCC is a multi-purpose, neighborhood resource center serving residents in southeast Carol Stream since 1986. It is located in a neighborhood where incomes are modest and many families are in transition. The Center serves 1,500 residents each year including children, their families, other adults and senior citizens with a full array of services.

Its goal is to help neighborhood residents work together to build a stronger community. Staff are professionally trained in education and human services, sharing a common commitment to minister to each person's physical, social, and spiritual needs. Services are available without preference to all people and, where fees apply, based on one's ability to pay.

Its mission is to restore hope and provide opportunities for people to become all that God intends them to be; partner with the local church to put Christian faith into action through service to the community.

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**I.A: TEACHING FAITH AND SCIENCE: HIGHER ED COURSE-BASED PROJECTS 1**

Coray

**Along the Creek: Where Conservation Science and Sense of Place Meet**  
Abbie Schrotenboer

We live intertwined with other creatures and enmeshed in ecosystems in a world created by God. Our God is a God of relationships, and he formed us in relationship with God, with each other, and with the creation around us. While we have God-given authority, we are also dependent on the creation.

However, for many of us, we are disconnected from the natural world around us and have become less aware of our dependence on ecosystems for the basic requirements of life. Our ability to be earthkeepers and maintain healthy relationships with the creation thus suffers. I suggest that conservation efforts can work as a multifaceted approach to not only provide scientific understanding of ecosystems but also opportunities for the development of sense of place, particularly place attachment.

Studies have linked place attachment to pro-environmental behaviors. In my own work, student sampling of macroinvertebrates in local waterways is providing information on the health of the stream communities, and is also providing a framework for people to see these waterways as a diverse and valuable ecosystem.

In addition, a field camera study in the stream corridor on my college campus provides an opportunity not only to evaluate wildlife behavior in a suburban setting but also to help the college community recognize the ways in which we share our place with other creatures. When we recognize our interconnections with the rest of creation, we can live more fully into the place that God has given us.

**I.B: WE BELIEVE IN CREATION 1**

Meyer 145

**Introduction**  
Clarence Menninga**I.C: SCIENCE AS UNDERSTANDING CREATION 1**

Meyer 133

**The Fifth Way: Teleological Language in Biology and a Thomistic Natural Theology**

**Seth Hart**  
Grad student, University of Oxford

J. B. S. Haldane is purported to have stated,

Teleology is like a mistress to a biologist: he cannot live without her but he's unwilling to be seen with her in public.

My proposal is to reveal the metaphysical implications of teleological structures in biology and argue that they provide evidential support for the famous Fifth Way of Thomas Aquinas. In this presentation, I will defend the claim that teleological language (or language of proper functionality) is an irreducible aspect of biological systems.

In the second half of the twentieth century, defenses of the use of teleological language in biology appeared from such prominent intellectuals as Francisco Ayala and Ernst Mayr.

Since then, an explosion of literature has appeared about the appropriate usage of teleology and its metaphysical implications. Large numbers of "teleonaturalists" have attempted to demonstrate that such language, which has proven itself vital to biological studies, is simply a shorthand for nonteleological equivalents. However, these attempted reductions have proven unsuccessful. Teleology is best understood as a real, irreducible aspect of biological organisms.

This, I will conclude, provides powerful evidential support for Thomas's Fifth Way. While some philosophical legwork still needs to be done, the reality of biological teleology should reignite interest in the Angelic Doctor's work, for it might provide a commanding case for the reality of God.

**I.D: STUDENT/EARLY CAREER, TRACK 1**

*Sponsored by ASA and InterVarsity's Emerging Scholars Network (ESN)*  
Meyer 021

**Finding God in His World: How Working in Science Strengthens Our Faith (Panel Discussion)**

You love science, but do you ever struggle to see the significance of a long day in the lab or the field? Do you sometimes wonder how your faith and your scientific work can inform each other? Come hear how working in science deepens the life of faith for our panelists.

Science professionals will share personal stories and ideas that helped them experience God through their scientific work.



**I.A: TEACHING FAITH AND SCIENCE: HIGHER ED COURSE-BASED PROJECTS 1 (CONT'D)**  
**Coray**

**How the Irish Elk Got Its Antlers: Phenotypic Plasticity and Objections to Evolution**  
**Matthew Morris**

Those involved in the Modern Synthesis viewed the environment's role in evolution as a sieve that removed less-fit randomly generated mutations. Phenotypic changes induced by the environment (phenotypic plasticity) were generally regarded as evolutionarily unimportant, a marked contrast from the neo-Lamarckian position of the inheritance of acquired characters. However, a minority neo-Darwinian position recognized that (a) natural selection operates at the level of the phenotype, and thus environmentally induced phenotypes could be favored by selection; (b) plasticity could evolve if plasticity itself had a genetic basis; and (c) an environmentally induced phenotype could come under the control of new mutations.

In the last decade there has been increasing experimental evidence to validate the significance of plasticity in evolutionary biology. However, evolution is typically still taught in such a way that evolutionary changes are necessarily gradual and reliant on the appearance of random mutations. For many lay-people, such a model seems implausible—how could stepwise mutations happen to coincide in the right order at the right time to produce complex phenotypes? How could an elk develop absurdly large antlers without the musculature to support it? Phenotypic plasticity helps clear this difficulty—the environment can induce sudden large adaptive changes in phenotype; hidden genetic and phenotypic variation can be revealed in new environments; and mutations of large effect can be compensated by developmental plasticity. I will suggest that teaching plasticity can help ease objections to evolutionary biology, but it requires reframing how evolution is taught.

**I.B: WE BELIEVE IN CREATION 1 (CONT'D)**  
**Meyer 145**

**A Confusion of Categories: Theistic Evolution, Evolutionary Creation, Biblical Evolution, Fiat Creation, Intelligent Design, Methodological Naturalism ...**  
**Terry M. Gray**

Richard H. Bube in his brief 1971 essay "We Believe in Creation" wrote that there was "... a profound confusion of categories ..." in the creation/evolution debate. His primary interest was in distinguishing between a theological idea—the biblical doctrine of Creation—and scientific descriptions whether it be fiat creation (the way he referenced Creation Science or young-earth Creationism) or biological evolution. In making this distinction Bube led the way for many in the ASA to recognize evolutionary biology and an old earth and universe.

However, we continue to use phrases and descriptors that seem to confuse the categories. If there is a confusion of categories when it comes to Creation and a scientific mechanism for origins, such as fiat creationism, why isn't there a confusion of categories in our terms that admit to biological evolution (e.g., theistic evolution, evolutionary creation, and Bube's own moniker, biblical evolutionism, found in the same issue of the *JASA*)? What about intelligent design and methodological naturalism? Why don't we speak of theistic chemistry or gravitational creation or biblical neurobiology?

Many would argue that the practice of science is consistent with a Christian worldview. If that is the case, then what is the relationship between science as practiced by those who hold to a Christian worldview and those that do not? Is theistic evolution different from the science of biological evolution? I will also attempt to answer the objection that this view leads to a fragmentation of a unified theistic perspective.

**I.C: SCIENCE AS UNDERSTANDING CREATION 1 (CONT'D)**  
**Meyer 133**

**The Nature and Origin of Biological Information and the Question of Agency**  
**Larry Funck**

The origin of life is among the most challenging questions in modern science. Perhaps the most critical issue to be resolved in answering this question involves the origin of biological information.

The first step in addressing this issue is the definition of the term itself—what is meant by biological information? How is the concept related to other forms of information such as those expressible in machine language or in human language? It will be argued that biological information comes in two forms, one that can be expressed digitally (e.g., DNA) and the other that is more analog in nature (e.g., proteins). These in turn can be related analogically to information expressible in human language.

Once the term is defined, we can then consider how biological information might have come into existence. Could it have happened via so-called natural processes? Is there necessarily an intelligent source required for its appearance?

Atheists such as Richard Dawkins answer "yes" to the first question and "no" to the second, while Intelligent Design proponents reverse the responses. It will be argued that an affirmative answer to both questions is the preferred response from a theistic perspective.

**I.D: STUDENT/EARLY CAREER, TRACK 1 (CONT'D)**  
**Meyer 021**

**What I Wish I'd Known: Best Practices for Thriving as an Early Career Science and Technology Profession**

What are the two to three key things experienced science and technology professionals wish everyone could discover earlier in their careers? Our panel will let you in on the secrets they have discovered for thriving as a student and/or early career professional in a variety of settings.

Join us to learn best practices that will help you flourish in your work and life.

**I.A: TEACHING FAITH AND SCIENCE: HIGHER ED COURSE-BASED PROJECTS 1 (CONT'D)**

Coray

**Nursing Ethics, Ethical Theory, and Virtue Ethics**

**Gayne John Anacker**  
California Baptist University

Ethical theory is in crisis in Western civilization, but the world of applied ethics, and Nursing Ethics in particular, does not comprehend this crisis, and therefore does not comprehend that its treatment of ethical theory as a foundation for professional ethics is seriously flawed. Instead, an alternative overall foundational approach to ethics must be sought, and for Christians, the overall approach should reflect an array of ethically relevant biblical values. I propose a Christian version of Virtue Ethics as the basis from which professional ethics, such as Nursing Ethics, should be approached.

This presentation will include the following elements: (1) a brief display of the commitment to goodness embedded within the American Nursing Association Code of Ethics for Nurses; (2) a brief, practical review of the failure of modern-era ethical theories (Deontology and Utilitarianism) to provide a rational foundation for applied ethics such as Nursing Ethics; (3) a display of the flawed understanding—prevalent within Nursing Ethics—of the role of modern-era ethical theories as a foundation for applied ethics; (4) an outline of a Christian version of Virtue Ethics, and its greater rational acceptability as a foundation for Nursing Ethics, and for any applied, professional ethics.

**I.B: WE BELIEVE IN CREATION 1 (CONT'D)**

Meyer 145

**Divine Action and the Sacramental Principle in the Science-Faith Dialogue**

**Jonathan Bryan**  
Northwest Florida State College

The nature of divine action in the cosmos remains a central question in the science-faith dialogue. Some would restrict divine activity to the manipulation of quantum uncertainties or chaotic systems, or the transmission of pure information. Others propose dual agency (carpenter-hammer), pantheism (nature inseparable from divine presence and action), or the world as God's body (divine action analogous to mental activity). In all cases, the nature of the interaction between divine initiative and the material (the "causal joint") is inherently, and necessarily unknowable. This is inescapable so long as we believe in a transcendent Creator who, no matter how related or attached to nature, is nonetheless truly other than the material creation, and so beyond the conceptual reach of any scientific assay. Divine action cannot be articulated in scientific categories.

This ontological gap between matter and spirit does not mean they are unrelated. Their relation may be approximated by the theological concept of the sacred or sacramental, in which otherwise natural phenomena (objects, places, actions, words) "participate in a reality that transcends them." They possess additional meaning and dimension that is inseparable from them. By the sacramental principle, we understand nature as more than mere matter, or the complexities and effects of matter. A sacramental understanding invites us to begin the radical project of truly integrating science and faith. We illustrate with a consideration of biblical pneumatology and the nature of life, the cruciform fabric of the ecosphere, and the sacramental implications of the Incarnation for Creation.

**I.C: SCIENCE AS UNDERSTANDING CREATION 1 (CONT'D)**

Meyer 133

**Evolution: The More Intelligent Design**

**Sy Garte**

Proponents of Intelligent Design often insist that certain complex biological features could not have evolved "by chance" but must be the product of a specific act of supernatural intelligence. In this talk, I will focus on the idea that evolution itself is the best example we have of intelligent design in nature.

In discussions of origin of life, it is often assumed that evolutionary processes became active as soon as the earliest proto-life forms appeared. But the biological process of evolution does not arise automatically from proto-life or chemical evolution; there is currently no good scientific model for the origin of biological evolution.

The evolutionary continuity principle states that "evolution must proceed via consecutive, manageable steps ..." We now know that there are many exceptions to this principle, wherein it is possible for relatively sudden and dramatic increases in fitness to occur.

I will present data from theoretical simulations of replication fidelity and survival probability that strongly indicate such a violation of the continuity principle early in the origin of evolving life regardless of the biochemical details of how evolution began. These results are consistent with evolution being the most intelligent design for the diversity of life.

