

The Heart of Science: Do right, love mercy, walk humbly

Doing and using science, domestically and abroad, in service to God, to God's world, and to our human sisters and brothers



**Joint Meeting of the American Scientific Affiliation