**I.D: STUDENT/EARLY CAREER, TRACK 1 (CONT'D)**

Meyer 021

**Speed mentoring**

Wondering how to put your career in science/tech and your mission as a believer in Christ together? Curious how to flourish in your work? Want to process one of our tracks or a plenary session further? Not sure how to find mentors? Join us for speed mentoring!

ESN track speakers and others will be available to share advice and answer your questions in a small group setting.

**II.A: TEACHING FAITH AND SCIENCE: HIGHER ED COURSE-BASED PROJECTS 2**
**Coray**
**Seeing the Invisible in the Light of the Bible: The Impact of Faith Integration on the Personal Faith of Students**
**Daisy Savarirajan<sup>1</sup> and Su Fong<sup>2</sup>**
<sup>1</sup>College of Science, Engineering, and Technology, Grand Canyon University

<sup>2</sup>Curriculum Design and Development, Grand Canyon Education

The integration of faith and learning (IFL) is an integral part of Christian higher education. Recent years have seen a spate in published studies testifying to an intense pursuit of meaningful IFL by many institutions of Christian higher education. However, little scholarship has been devoted to explore the influence of faith integration in science and its effect on the spiritual growth of students.

Grand Canyon University has integrated the Christian Worldview (CWV) in at least 30% of its college-program courses. Instilling the core Christian convictions into each student's total college life has been one of the distinctive tasks of the university. The purpose of this study is twofold: (1) to understand how CWV develops in the microbiology course, and (2) to understand how IFL affects a student's personal faith.

The data was collected over a period of three consecutive years, from 2016 to 2018, from students preparing for health care and science careers. Using the survey design with open-ended questions, over 400 participants provided responses to articulate the Christian worldview perspective of microorganisms and diseases.

Findings reveal a positive impact of IFL on the personal faith of students. The results also indicate students demonstrating growth in their understanding of how the Christian faith and microbiology concepts intersect.

**II.B: WE BELIEVE IN CREATION 2**
**Meyer 145**
**Immortality and the Necessity of Death**
**John R. Wood**

The King's University, Edmonton, AB

Francis Bacon had a dream. He challenged physicians to turn their attention to curing the common causes of human dying. They did and the resulting unprecedented gains in human longevity would have shocked him.

But yesterday's dream is today's dilemma. A growing number of retirement age "baby boomers" got up this morning, and more will do so tomorrow. Yet still we are all going to die. There is no miracle of modern science (yet?) that will prevent that happening. Those relentless facts present us a challenge.

Death is a central human issue, but a difficult one to talk about. We live in a culture that is deeply conflicted about death. The impulses to seek immortality vie with competing visions of a good dying. Some want us to extend life with the dream of immortality—silicon-based and transhumanist, if necessary. While others lobby for life-ending rights, comparing support for a medically assisted death with enlightened views toward those who attempt suicide. Meanwhile, observers say that inside the church we do little better in talking about death than the broader culture.

However, there are insights for better practice to be gained from contemporary academic theology. Scholars have been rethinking the traditional readings of death in Genesis. Finiteness has been present from the beginning. Humanity was always mortal, with a limited life span. These re-readings raise challenging issues, while also pointing to intriguing new possibilities for the discourse of science and faith. They can help us in learning to die well.

**II.C: DIGITAL TECHNOLOGY 1**
**Meyer 133**
**The Cyber Problem: History, Outlook, and Responses**
**Timothy P. Wallace**

The computer revolution enabled the creation of the internet for education, commerce, and communications, but also gave us disasters such as plane crashes and medical device failures. In recent years, cyber vulnerabilities have become apparent, as email accounts and web sites are compromised, files are encrypted for ransom, and internet-enabled devices turn against us.

We'll take a fast trip through seven decades of computer hardware and software development in which recent trends are not positive. A few stories will illustrate the situation in which we find ourselves. The complexity of new software systems is working against the reliability and security we need. The rise of the so-called zero-day vulnerabilities and the malware marketplace means no system is safe from the determined hacker.

The total problem is quite intractable, but we'll consider two kinds of responses. What can the Christian engineer, computer scientist, or software manager do to avoid creating potentially vulnerable systems? At the user level, we'll look at a few things that I do personally to reduce computer risks, some quite easy and others more difficult.

**II.D: STUDENT/EARLY CAREER, TRACK 2**
*Sponsored by ASA and InterVarsity's Emerging Scholars Network (ESN)*
**Meyer 021**
**Building Bridges with Secular Colleagues in Science and Technology**

According to a recent Pew survey, a majority of the American public (59%) said science and religion often conflict. For Christians in science and technology fields, talking about faith with secular colleagues can seem daunting, yet often the most meaningful conversations come when we have the courage to talk about how we see faith and science working together. Our panel will share ideas on how they build bridges with secular colleagues and create meaningful dialogue on science and faith.

**II.A: TEACHING FAITH AND SCIENCE: HIGHER ED COURSE-BASED PROJECTS 2 (CONT'D)**

Coray

**Exploring Connections between Environmental Plastics and Microorganisms and Beyond**Sarah M. Richart  
Asuza Pacific University

Petroleum-based plastics are lightweight, inexpensive, and durable, and their use has greatly improved modern medicine and made transportation less expensive. These human creations, however, have changed the face of the earth, with plastics now integrated into the geological record, one hallmark of the so-called Anthropocene Epoch. There is little natural biodegradation of petroleum-based plastics because microorganisms that we rely on for biodegradation lack metabolic pathways to breakdown and assimilate these carbon-rich materials.

This presentation explores some of the microbiological implications of plastics in the environment, including the possible use of microorganisms in bioremediation of plastic environments, and forms the basis for a semester-long assignment embedded in introductory microbiology classes. In class, plastics are incorporated into many basic microbiological concepts. Outside of class, students are given a series of weekly journal assignments that begin with auditing their own plastic usage for a week followed by setting goals for reducing their plastic usage. Students read and reflect on news articles related to plastics, including their effects on wildlife and humans, and other theological pieces that help them develop an ethic toward plastic usage specifically and care of creation more broadly. Students also write a letter to a newspaper, political representative, or company expressing a point of view related to plastics.

This assignment could be easily adapted to other introductory natural science courses addressing plastics or other human-caused environmental problems such as rising global temperatures or species extinction.

**II.B: WE BELIEVE IN CREATION 2 (CONT'D)**

Meyer 145

**Un-Creation, Re-Creation, Creation:  
A New Theory for the Origins of Genesis 1**

Alan Dickin

If Genesis chapter 1 is a divine revelation, why does it appear to contradict a scientific account of creation? To answer this question, we need to better understand the relationship between Genesis 1 and the primeval history of Genesis.

One of the most important episodes of this primeval history is the story of the Great Flood, which has been seen by many scholars as a process of “un-creation” that returned the earth to its initial chaotic state. It might seem that only a worldwide flood could explain the loss of life described in the Genesis and Mesopotamian deluge accounts. However, a catastrophic river flood in the Neolithic Period can explain the annihilation of the known world in a way that cannot be explained by flooding events during the sophisticated civilizations of the Bronze Age. A Neolithic Flood is also consistent with geological evidence for a uniquely wet period in the early sixth millennium BC.

A realistic understanding of the experience of the Flood helps us to better comprehend Genesis 1. Rather than Genesis 1 inspiring the story of un-creation in the Flood, it was the experience of the Flood that inspired the vision of creation in Genesis 1. It began with the chaotic watery darkness of the Flood, and its ordering of the Heavens and the earth paralleled the re-ordering of the world after the Flood. The recipient of this vision heard the divine command and saw its creative power, but in turning his experience into words he spoke out of a prescientific worldview.

**II.C: DIGITAL TECHNOLOGY 1 (CONT'D)**

Meyer 133

**Algorithms and Cosmos:  
Theological Reflections on the Freedom and Limit of Human Technology of the Mind**

Heather Champion

In the age of the algorithm, neither the pope nor the tenured professor of science ultimately legitimates truth. Rather, modern appeals to cognitive science are fusing with ancient practices of petitioning powerful agents “up in the cloud” to direct, adjudicate, and construct social, economic, and political truths. Despite the potential and actual perils of this situation, theological attention to algorithms is greatly lacking.

This presentation presents a theological account of algorithms as both free and limited, arguing that they can be developed in Christian faith and hope. Algorithms are both descriptive and constitutive legitimations of “cosmos”; they are both discovered and invented. This means that imagination and intention as well as sustained attention to what is “already there” are key to developing an abstraction that represents reality well. It also indicates that algorithms are theologically significant as human means of encountering and engaging the complexities and limits of creation.

**II.D: STUDENT/EARLY CAREER, TRACK 2 (CONT'D)**

Meyer 021

**Choosing the Best Path for You: Making Good Career Decisions at Moments of Transition**

There are huge decisions to make at many moments of an early science and technology career. Our panel will share wisdom on how to make good decisions at moments of transition. Whether you're figuring out what to do after you graduate, considering a postdoc in a new subspecialty, deciding between job offers, or making other key decisions, please join us.

**II.A: TEACHING FAITH AND SCIENCE: HIGHER ED COURSE-BASED PROJECTS 2 (CONT'D)**

Coray

**The Scientific Endeavor and the Whole Person**

 Stan Zygmunt  
 Valparaiso University

On her way to obtaining a bachelor's degree in a science field, a student ought to come to grips with the character, scope, and limitations of the scientific endeavor, particularly in her chosen discipline. Unfortunately, many students will graduate with a simplistic notion of the "scientific method" that bears little resemblance to the way science actually works.

I teach a course for upper-level science majors that tries to remedy this situation. I present various philosophical schools of thought along with historical examples of scientific discoveries and revolutions. By examining case histories, students are better able to understand how scientific choices are made and what factors influence them. This also reveals how competing ideas, models, and theories are formulated and accepted by the scientific community. These studies illustrate that science is a human endeavor and is strongly influenced by both human abilities and limitations.

In this course we also explore connections between the scientific endeavor and the personal lives of scientists. What are our motives and desires for learning about the natural world? How does science influence and interact with our various faith commitments? These issues are discussed to help students become persons whose lives have increasing coherence and unity.

I will discuss my experiences in teaching this course over the last twenty years, including the choice of texts, the conduct of class discussions, and the structure of written assignments, including a final paper inviting reflection on the interaction between a student's faith commitments and scientific pursuits.

**II.B: WE BELIEVE IN CREATION 2 (CONT'D)**

Meyer 145

**Fruit Flies and Human Origins: The Genetics and Theology of Molecular Homology**

 Ian Clary and Julie Woodman  
 Colorado Christian University

To better understand God's creation and the innermost workings of human cells, non-human species are commonly used as model systems for study. Molecular homology, the fact that genetic sequences are similar, sometimes identical, across multiple species, makes this possible. For example, the developmental disorder Cornelia de Lange Syndrome is mostly studied in *Drosophila melanogaster* (fruit fly) and *Saccharomyces cerevisiae* (budding yeast) in order to more fully understand the molecular etiology of the disease. Molecular homology to humans is therefore a powerful tool that can enhance and drive scientific research and medical breakthroughs. Moreover, these genetic similarities found across organisms inextricably link all of God's creation.

In this presentation, we will include scientific work that demonstrates how molecular homology can be used to understand more about our own species and how it can be used in the treatment of specific disorders. We will also explore theological implications of molecular homology, particularly as it relates to the question of human origins.

In conversation with Prof. Gijsbert van den Brink, University Research Chair of Theology and Science at VU Amsterdam, we will examine the relations between species and the nature of common ancestry. With Prof. van den Brink's forthcoming *Reformed Theology and Evolutionary Theory* as a guide, our purpose will be to determine the potential limits set by scripture and theology as well as areas of potential development in relation to the biological sciences.

**II.C: DIGITAL TECHNOLOGY 1 (CONT'D)**

Meyer 133

**AI and the Apocalyptic Imagination: The Ends of Divine, Natural, and Artificial Agency**

 Michael J. Paulus Jr.  
 Seattle Pacific University

New information and communication technologies (ICTs) are reshaping our lives and the environments in which we live to such an extent that philosopher Luciano Floridi claims we are living through an information revolution. ICTs are changing our self-understanding, how we relate to each other, and how we understand our role in the world. At the center of this revolution is the advent of automated information processing and intelligent systems.

These technologies of artificial intelligence (AI) raise questions about data collection, algorithmic agency, and the future of every dimension of life. They also inspire a range of hopes and fears. Some AI narratives are optimistic and utopian, anticipating AI to solve known problems and create a superior form of life. Others are pessimistic and dystopian, expecting AI to exacerbate old problems and create new ones. The most extreme anticipations and anxieties include apocalyptic visions of an earthly paradise, posthuman immortality, and the end of the human species and human civilization.

Eschatological narratives about AI often draw from Judeo-Christian apocalyptic categories, and therefore present us with an opportunity for a deeper engagement with the apocalyptic imagination as we reflect on hopes and fears associated with our information revolution. This presentation explores how the Christian apocalyptic imagination provides a constructive conceptual and narrative framework for viewing our current information revolution as an information revelation about divine, natural, and artificial agency participating in new creation.

**II.D: STUDENT/EARLY CAREER, TRACK 2 (CONT'D)**

Meyer 021

**Speed Mentoring**

Wondering how to put your career in science and your mission as a believer in Christ together? Curious how to flourish as a scientist? Want to process one of our tracks or a plenary session further? Not sure how to find mentors? Join us for speed mentoring!

Our ESN track speakers and others will be available to share advice and answer your questions in a small group setting.

**III.A: TEACHING FAITH AND  
SCIENCE: HIGHER ED  
BROADER APPROCHES**

Coray

**Using Reconciliation  
Approaches to Teach  
Evolutionary Theory**

Michael Tenneson  
Evangel University

A growing number of scholars are investigating methods of teaching evolutionary theory to religious students.

This talk will report on findings from a Howard Hughes Medical Institute funded project to help students find a “Road to Reconciliation” at the intersection of evolution and religion. Grant awardee Jamie Jenson (Associate Professor of Biology at Brigham Young University) formed a research group made up of faculty associated with four religious institutions: Brigham Young University (The Church of Jesus Christ of Latter-Day Saints), Colorado Christian University (Evangelical Christian), Evangel University (Assemblies of God), and Point-Loma Nazarene University (Church of the Nazarene).

At each university, professors presented units on evolution that were compatible with their religion’s theological perspectives. Students were asked to describe their beliefs about evolution before and after these presentations via essay prompts and the GAENE survey instrument. All groups showed significant gains in evolution acceptance without a reduction in commitment to their religious beliefs.

**III.B: WE BELIEVE IN CREATION 3  
(THIS SESSION HAS TWO  
40-MIN. PRESENTATIONS)**

Meyer 145

Please note: This talk ends at 4:25 PM

**The Beginning and End  
of Creation**

George L. Murphy  
Trinity Lutheran Seminary

How did the universe begin and how will it end? The successes of scientific cosmology have encouraged some of its practitioners to answer such questions once considered philosophical or theological. Christian theologians need to examine the traditional teaching that God created the universe “out of nothing” and the promise of a new creation.

This presentation considers first the development of belief in *creatio ex nihilo* and its contrast with Plato’s idea of creation as formation of primal matter, hylomorphism. Claims by Krauss and Hawking that physics can explain why there is something rather than nothing will be examined. While they are overstated, more modest versions can be understood in light of Isaiah 45:15, “Truly, you are a God who hides yourself.”

We will note that *creatio ex nihilo* is not an isolated doctrine. Connection with, in particular, the doctrine of justification will be discussed.

Hope that God will bring about “new heavens and a new earth” (as in Revelation 21) contrasts with the “freeze or fry” (and probably freeze) prospects offered by cosmological extrapolations. Christian eschatology contains elements both of discontinuity and continuity between God’s old and new creations. The new will come about, in Polkinghorne’s words, *ex vetere*, from the old.

**III.C: DIGITAL TECHNOLOGY 2**

Meyer 133

**Embodied Relations and  
Disembodied Presence:  
Ethical Reflections on  
Telepresence and Virtuality**

Michael J. Sleasman

This presentation will explore developments in telepresence and telemedicine—robotic or otherwise—as a case study for assessing emerging technologies and the ways in which theological resources, particularly a robust theological anthropology, might inform such an engagement of these developments.

Telemedicine serves as an interesting case study for modeling technology assessment for several reasons. The first is that the technology for the most part already exists, and the derivative digital communication technologies upon which it is based, in many cases, have already been adopted into mainstream use. While some aspects of telemedicine have become common use (e.g., email communications with care teams, patient management systems, remote diagnostics and monitoring), certain applications such as telerobotics, robotic avatars, and telesurgery seem a bit more distant or on the far horizon regardless of whether they are already consumer realities (e.g., telesurgery has been utilized with increasing frequency since the mid-1990s).

The presentation will begin with a brief technological genealogy, sketching the emergence and evolution of telepresence, and specifically telemedicine. This will serve as an entrance into a broader discussion of cultivating a broad technology assessment for these emerging technologies.

The talk will conclude by briefly proposing theological resources, particularly from theological anthropology, as areas of additional inquiry that might serve to guide or inform a robust engagement of telemedicine and similar arenas of emerging technology.

**III.D: SCIENCE AS  
UNDERSTANDING  
CREATION 2**

Meyer 021

**Testing Biblical  
Creation Accounts with the  
Latest Science**

Hugh Ross  
Reasons to Believe

The ultimate test for the reliability and authority of the biblical creation texts is to determine whether ongoing scientific advances demonstrate increasing or decreasing concordance between the biblical declarations and the established scientific record.

In this brief talk, I will describe and visually show the trend of scientific advances from the 1950s right up to 2019 that are relevant to the description of the biblical account of creation.

Most of the talk will focus on scientific discoveries and experiments made during the past year that dramatically enhance the scientific case for the predictive power of the Bible to accurately describe both the physical details and the chronological order of the events of creation, especially those relevant to creation days three and four.

**III.A: TEACHING FAITH AND SCIENCE: HIGHER ED BROADER APPROACHES (CONT'D)**

Coray

**How Oral Roberts's Views on Science and Faith Influenced the Character of Christian Higher Education in America's Bible Belt**

**Dominic Halsmer and David Meddaugh**  
Oral Roberts University

Oral Roberts, the founder of Oral Roberts University (ORU), was a pioneer of higher learning in a Christian context. His "whole person" education emphasized simultaneous academic excellence, physical health, and spiritual sensitivity. In this "whole person" education, Oral advocated for the integration of secular and spiritual knowledge, a remarkable position considering his denominational background and historical context. Today, ORU has maintained a large degree of theological and academic freedom because of Oral's steps to ensure his vision of ORU serving the historic church, not a denomination. This vision of serving a broader, more ecumenical church was Oral's driving mission. Oral argued that his university could provide where other Christian institutions did not because of Oral's unique view of Truth.

In the midst of the Young Earth Movement in the 1960s, Oral Roberts instead integrated so-called "secular science" and doctrine. In addition, he was able to separate scientific knowledge from its secularistic implications and reframe this scientific knowledge in a Christian context because he believed that all true knowledge, like all healing, comes from God. This allowed Oral to create an academic curriculum that would become accredited 6 years after the University's founding and yet maintain a consistent university emphasis on spiritual life. Oral Roberts's views represent a step forward in Christian attitudes toward science and provides a model for how secular knowledge can be successfully integrated into Christian education.

**III.B: WE BELIEVE IN CREATION 3 (THIS SESSION HAS TWO 40-MIN. PRESENTATIONS)**

Meyer 145

*Please note: This dialogue begins at 4:30 PM*

**Fine-Tuning of the Universe and Methodological Naturalism**

**Walter Bradley**  
Baylor University  
and  
**Randy Isaac**  
ASA

The exchange between Walter Bradley and Randy Isaac in the December 2018 issue of *PSCF* is only the tip of the iceberg of their many years of both public and private dialogue.

While passionately in strong agreement on the basics of creation and the foundations of faith, these two good friends differ in subtle aspects of methods of interpreting the natural world.

In this session, Walter and Randy will continue their dialogue, inviting the audience to listen in and perhaps ask a few questions. The main topics will be fine-tuning of the universe and methodological naturalism, although the conversation may go in any unexpected direction.

**III.C: SCIENCE AS UNDERSTANDING CREATION 2 (CONT'D)**

Meyer 133

**Information Communication Technology: The Devil's Playground or the Church's Harvest Tool?**  
Omololu Fagunwa

The church is the company of all the redeemed. Fellowship, prayers, and teaching of the word have considerable bodies of works on the church growth phenomenon and the influence of leadership, evangelism, and small groups, but few have attempted to give details on the identified growth factors in Acts 2:41–47. Science and technology in serving humanity in the religious sphere could have some implications and applications.

There are advantages of using Information Communication Technology (ICT). Present studies explore the perception and practices among Nigerian Christians on the use of ICT. It also explores implications for church health. Survey questions were used to identify how Christians use some ICTs for personal and spiritual purposes. Hard and soft (online) copies of the survey questions were administered. The result shows that about 92% of the online respondents use the internet on a daily basis while only 7% visit a church/ministry website. The result also shows a downward slope of usage: internet (92%), social media (89%), electronic Bible (57%).

Church leaders highlight their concerns about the use of ICT in the church, despite the potential benefits. This technology could hinder or increase growth, but in itself the technology is neutral. Practicing wise stewardship for God's glory should be the focus.

**III.D: DIGITAL TECHNOLOGY 2 (CONT'D)**

Meyer 021

**Review of the Physical Basis of Fine Tuning**  
Ronald T. Myers

The anthropic principle is the idea that the universe appears to be designed for life. It has been asserted that small changes in basic physical parameters and initial conditions would lead to a universe without life. This is the associated concept of fine tuning. This has led to the use of fine tuning as an apologetic for faith in God, although not without controversy.

However, since circa year 2000, journal articles have been published in refereed journals showing how other parameter choices outside the previously considered narrow range will give rise to stars and the biophilic elements that support life as we know it.

Since an apologetic is only as good as the facts behind it, this talk will review some of the physics that serve as the basis of the anthropic principle and fine tuning and then note the later results. It is concluded that

- (a) Use of dimensionality of space remains a strong apologetic;
- (b) Proton-neutron and electron-proton mass ratios are weak apologetics;
- (c) Constraints on the electromagnetic constant need to be re-examined and therefore should not now be used as an apologetic;
- (d) Constraints on strong and weak force leading to stars and biophilic elements have been significantly weakened (i.e., now broader), making fine tuning useless as an apologetic.

### III.A: TEACHING FAITH AND SCIENCE: HIGHER ED BROADER APPROACHES (CONT'D)

Coray

#### Education in the Twenty-First Century: Addressing the Intersection of Science and Faith on YouTube

Dale Gentry

University of Northwestern—St Paul

Scientific literacy provides a framework for understanding that can be used to critique claims about the history of the earth, how it works, what problems we are facing as a society and how to judge the solutions. Sociologists tell us that some groups are more inclined to understand and trust the conclusions of science than others, and Christians have room to improve. However, the best strategy to effectively improve the scientific literacy of Christians is unclear.

Free online videos have become a significant educational resource. The success of YouTube channels supported by grants from the National Science Foundation and PBS, show that YouTube is a respected platform for teachers and students. Christians have similarly embraced this format with similar success teaching about faith and theology; however, there is an empty niche waiting to be filled at the intersection of science and Christian faith. I created Disciple Science to fill that niche.

Disciple Science is a new non-profit media production company that will produce videos, a blog, and a podcast to show how science and theology together can provide a fuller understanding of the world. Come hear about the process, plan, challenges, and opportunities that lie before us as we explore the intersection of science and Christianity in the public arena.

### III.B: WE BELIEVE IN CREATION 3 (THIS SESSION HAS TWO 40-MIN. PRESENTATIONS)

Meyer 145

*Please note:* This dialogue began at 4:30 PM

#### Fine-Tuning of the Universe and Methodological Naturalism

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Baylor University

and

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### III.C: DIGITAL TECHNOLOGY 2 (CONT'D)

Meyer 133

#### The Challenge of Transhumanism: Discerning a Christian Response

Derek Schuurman

Calvin College

The adage that “we shape our tools, and thereafter our tools shape us” takes on a new meaning with transhumanism. Transhumanism is a movement that seeks to enhance humans using technology far beyond the limits of their current physical and intellectual capacities to evolve into something better.

Technology, like glasses, pacemakers, and artificial limbs, already augment human capabilities, but the goal of these technologies is to restore normal human capacities that have been lost or damaged due to disease or accidents. In contrast, the goal of transhumanism is for humanity to take control of its evolutionary destiny and move toward a “post-human” future.

Transhumanists look forward to a day when we will overcome disease, suffering, and death. Christians also look forward to a day when “there will be no more death or mourning or crying or pain, for the old order of things has passed away” (Rev. 21:4). The issue with transhumanism is that it looks to technology as savior of the human condition instead of God (or in addition to God).

The notion of disembodied existence found in certain transhumanist ideals also reflects elements of Gnosticism. We need to recall that the incarnation reveals the value God places on our physicality and humanity. We need to remember how Christ, “the Word who became flesh” (1 John 3:2), models what it means to be truly human. Furthermore, the importance of valuing bodies should inform our current technology use and design by encouraging embodied experiences and practices.

### III.D: SCIENCE AS UNDERSTANDING CREATION 2 (CONT'D)

Meyer 021

#### Randomness and Order in God's Creation

Robert Bishop

Wheaton College

Christians often are puzzled about randomness or chance because God is a God of order and is sovereign over all things, according to scripture. So what is up with randomness? Is it a real thing?

Scientists talk about two forms of randomness: apparent randomness and irreducible randomness. I will describe what these forms of randomness mean and talk about how they both are forms of order that scientists study.

Then I will discuss how randomness expresses something about God's love and value for the creation and why chance is something Christians can theologially understand as part of how the Triune Creator acts through nature.



**IV.A: TEACHING FAITH AND  
SCIENCE: HIGH SCHOOL  
AND YOUTH MINISTRY**

Coray

**Jesus Loves You and  
Evolution Is True**

Jason Lief and  
Sara Sybesma Tolsma  
Northwestern College, Iowa

As the current political and religious climate becomes more polarized, it is important for the Christian community to understand that science is not a threat to the faith of Christian youth. Current research shows young people abandoning institutional forms of religion and suggests that a part of this phenomena is the disconnect they perceive between contemporary science and faith. Thus, youth ministry must provide young people the opportunity to explore the relationship between Christian faith and the faithful engagement of the created world through science.

While recognizing that theology and biology are distinct disciplines with their own language and epistemology, we also recognize what J. Wentzel Van Huyssteen calls the transversal spaces where biology and theology overlap. It is these spaces that allow theology and biology to engage in important conversations about what it means to be made in the image of God, and what the incarnation of God in Jesus Christ means for the embodied, lived experiences, of young people. This dialogue between biology and theology provides insight into issues facing youth ministry, such as sexuality, anxiety, cutting, and identity formation.

Our presentation will focus on the primary thesis of our work: the theological engagement of evolutionary theory from the vantage point of the incarnation provides an opportunity for the Christian community to reclaim an embodied view of salvation as the foundation for an embodied eschatological vision for human identity. Based upon this thesis, we will address practical implications for science and youth ministry within the Christian community.

**IV.B: TEACHING FAITH AND  
SCIENCE: READING  
GENESIS**

Meyer 145

**Toward a Retranslation of  
the Genesis Text**

Dick Fischer

The Bible vs. science debate will never be resolved until the Genesis text is revised and interpreted as Semitic history, not human history. Bible exegesis took a wrong turn at the very start. Followers of the early church consisted of Romans, Greeks, and converted Jews who would pray, take communion, and read scrolls aloud at weekly meetings. The Greek Septuagint was an object of reading and study, and the first book, Genesis, was a likely starting place. Listening to the stories of Adam and Noah read aloud, Gentiles in the group had no reason to believe Jewish history was not their history too. Thus, the mistake that took root then persists to this day—Jewish history interpreted as human history.

With the 1611 King James Version as a guide, Genesis blossomed into puzzling modern versions. A cursory reading of the Genesis 2–11 narrative places early patriarchal history within the context of the Neolithic Period in southern Mesopotamia, present-day Iraq, beginning no earlier than 10,000 years ago, whereas our species has occupied earthly domains for hundreds of thousands of years. Although Old Testament commentators have gained an awareness of ancient Near East literature in recent years, it has had minimal effect.

We will explore troublesome words and phrases that have resulted when Hebrew is converted into English without regard to the Near East history of which Genesis is a part. An immediate improvement will be seen when evidence that has been available for over 100 years is factored into the translation.

**IV.C: LOCAL CHAPTERS  
SEMINAR**

Meyer 133

**Local Chapters Overview**

Coordinated by  
Leslie Wickman and Vicki Best

This session will include a description of the ASA Local Chapters Campaign, including an overview and status of each of our existing local chapters. We will also briefly go through the Local Chapters Handbook.

**IV.D: SCIENCE AS  
UNDERSTANDING  
CREATION 3**

Meyer 021

**And God Made of One  
[Blood] Every Ethnos-Nation  
of Anthropon-Humans**

Fred S. Cannon

The Pennsylvania State University

Which came first: one individual human? Or one bloodline of humanity? Regarding this, when Paul spoke in Athens, he said, “God made of one [blood] every ethnos-nation of anthropon-humans to live on all the face of the earth ...” (Acts 17:26). Should we narrow this meaning yet further to read “from one man”?

To address this key question, we note that amongst the earliest Codices and Church Father letters, half read “... of one blood ...” including letters of Irenaeus (AD 180), Ephraem Syrus (AD 373), and the Armenian text (AD 411). Another half read “... of one ...” (with no noun), including the Codices Vaticanus (c300 AD) and Sinaiticus (c350). Significantly, no early texts read “... from one man ...” Indeed, this “one man” emendation did not become popularized until the 1960s. We emphasize the vast disparity between the emended “from one man” versus the faithful “of one blood” or “of one,” when considering human origins.

Paleogeneticists are learning that the clade of *Homo sapiens* may have numbered only thousands during climatic bottlenecks that occurred just 80,000–30,000 years ago; and we all are thus linked by a tight genetic bloodline. Although humans exceed 7 billion persons, we vary less genetically than other species who host fewer than 100,000 individuals.

Darwin used the term “common blood” to describe similarity amongst species. Paul stressed that whatever our ethnos, we must respect all humans as one blood-kin, under God. Thus, the Genesis 1 adam—as the collective human bloodline—can be distinguished from the Genesis 2 individual named Adam.

**IV.A: TEACHING FAITH AND SCIENCE: HIGH SCHOOL AND YOUTH MINISTRY (CONT'D)**

Coray

**Online Science and Religion Materials for High School Students**

**Denis O. Lamoureux**  
St. Joseph's College,  
University of Alberta

In his co-authored book with Dennis Venema, *Adam and the Genome* (2017), Scot McKnight observes, "The number one reason young Christians leave the faith is the conflict between science and faith, and that conflict can be narrowed to the conflict between evolutionary theory and human origins as traditionally read in Genesis 1–2."

In this session, I will introduce two sets of online materials intended to assist high school students from stumbling over science, and in particular evolution. The first is a 4-hour series of 5 lectures with handouts and class discussions (<https://sites.ualberta.ca/~dlamoure/wlhs.html>). These have been successful in Roman Catholic schools over the last 8 years.

The second is an 11-hour introductory course on Science and Religion with 100 pages of notes, 100 pages of handouts, and 25 class discussions. Topics include Models for Relating Science and Religion, Scientific Evidence for Evolution, Intelligent Design in Nature, Galileo's Religious Beliefs, Darwin's Religious Beliefs, Interpretations of the Biblical Creation Accounts in Genesis 1–3, and the Modern "Evolution" vs. "Creation" Debate (<https://sites.ualberta.ca/~dlamoure/150homepage.html>).

**IV.B: TEACHING FAITH AND SCIENCE: READING GENESIS (CONT'D)**

Meyer 145

**Learning from Bonhoeffer to Read Genesis Theologically**

**Patrick S. Franklin**  
Tyndale University College and Seminary

Within conservative Christian circles, tendencies toward historical foundationalism, often at the presuppositional level, continue to frame many of the conversations surrounding the initial chapters of Genesis. For example, present debates about the historicity of Adam often take place with such presuppositions taken for granted. But why should historical foundationalism frame the discussion? Is there a risk that this actually displaces the theological concerns of the text?

In this address, I will engage Dietrich Bonhoeffer's theological reading of Genesis 1–3 (his *Creation and Fall*, published in 1937), arguing that Bonhoeffer's theological approach to interpreting Genesis (one that aimed provocatively to subvert the Nazi ideology of the German State Church) can be instructive for our own reading today. Though his interpretation of Genesis 1–3 is nonhistorical (perhaps better, postfoundationalist), it succeeded at saying the right thing at the right time. By following the theological contours of the text, Bonhoeffer was equipped to provide an incisive and fitting exposition, one that allowed the Word and Spirit of God to speak actively and prophetically through the scriptural text to the concrete context of a church in dire need of encouragement, exhortation, correction (even rebuke), and expansive theological imagination.

When teaching about faith and science, it is important to be aware of the presuppositions that inform (and partially predetermine) our approach to the issues before us. Reflecting on Bonhoeffer's approach can help us examine these and envision other fruitful possibilities as we seek to read and relate God's Word and world in our own contexts.

**IV.C: LOCAL CHAPTERS SEMINAR (CONT'D)**

Meyer 133

**Chapter Leaders Panel Discussion**

Coordinated by  
**Leslie Wickman and Vicki Best**

Leaders of Local Chapters from across the US and Canada will share highlights, best practices, and lessons learned from their experiences. There will also be time allocated for Q&A with the audience.

**IV.D: SCIENCE AS UNDERSTANDING CREATION 3 (CONT'D)**

Meyer 021

**The Human Heart Speaks: Recurrence Analysis of Cardiac Electrical Events in Health and Disease**

**Charles L. Webber Jr.**

Creations of the natural order (animals, minerals, vegetables) present as animate or inanimate structures consisting of unique combinations of atoms, elements, molecules, genes, etc. Over time these structures are subjected to growth and development as well as decay and disintegration.

The common denominator linking all created things is the information content each holds within their temporal and spatial domains. Logically, structure/function implies information and information implicates underlying rules. There are many mathematical ways in which information content has been quantified. In information theory, for example, entropy measures can convey the amount of information contained within structures and even within languages.

The focus of this presentation will be on the information content found within the beating human heart: its normal rhythms, electrical excitation of contractions, and pathological states. The methodology introduced will be Recurrence Quantification Analysis as devised by the author. The application of recurrence strategies will illustrate the complexity (high information content) within the living heart, and how physicians can utilize this information to deduce underlying rules of physiology as well as forecast potentially fatal events (cardiac fibrillation). Recurrences simply refer to repeating patterns in time or space, stemming from underlying rules of nature.

From the biblical perspective, creations of the natural order "speak" without words (Psalm 19:1–4). In this talk (with words) it will be shown how the human heart can be communicating its state of health or disease using tools from nonlinear bio-mathematics.

**IV.A: TEACHING FAITH AND SCIENCE: HIGH SCHOOL AND YOUTH MINISTRY (CONT'D)**

**Coray**

**Cosmology & *Contact* in the High School Classroom**  
**Faith Tucker Stults**

Many students from Christian backgrounds feel that some consensus scientific theories—such as evolution, Big Bang cosmology, and climate change—are in conflict with their Christian faith. These students are likely to feel they must choose between science or faith, resulting in either a loss of faith or a loss of scientific engagement.

My desire to relieve students from this unnecessary choice led me to work in Christian education. For the last five years, I have taught high school physics and astronomy at an interdenominational Christian high school in the San Francisco Bay Area.

In this presentation, I will share two projects that I use to help students think critically about science and faith. In my astronomy class, our unit on cosmology carefully weaves together the nature of science and faith, the history of cosmology, and evidence for Big Bang cosmology. Throughout the unit, students write a series of personal journals to reflect on what they are learning.

In my physics class, the students watch the movie *Contact* (1997) and respond to a variety of science and faith related prompts through art, creative writing, essays, or other formats. These responses then lay a groundwork for an extend class discussion on the relationship between science and faith.

These projects are consistently among my students' favorite parts of the courses and have been beneficial tools in helping Christian students better understand the methods, motivations, and claims of science, and in relieving their sense of conflict with their religious beliefs.

**IV.B: TEACHING FAITH AND SCIENCE: READING GENESIS (CONT'D)**

**Meyer 145**

**Adam, Darwin, and the Rest of Us: Assessing the Doctrine of Original Sin in Light of the Theory of Evolution**

**Nicolas Daffern and Matthew Wiley**

As the evidence for evolution continues to mount, modern Christians face the challenging task of integrating scientific views of human ancestry into a scripturally sound theology.

Historically, the church held a view of creation that did not account for evolution, and it is only recently, with the rapid accumulation of genetic evidence for evolution, that Christian communities have begun to accept the theory. As such, much work remains to be done to develop a systematic theology that incorporates important ideas that stem from the theory of evolution.

One theological doctrine that has the potential to be affected by these ideas is that of original sin. This generally accepted doctrine maintains that there is a relationship between Adam's original disobedience and our inherited sin nature. It is thus tied closely with our ideas of human ancestry and potentially with our ideas of evolution.

Here we assess some implications of evolution on the doctrine of original sin. We first highlight several important ideas from the theory of evolution and the experimental evidence for these ideas. We then look at different theological accounts of original sin and trace how they could be viewed in the light of these ideas.

**IV.C: LOCAL CHAPTERS SEMINAR (CONT'D)**

**Meyer 133**

**Chapter Planning Workshop**

Coordinated by  
**Leslie Wickman and Vicki Best**

This will be a hands-on working session to get new Local Chapters started or to get some help planning a chapter event.

ASA leaders will help members fill out application paperwork and brainstorm ideas for new chapters in their local areas.

**IV.D: SCIENCE AS UNDERSTANDING CREATION 3 (CONT'D)**

**Meyer 021**

**Science and Charlotte Mason**

**J. Carroll Smith**

Retired professor, Charlotte Mason Institute

Charlotte Mason confronted the issue of evolution in her works dated in the early part of the 20th century. For her there was no separation between science and faith. Science was a continual revelation from God.

Since her model of education is one based on relationship and not power, she started the teaching of science with very young children. And, coming from an educational paradigm that followed the classical approach to learning in England at the time, she radically changed education from memorizing to knowing as one would know as a person and as one would be known by a person. For her, there was a strong connection between the knower and the known.

To discover how she accomplished this, we will explore the tools she recommended. How is her model different from other models? We will explore these ideas by looking at the ways in which Charlotte Mason wanted children not only to examine science from a book, but also how and why she wanted children in science.

Coray

No talk scheduled.

**V.B: SCIENCE AND TECHNOLOGY: WORKING WITH CREATION 1**

Meyer 145

**Climate Change: Where Do We Place Our Hope?**

David A. Larrabee

When talking about climate change one question invariably arises: What gives you hope? This talk is my answer.

Physically, the problem is the atmospheric emission of greenhouse gases. Historically, humans use an ever-increasing amount of energy to satisfy an ever-increasing material lifestyle that is shared unequally among the world's population. Now emissions push planetary boundaries, severely restricting our options.

Rather than look at what is deemed possible (such as the IPCC analysis), an analysis will be presented that looks at what is required to meet the goals of limiting temperature rise to 1.5 and 2°C. An analysis using GINI coefficient, a measure of inequality, will highlight the fact that CO<sub>2</sub> emissions are largely driven by human desires rather than human needs. In other words, the basic problem is human greed, and the desire for an ever-increasing materialistic lifestyle.

Proposed solutions assume that people in developed countries are unwilling to adopt a less materialistic lifestyle and are putting faith in technology, economics, or politics to find ways of maintaining the status quo and extending the benefits to the rest of the world. The fundamental problem is that there is no limit on human desires for more stuff, but there is a limit on how much CO<sub>2</sub> the planet can absorb without crossing boundaries.

Following Christ is not about accumulating stuff, it is about following God's will and taking care of our neighbors as well as the planet. The only effective long-term hope is in the transformational power of Jesus.

**V.C: SCIENCE AND TECHNOLOGY: SERVING HUMANITY**

Meyer 133

**Artificial Creatures and Alternate Creations: Framing the Conversation about Virtual Reality and Robotics**

Christopher Kawell

Robotics and virtual reality technology are on the rise in our society. Though often discussed separately, they share a common goal: creating virtual agents and environments that we can experience either alongside or instead of reality. This warrants careful consideration of the relationship between fiction and reality, as well as between human-made and God-created things.

This presentation will introduce this conversation in two parts: one descriptive and the other prescriptive. In the descriptive part, we will talk about what robotics and virtual reality are (and what they are not), what characteristics they share, and how they are different. We will also point out some aspects of each technology that we have seen before in human history, as well as what makes them novel.

In the prescriptive part, we will talk about how these technologies ought to be developed and used. We will discuss the importance of reality as opposed to fantasy or illusion and (conversely) the importance of human-made, fictional characters and worlds.

This talk is meant as an introduction to a conversation that we hope is taken seriously by Christians and leads to robotics and virtual reality becoming not a curse but a blessing on our society.

**V.D: SCIENCE AS UNDERSTANDING CREATION 4**

Meyer 021

**Global/Local Explorers of God's Creation: No Wheaton College Nobel Scientists, but Some Great Near-Misses**

Dillard Faries

There have been four great scientists of the 20th century (Robert Millikan, Edwin Hubble, Grote Reber, and Howard Claassen) who have a strong (or almost) connection to Wheaton College, Illinois.

The combined result of their research in opening new views of the cosmos is remarkable, revealing a Creation that is much bigger and much older, much more dependent on the tiniest pieces and the weakest of signals, and capable of much weaker interactions than imagined before 1900. The transformations of the world view of God's Creation from "local" talent is noteworthy, even mind-boggling.

That Wheaton College did not manage to garner any Nobel Prizes from such an array of talent is, of course, no great cause of shame. If one may damn by faint praise, perhaps one may praise by faint damnation. If you like, one may also note that Wheaton College presidents and Bible teachers have not been observed to walk on water.

Coray

No talk scheduled.

**V.B: SCIENCE AND TECHNOLOGY: WORKING WITH CREATION 1 (CONT'D)**

Meyer 145

**Environmental Problems as a Place for Compromise and Dialogue**  
Johnny Wei-Bing Lin

In today's polarized politics, the discourse around environmental issues has proven to be something of a model in its intractability. Sometimes it appears that the primary belief that the different sides agree on is the conviction that the worldviews and motivations of the other side are morally suspect and that the policies they advocate will result in disaster. And yet, is this truly the case?

In this presentation, I argue that for all the vitriol surrounding environmental issues, the intrinsic nature of environmental problems and their solutions suggest a way of addressing environmental issues other than those of zero-sum politics and morality plays, a way that encourages integration and compromise rather than win-lose outcomes.

The prudential element of many environmental problems, the limitations of scientific input into environmental issues, and a rich landscape of collaborative models of environmental problem-solving result in a remarkable degree of common ground upon which we can practice dialogue and collaboration, even in the midst of disagreement and discord. (For background, see *The Nature of Environmental Stewardship*, Pickwick Publications, 2016, <http://nature.johnny-lin.com>.)

**V.C: SCIENCE AND TECHNOLOGY: SERVING HUMANITY (CONT'D)**

Meyer 133

**Science and Technology in Disservice of Humanity: Iatrogenic Contributions to the Opioid Epidemic in America and a Way Out**

Mark A. Strand

The pharmaceutical industry has utilized technology to serve humanity in almost miraculous ways. However, technology is susceptible to compromise when corporate interests predominate. The opioid epidemic we are facing in the US was worsened by corporate interests, resulting in iatrogenic effects and the disservice of humanity.

An estimated 25 million adult Americans suffer daily from pain, so that in 2001, the Joint Commission, which accredits health facilities, issued pain-management standards that instructed hospitals to measure and treat pain. This movement liberalized opioid prescribing. Thus thousands of naïve patients were exposed to a highly addictive drug, setting off progression to opioid addiction among some and accelerating the epidemic. The role of corporate interests came to a head in 2007, when Purdue Pharma executives pleaded guilty to criminal charges regarding the marketing of their bestselling opioid medication.

These iatrogenic contributions to the opioid epidemic put the medical community on high alert to solve the problem. The author is the pioneer of the North Dakota ONE Rx project, utilizing community pharmacists to deliver primary prevention and de-stigmatization of opioid use disorders.

Two critical theological observations can be drawn from this project: (1) Science and technology thought leaders are influenced by their sinful nature; and (2) Opioid use disorder is a chronic disease, not a moral defect. Healthcare professionals need to increase their empathy for addicted individuals to de-stigmatize addiction among their patients and in the community at large.

**V.D: SCIENCE AS UNDERSTANDING CREATION 4 (CONT'D)**

Meyer 021

**An Observational Study of Evolving Stars**Bruce J. Hrivnak  
Valparaiso University

Stars illuminate our night sky and have inspired awe and wonder for millennia. During the 20th century, astronomers began to measure their properties and deduce how such stars evolve with time as they fuse successively heavier elements in their cores to produce the energy by which they shine.

Stars with masses similar to that of the Sun or up to a few times that of the Sun evolve to become red giant stars, eject their outer atmospheres to become so-called planetary nebulae, and eventually cool to become white dwarfs.

My collaborators, students, and I have been studying stars in transition between the red giant and planetary nebula phases. These proto-planetary nebula are in a relatively short-lived phase lasting only a few thousand years. Such stars have only been discovered and studied in the past 35 years.

In this presentation, under the topic of science as understanding creation, I will review the discovery and properties of these proto-planetary nebulae. A particular focus will be on what we have learned from studying their variability in light and velocity, and on our attempts to actually measure the evolution of these stars. This research is supported by the National Science Foundation and Valparaiso University.

**VI.A: TEACHING FAITH AND SCIENCE: IN CHURCH**

Coray

**Young-Earth Evolutionists? Adaptation of Young Earth Creationist Models, and Implications for the Church**  
Joel Duff and Gregg Davidson

Navigating the waters of debate over the origin and development of life has become increasingly confusing as traditional lines are blurred between evolution and special creation.

Leading young earth creationist (YEC) organizations voice strong opposition to evolution while simultaneously promoting models for life history that mirror many aspects of classical evolution. Exhibits, such as found in the Answers in Genesis theme park, The Ark Encounter, present a model in which a few specially created “kinds” on the Ark experienced hyper-fast adaptation solely by natural mechanisms after the Flood to produce the myriad species seen today. At the same time, YEC arguments are moving away from historical biblical orthodoxy.

In this session, we will review current YEC models of the origins of diversity and compare them with conventional evolutionary and progressive creation models with an eye on key biblical implications that are important to the church.

**VI.B: SCIENCE AND TECHNOLOGY: WORKING WITH CREATION 2**

Meyer 145

**Creating a Class in Sustainable Metallurgy**William Jordan  
Baylor University

Sustainable engineering is an important topic for engineering students to consider. Several approaches to teaching sustainable engineering have been tried. Among these options are to cover the topics in an engineering ethics course, as a module in a required course or in a stand-alone generic sustainable engineering technical elective. However, if this topic is to be truly understood and applied by our graduates, then they need to learn about the topic in a systemic way for the particular type of engineering they wish to practice.

To meet this need, the author has created an advanced course in Corrosion and Sustainable Metallurgy. This class can be taken by seniors or by first year graduate students.

Sustainable metallurgical engineering is first presented from a Christian perspective. There is then a discussion about the circular economy and how that relates to materials engineering. Students will examine how corrosion effects the goal of creating sustainable metal applications. Topics such as recycling and re-using metallic parts are covered.

There is no one textbook that covers the entire range of topics in this course. About one half of the course is based on Michael Ashby's book *Materials and Sustainable Development*. The course ends with a group project where the students evaluate a real world sustainable materials problem and recommend a solution.

**VI.C: CHRISTIAN WOMEN IN SCIENCE**

Meyer 133

**The Past, The Present, and the Future: Women Breaking Barriers As Scientists Backed by Faith**Loryn Phillips  
Coordinator

During this session, a presentation will explore the founding and history of CWIS and the current path the organization is taking. What will the future hold for the Christian women in science?

A potential plan will be laid out to discuss the possibilities that the organization can take in empowering women of all ages and backgrounds to advance one another in both faith and science.

A short survey will be distributed so that we can receive your input.

**VI.D: SCIENCE AS UNDERSTANDING CREATION 5**

Meyer 021

**The Quest for the Meaning of Quantum Physics**

Kenell J. Touryan

I learned my quantum physics (QP) at Princeton, under the tutelage of Noble Laureate Eugene P. Wigner, who admonished us to forget the philosophical underpinnings of the quantum phenomenon ... and just calculate! After all, quantum calculations have described the atomic world with great precision.

Grasping the physical nature of QP and its relation to classical physics has so far eluded a final explanation. What is real? What does a “measurement” in QP really mean? Is it pilot waves, many worlds, spontaneous collapse, or a yet undiscovered insight?

In a well-researched book, *What Is Real?: The Unfinished Quest for the Meaning of Quantum Physics* (Hachette, 2018), astrophysicist Adam Baker traces the arguments between Einstein and Bohr in the 1920s, through the proliferation of alternative explanations, all the way to the present. The debate starts with Neils Bohr's emphasis on complementarity, later supplemented with the concept of hidden variables, espoused by Bohm, followed by John Bell's contention that all hidden variable models must have the “action at a distance” phenomenon introduced by Einstein himself. In addition, Bell added the concept of spontaneous collapse that has nothing to do with observation or measurement, but happens entirely at random, for no reason at all, whether someone is looking or not.

The many worlds idea introduced by Bohm and Everett, which has morphed into the multiverse theory, may have some interesting implications for the Christian physicist. After all, we believe that we live in two worlds: the physical and the spiritual. Could it be that this “reality,” foreign to the naturalist, could thus provide the missing interpretation?

**VI.A: TEACHING FAITH AND SCIENCE: IN CHURCH (CONT'D)**

Coray

**The Bible Tells Me Otherwise; Besides Even Scientists Don't Believe This Stuff, and It's Not My Problem Anyway**

Luke J. Janssen

For centuries, the Church believed that the earth is covered by a dome from which the celestial bodies were suspended. It resisted vigorously a Copernican model which better explained celestial motions because it perceived conflict with scripture (particularly passages describing Earth as built on firm foundations and being immovable). The Church eventually came to accept the scientific explanation, and centuries later apologized for "the Galileo affair."

Today, much of the Church continues to resist other scientific models also built upon diverse lines of evidence but seeming to conflict with scripture. Pew Research Center polled over 2,000 adults, examining how various sociological factors played into attitudes regarding human origins and Big Bang cosmology.

I will explore several trends and divisions that were identified which are tremendously strategically relevant to the mission of the ASA, especially in our interactions with the unbelieving community, with the Christian Academy, and with non-academic believers. For example, scientists agree nearly unanimously (98%) that humans evolved from lower hominids, while nonscientists reported much lower levels of acceptance which varied with religious affiliation. In particular, white evangelical Protestants were most likely to disagree (64%), and surprisingly also most likely to believe that even scientists are divided on the matters of human evolution (49%) and the Big Bang (69%). Only a minority of respondents (30%) felt a tension between faith and science within themselves, but twice as many (59%) acknowledged that this is a problem for other people.

**VI.B: SCIENCE AND TECHNOLOGY: WORKING WITH CREATION 1 (CONT'D)**

Meyer 145

**Exploring Extraterrestrial Creation: Theology and Ethics of Space Exploration**Glenn A. Marsch  
Grove City College

The advent of commercial space enterprises suggests that humanity is on the cusp of a new era of space exploration sustained by economic advantage. This prompts speculation on the morality of exploration in general but of space in particular. Does the morality of space exploration depend on whether there is life present on the target world?

The writings of C.S. Lewis, especially his dialogues with Arthur C. Clarke, are germane to this discussion. Lewis was suspicious of the human exploration of space.

A case will be made that the exploration of space is licit, but given our fallen natures should be done with great caution. Technical impedances to this grand endeavor include the vastness of space and dangers from radiation. The dominion mandate does not cease at the Kármán line but assumes that humans can explore space with the blessing of God, because that is our nature and our calling.

**VI.C: CHRISTIAN WOMEN IN SCIENCE (CONT'D)**

Meyer 133

**How Women in Their Communities (Church and Career) Have Thrived and Glorified God**

Loryn Phillips

**Panelists:**

- Lynn Billman
- Hannah Eagleson
- Gayle Ermer
- Loryn Phillips
- Leslie Wickman

We will discuss ideas surrounding the empowerment, encouragement, and mentorship of women in CWiS. How can women who have forged a career science mentor and guide those starting out or are just beginning to experience the controversy and struggle of being a Christian female scientist?

**VI.D: SCIENCE AS UNDERSTANDING CREATION 5 (CONT'D)**

Meyer 021

**Beyond Nature, Naturalism, and Natural Theology: To What Extent Can Design Arguments for the Existence of God Support Christian Beliefs?**

Roger Stork

Design arguments for the existence of God arise from natural theology in which reason, sense-perception, and introspection are used to investigate the existence and nature of God, independent of divine revelation and in which some possible link between the natural world and some transcendent other may be explored.

At most, what humans can know from nature is that God exists and something about God's attributes; at most producing "just adequate" descriptions of God that fall short of "... establishing or confirming the real moral character of a personal agent worthy of worship ..."

Christianity recognizes natural theology as part of God's general revelation. However, the strength of Christianity is found in the life of its central figure, Jesus of Nazareth. As such, design arguments are limited in their ability to grasp the richness or fullness of the knowledge of God as revealed in Christ. Yet, these arguments may still be useful to the believer, and more broadly, perhaps to others.

This presentation explores the possible extent that design arguments can support Christian belief in a personal God. First, the structure of the argument is outlined, an example is provided, and historical criticisms are briefly reviewed. Next, the intuitive nature of design arguments is examined along with their cognitive underpinnings. Lastly, a final section focuses specifically on support that design arguments may provide for Christian beliefs.

**VI.A: TEACHING FAITH AND SCIENCE: IN CHURCH (CONT'D)****Coray**

No talk scheduled.

**VI.B: SCIENCE AND TECHNOLOGY: WORKING WITH CREATION 1 (CONT'D)****Meyer 145**

No talk scheduled.

**VI.C: CHRISTIAN WOMEN IN SCIENCE (CONT'D)****Meyer 133****What Women Are Called to Do: How This Impacts Our Science and Our Faith?**  
**Loryn Phillips**

CoordinatorAs women, we are encouraged to lift each other up and guide one another. Theologically speaking, what does the Bible state about science and faith? Scientifically, how do we advance our faith through our work? What steps can women take to explore and know their Creator and his creation in science and faith?

**VI.D: SCIENCE AS UNDERSTANDING CREATION 5 (CONT'D)****Meyer 021****Explore Material Creation on Its Terms and the Creator on His Terms: The Confusion behind Sean Carroll's Scientific Investigation of God's Existence****Adam Wright**  
Stanford University

In his 2016 book *The Big Picture*, author and theoretical physicist Sean Carroll defends a philosophical framework known as poetic naturalism, an attempt to provide a unified conception of knowledge and the makeup of existence using science as its only tool and nature as its only reality.

While some atheists claim that science has dismissed the claims of religion indirectly, Carroll takes a more direct approach. He does not assert that God is the unnecessary relic of a prescientific age, rather he takes God's existence to be a valid scientific hypothesis that is disfavored by the data. Science, according to Carroll, is the process of developing models to explain some phenomena and evaluating them based on how simply and accurately they account for objective data. In his "Abducting God" argument, he makes the case that naturalistic models account for the world we observe better than theistic models.

In this talk, I will explain his reasoning and argue that his methodology is flawed. I argue that scientific methods are designed to strip the human element from the truth-seeking process, limiting its scope to the objective and nonpersonal material world. This is appropriate for investigating material creation, since it is tangible, unsurprising, and subject to our manipulation, which makes observation, prediction, and replicable experimentation possible. Conversely, God the creator is invisible, personal, and inscrutable, making science an ill-suited tool for investigating the God hypothesis. I will conclude that science is successful precisely because it explores material creation on its own terms and briefly address what it might look like to seek the Creator on his terms.



1

**Extract from the Edible Plant, *Melissa officinalis*, Inhibits HSV-1 Binding to Cells via Glycoprotein B: A Segway for Use toward Inhibition of Poxviruses and Filoviruses**

**Karen L. Denzler**  
Grand Canyon University

In Genesis 1:29 (ESV), God says “Behold, I have given you every plant yielding seed that is on the face of all the earth, and every tree with seed in its fruit. You shall have them for food.” Numerous plants are edible and are used for food and spices.

Scientists have extensively studied plants and the molecules that are present in them. The plant used in this study is known as *Melissa officinalis*. It is a member of the mint family and its common name is lemon balm. It has historically been used as a home remedy to treat digestive problems, improve heart health, treat diabetes, decrease inflammation, and treat infectious diseases like colds and flu.

Current scientific literature contains reports of extract from *M. officinalis* having antiviral activity. Our group studied an extract containing secondary metabolites from this plant in relation to antiviral activity and focused on HSV-1, the cause of herpes labialis or cold sores.

Our studies found that extract of *Melissa officinalis* inhibited binding of HSV-1 to cells and prevented initiation of infection. Further studies showed that a component of the extract bound to glycoprotein B on the virion. In addition, high concentrations of the extract disrupted virion structure and suggest a virucidal mode of action as well. We tested the extract against viruses from other families and found intermediate inhibitory activity toward adenoviridae (adenovirus), papovaviridae (Human papillomavirus), and rhabdoviridae (rabies virus) families and high inhibitory activity toward poxviridae (smallpox, monkeypox) and filoviridae (Ebola virus).

2

**The Meaning of Measurement: On the Redefinition of the Fundamental Units of Measurement**

**Carl Fictorie**  
Dordt University

In November 2018, the General Conference on Weights and Measures (CGPM) unanimously voted to revise the International System of Units (SI). In the past, several physical artifacts such as the meter bar and the standard kilogram were the basis of the SI.

The new definitions base the SI on fixed values of fundamental physical constants, and they become independent of the methods and tools used to measure the values of the constants. At the same time, using fundamental physical constants ties the units to the theoretical framework surrounding those constants. Thus, this transition may be fixing a particular scientific paradigm onto the basic measurements that scientists use to investigate the creation.

Science is inherently inductive, and measurements are at the beginning of the chain of induction. How scientists choose to reference those measurements has significant implications for the state of knowledge in the sciences, particularly basic epistemological assumptions.

I will analyze and evaluate implications of this change for a Christian understanding of the use of fundamental units as a measurement tool for investigating and understanding the creation.

I will argue that this redefinition of the SI introduces an additional level of theory to the nature of measurement that requires acceptance of the scientific paradigms in which the definitions are embedded. Despite this, Christians can conclude that scientific knowledge is still valid insofar that it is an effort toward a faithful description of the creation.

3

**Educating Ethnic Minority and Christian Fundamentalist Students: An Examination of Physical Science Textbook Rhetoric**

**Emily Grace and Rachel B. Griffis**

Royal Holloway Univ. of London

In recent years, there has been an enormous effort to increase diversity, particularly racial and ethnic diversity, within the physical sciences, which has benefitted students, teachers, and scholars. Religiosity, however, continues to be a diversity issue often ignored within a university setting, especially the education of Christian fundamentalists whose beliefs conflict with scientific fact.

By evaluating Pew Research data on the ethnic background of Americans who are biblical literalists, we argue that the failure to welcome and intellectually engage Christian fundamentalist students could simultaneously exclude racial and ethnic minority students. Although educating fundamentalist students whose backgrounds have prepared them to reject scientific evidence is significantly challenging for multiple reasons, we nevertheless suggest that finding ways to welcome and engage these students is a challenge we, as a scientific community, can no longer ignore if we wish to increase diversity.

To demonstrate the prevalence of this issue, our presentation provides analysis of two representative physical science textbooks, *Conceptual Physical Science* and *An Introduction to Physical Science*, which contain passive aggressive language and condescending rhetorical moves directed at students who are skeptical of scientific fact. We discuss the importance of a welcoming environment in guiding these students through the critical thought needed to evaluate their positions.

4

**Preparing Students with Science and Faith Integration for Holistic Service to Humanity**

**Michael Guebert**  
Taylor University

Preparing Christian College science students for effective work in global development requires a multidisciplinary approach of natural and social sciences, as well as proficient soft skills. However, many students of faith, while eager to serve, may not be sufficiently mature spiritually, thus hindering their service.

The Sustainable Development Goals (SDG), released in 2015, identify seventeen global goals “to end poverty, fight inequality and stop climate change” by 2030. The ambitious SDG come during a time of increasing global awareness and commitment to sustainability, including a rising number of higher education programs in “sustainability.” Along with the more traditional programs in International Development, students are eager to use their major to serve the global good with increasing interest in science-related disciplines such as agriculture, water and sanitation, and global health.

Christian faith provides a great motivation for many to serve humanity for the sake of Jesus Christ. Blending our disciplinary knowledge of the environment and society with our deep religious beliefs can produce effective results. However, a survey of workers in Christian development organizations revealed that finding workers with both technical skill and maturity of personal faith was arguably the greatest challenge faced by faith-based development organizations.

As we move through the SDG era, how might Christian universities redesign programs to prepare students for effective holistic missions? This presentation seeks audience responses as we consider the best approaches to develop students in natural and social science competencies, the requisite soft skills, and especially spiritual formation and maturity of our students.

5

### The Limbic System and Christian Sanctification

Tony Jelsma

Dordt University, Sioux Center IA

Our brains are amazingly complex in their ability to sense our environment and respond accordingly. While various parts of the brain carry out specific functions, some brain activities involve collections of structures.

The limbic system, for example, regulates motivated behaviors, which are conscious actions that are driven by our own desires. These behaviors include the motivation to eat, our response to threats by fighting or fleeing, and engaging in sexual activity. These actions involve multiple aspects—emotions, conscious awareness, and choice of response—which correlate with different components of the limbic system. While these actions are prompted by emotions and urges, they are also governed by the ability (and responsibility) to control them, given the self-discipline.

The Christian life is also associated with appropriate responses to these situations. Our responses can be done in a manner that pleases God or in disobedience to God. As Christians, developing control of our limbic responses may be viewed as part of our sanctification. We may not avoid the drives, but over time we train our brains (and bodies) to overcome temptation and respond appropriately.

We continually fall short but as we mature as Christians, we can look to Jesus, who modeled the kinds of responses to temptation that we need to display in our lives. Thus, an understanding of the functions of the limbic system can help us better understand sanctification, an important aspect of our Christian life.

6

### Breast Cancer Epidemiology: A Case Study in Using Science for Social Justice

Lydia Marcus and Ashley Huizinga

Univ. of Wisconsin-Milwaukee

The study of epidemiology has the power to reveal health inequity and its causes; thus, epidemiology allows us to pair the exploration of the pattern of disease with the mandate to holistically seek justice for God's creation. Epidemiology helps us to conceptualize social determinants of health, which are human-created systems that sometimes disenfranchise society's most vulnerable. In this presentation, we use breast cancer as an example of epidemiology and social justice in action.

Breast cancer is the most common cause of cancer deaths among women worldwide. In the United States, though white women have historically had a higher incidence rate of breast cancer, black women have a higher mortality rate. This is due in part to treatment disparities, but it is also due to differences in the cancer subtypes each group of women tends to get.

Contrary to previous assumptions, differences in cancer subtypes between black and white women may be largely due to modifiable risk factors, not genetic differences between races. Epidemiology reveals these risk factors and equips us with the knowledge necessary to reduce women's risk of developing breast cancer and to reduce disparities in mortality rates between black and white women.

By practicing epidemiology, we can work to bring in God's Kingdom by identifying and addressing the ways in which we (often unknowingly) subject fellow humans to injustice. We have a responsibility to care for creation; epidemiology is one way of doing so.

7

### Antibacterial Activity of Selected Plants from Southwest USA

Z. Merhavy, C. Huls, T. Varkey, J. Varkey, G. De Bruyn, and R. Velupillaimani, PhD  
Grand Canyon University

The emergence of drug resistant microorganisms has posed important public health problems. The annual cost of treating antibiotic resistant infections in the United States alone has been estimated to be as high as \$30 billion. This has led to an urgent need for new antimicrobial drugs, particularly from natural resources.

Phytochemicals obtained from medicinal plants have been used widely in the development of novel therapeutics including antimicrobial agents. Therefore, it is imperative to detect substances which have inhibitory effect on the growth of bacterial species.

Ethanol (80%) extracts of leaves of several plant species from southern Arizona were screened for their antimicrobial efficacy against *Staphylococcus epidermidis*, *Mycobacterium smegmatis*, and *Streptococcus mutans*. Extracts were prepared by maceration process, and antibacterial activity of different plants was evaluated and compared by measuring their zones of inhibition.

The results indicated that *Lagerstroemia microcarpa* and *Myrtus communis* leaf extracts were highly effective against all the test bacteria. The leaf extract of *Condea emoryi*, *Gaura angustifolia*, *Tribulus terrestris*, *Cercidium hybrid*, *Celtis occidentalis*, *Lantana camara*, *Fallugia paradoxa*, *Hamelia patens*, *Thelesperma*, *Vachellia rigidula*, *Mahonia aquifolium*, *Olea europaea*, and *Chilopsis linearis* showed moderate activity. However, the leaf extracts of *Calliandra californica*, *Pedilanthus macrocarpus*, and *Celtis ehrenbergiana* were effective only against *M. smegmatis*.

The minimum inhibitory concentration and minimum bactericidal concentration of crude ethanolic extracts and TLC isolated fractions will be tested against bacterial strains. Further screening and identification of Novel antimicrobial compounds from various

plant extracts will be discussed.

8

### Paper-Immobilized Yeast-Based Biosensors for the Detection of Pharmaceuticals in Technology-Limited Settings

Rachel Miller, Jamie Luther, Abigail Weaver, Marya Lieberman, and Holly Goodson  
University of Notre Dame

There is a need for analytical tests in low resource areas, such as low and middle-income countries (LMIC) (e.g., to evaluate the quality of medicines, water, and food). The WHO estimates that about 10% of all pharmaceuticals and medical supplies are substandard or counterfeit in LMICs. Analytical screening methods are needed to identify substandard pharmaceuticals before they are distributed to patients. However, the cost of the test, equipment, and trained personnel can prevent the use of adequate analytical screening techniques in these settings.

Our lab developed an inexpensive and portable yeast-based biosensing technology in order to evaluate the quality of the anti-malarial drug, doxycycline. This biological paper analytical device or "BioPAD" can detect between 30–10,000 µg/mL doxycycline and is stable for over one year.

Recent work in our lab has focused on making the BioPAD easier to use by developing a fluorescent reporter system and portable reading device for this technology. By using fluorescence, we have eliminated the need for additional reagents and improved the sensitivity of the system.

In addition, we have been working to expand the BioPAD to detect estrogen in order to address a growing need in LMICs to detect substandard hormone-based drugs. Thus far, we have created a fluorescence-based estrogen biosensor capable of detecting estrogen concentrations as low as 0.5 nM E2 and are currently working to integrate it into a paper-based test.

9

**Collaborative and Cross-Disciplinary Undergraduate Research as a Tool to Improve Scientific Knowledge and Integration of Faith**

**Mark A. Parker**  
Colorado Christian University

Students attending traditional liberal arts universities have more limited opportunities to participate in research projects as undergraduates than do those who attend major research universities as undergraduates.

Undergraduates attending faith based institutions face the additional challenge of not only developing as young scientists, but also of integrating their developing faith and their growing scientific knowledge.

In this unique environment, undergraduate research projects which provide students with direct, hands-on experience with research, linking either different disciplines or different institutions, provides a model for determining the benefits research provides to both professional development and faith integration for students.

During the last five years a number of undergraduates have participated in either a collaborative program between Colorado Christian University and the University of Colorado Medical Center or in a collaborative project between faculty in biology and psychology.

The effect of this experience on the students' post-graduate education and on their perception of their integration of faith and science will be discussed. In addition, future programs to improve both aspects of the study will be discussed.

10

**How the Gene, Selection, and Biosphere Genome Pools Could Be the Mechanism God Used to Ensure the Appearance of Humankind**

**Carlos Pinkham**  
Retired, Norwich University

The concept of the gene pool is well understood. It is proposed that an expansion of the concept to include the selection pool (all the alleles in all the released gametes of a species) and the biosphere genome pool (all the alleles in all the released gametes of all the species on the planet) provides one part of the ample sample that allowed evolution to find the requisite conditions necessary for humankind to evolve.

It is further proposed that as the solar system approaches the northern margin of the galactic plane during its 63 My-long oscillations within the galactic plane, the resulting increase in the cosmic ray flux reaching Earth coming from the Virgo Supercluster creates the extermination of a large percentage of extant species and gene duplication in many of the survivors. Thus, those that do survive have the potential for a larger gene pool and as they explosively fill the now empty niches, the biosphere genome pool enlarges to a size not seen in the prior cycle.

This periodic, chaotic disturbance in size of the biosphere genome pool provides the mechanism for the evolution of complexity. The evolution of complexity, in turn, ensured the essential sequencing of requisite conditions leading to humans, thus providing another part of the ample sample referred to above. These phenomena are universal and could have led, or could lead (in conjunction with other, universal phenomena) to the evolution of intelligent, hominid-like organisms elsewhere in the universe.

11

**Abraham's Camels: Fact of Fiction?**

**Stephen Reinbold**  
Retired, Metropolitan Community College-Longview

Did Abraham receive camels from Pharaoh? Did he send them to Aram to buy a bride for Isaac?

These are questions answered affirmatively by Christians relying on biblical inerrancy with support from some cultural artifacts.

The archaeologist William Albright, a century ago, forcefully stated that the presence of camels in the Genesis narrative represented an anachronism that was added by later scribes. Headlines a few years ago in newspapers such as *The New York Times* pronounced that Abraham's camels were phantoms. These announcements were not new to archaeologists but were precipitated by an article in the journal *Tel Aviv* in which archaeologists stated that camel remains were found with human remains at a site in Israel dated about 1000 BC and not before. Even in archaeology, the absence of domesticated camels in the Levant and Egypt before then leaves a gap not easily filled.

I propose tests of the presence of camels in the region independent of camel remains or cultural artifacts, and also independent of ancient records. I will examine studies of the following: modern and ancient DNA, revealing how camels were transported after domestication; genes for adult lactase persistence originating in Saudi Arabian pastoralists who then migrated to Africa; and diseases possibly originating in camels and reported from Egyptian mummies.

My preliminary examination of the evidence is actually consistent with the 1000 BC date. If so, how important is the date to faith in the Bible? Might Abraham's receipt of tribute from Pharaoh simply have been a rare event?

12

**Factors Affecting Nest Success of Shrubland Birds in a Fragmented, Urbanized Landscape**

**Heather L. Secker**  
University of Illinois Urbana-Champaign; Wheaton College, Wheaton, IL (current affiliation)

Researchers have documented population declines of birds of temperate shrubland habitats in eastern North America in recent decades, yet few studies have been conducted on the nesting ecology of shrubland birds. Particularly, little is known regarding causes of nest failure and types of nest predators in shrubland patches in fragmented, urbanized areas.

The purpose of this study was to examine predator types and causes of failure, as well as vegetative, landscape, and related factors in relationship to daily survival rate of nests in shrublands located within an urban/suburban landscape matrix (near Chicago, IL).

Depredation was the most common cause of nest failure, followed by weather. Most nest predators were woodland species. The daily survival rate was most strongly influenced by several factors.

The concept of creation care provides a rationale for understanding wildlife habitat requirements and behavior, including interrelationships among predators, prey, and competitors; applied knowledge can aid design and stewardship of preserved areas that benefit wildlife while also allowing for human recreational opportunities in developed landscapes.

13

**Effect of Winter Weather on Raccoon Activity near a Suburban College Campus**

**Amber Shoberg** and **Abbie Schrotenboer**  
Trinity Christian College

Contrary to common misconception, raccoons do not hibernate through the winter but instead sleep for long periods of time in the severest winter conditions. They still venture out of their dens to feed or to mate. Severe winter weather can change group dynamics, activity time, sleeping heart rates, and even mating patterns in raccoon populations. Through the use of wildlife cameras, I am measuring raccoon activity by a suburban creek on a college campus throughout the winter months. Five cameras are capturing images of moving wildlife and the data will be analyzed in order to find any correlation between number of raccoon sightings and weather conditions. I will take into account both temperature at the time of activity and daily precipitation amount and type.

Data from April 2018 to January 2019 have revealed a decrease in raccoon sightings as temperatures drop, with zero Celsius being the average lowest temperature when raccoons are still active. The data has also shown activity to become more nocturnal as temperatures decrease. Following this data trend, I expect raccoon sightings to increase from January to April 2019, as temperature rises and less snowfall is experienced. It is also likely that activity increases in late January/early February as raccoons come out to mate.

Knowledge of wildlife activity can be a valuable tool to Christians who aim to be good ecological stewards. This study can help enable suburban residents and institutions, including the college campus, to avoid harmful interactions and promote awareness for peaceful coexistence.

14

**God’s Solar Power Harvesting Cells: Excitation Energy Transfer in PSI-LHCI Supercomplexes from *Chlamydomonas reinhardtii* Cells Adapted to State 1 and State 2 Conditions**

**Ramesh Velupillaimani**,<sup>1,3</sup>  
**Daisy Savarirajan**,<sup>3</sup> **Julian Whitelegge**,<sup>2</sup> **Su Lin**,<sup>1</sup> and **Andrew N. Webber**<sup>1</sup>

<sup>1</sup>Arizona State University;  
<sup>2</sup>University of California;  
<sup>3</sup>Grand Canyon University

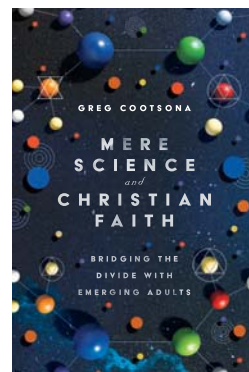
Green algae are miniature marvels that function to capture and convert solar energy into chemical energy using two photosynthetic pigment protein complexes: photosystem I (PSI) and photosystem II (PSII). To determine the excitation energy transfer during state transition, two forms of PSI-LHCI supercomplexes were isolated from *Chlamydomonas reinhardtii* cells acclimated to State 1 and State 2 conditions.

Analysis of PSI-LHCI supercomplex from state 2 cells by liquid chromatography, combined with electrospray ionization mass spectrometry (ESMS), revealed 50 different Intact Mass Tags (IMTs). Many of these IMTs were associated to known components of PSI as well as the thylakoid ATP synthetase. LC-MSMS analysis indicated the presence of subunits of PSI, ATP synthetase, and LHCI, as well as some specific members of the LHCI super family such as LhcbM5, CP29, CP26, and Lhci-1.3 subunit, confirming the association of LHCI to PSI-LHCI supercomplex under State 2 condition.

Excitation energy transfer measurements of PSI-LHCI supercomplex from S2 cells, using time-correlated single photon counting and streak camera fluorescence kinetic measurement at room temperature, revealed an increased antenna size in the PSI-LHCI supercomplex. Global analysis of the fluorescence kinetics indicated an additional fluorescence decaying process with a lifetime of 258 ps, which likely originates from the functional coupling between the LHCI and LHCI antennas in PSI-LHCI-LHCI supercomplex. These results point to structural re-arrangements of the complexes.

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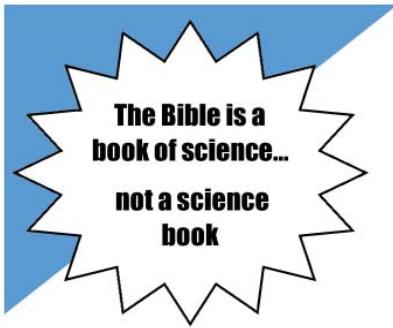
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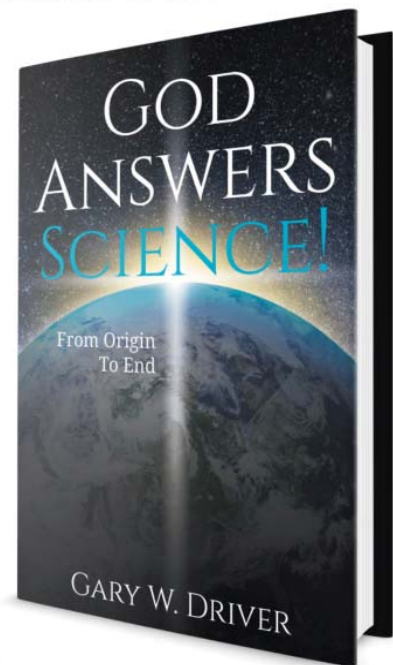
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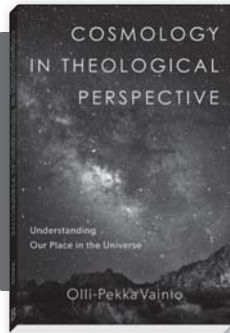
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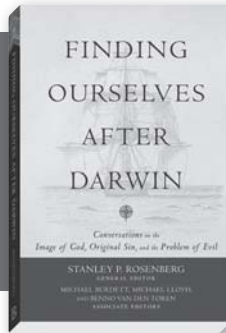
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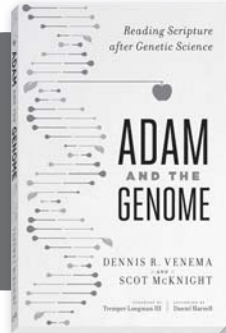
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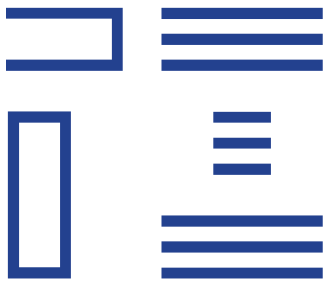
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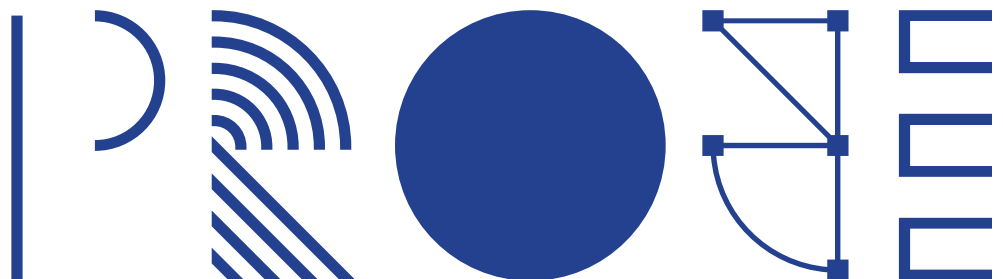


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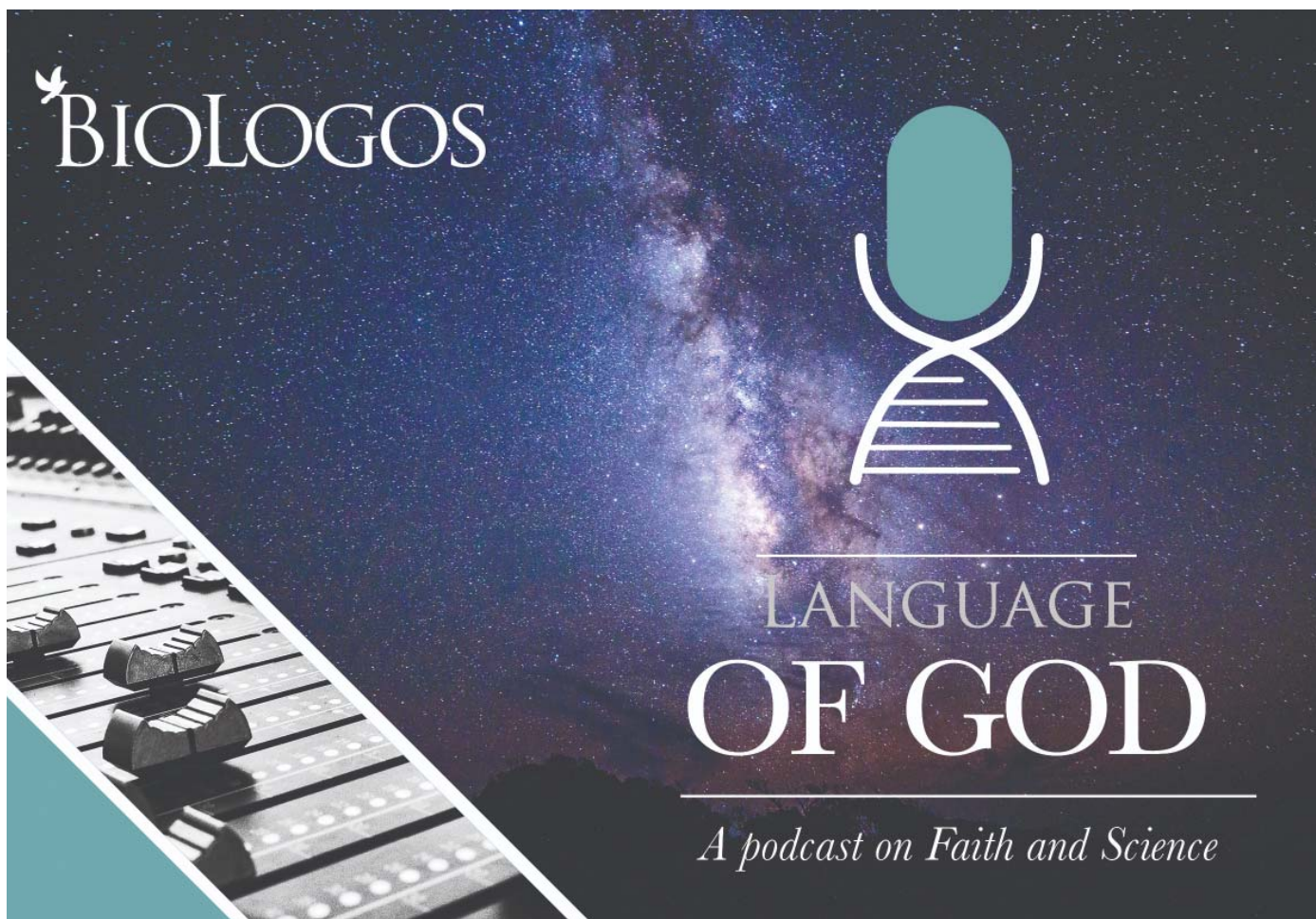
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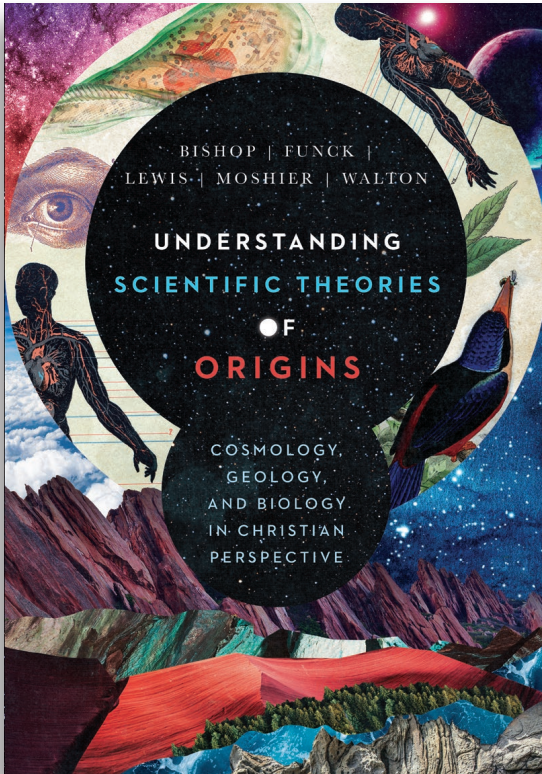
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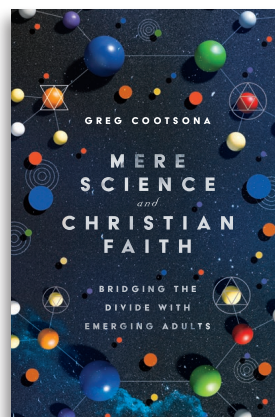
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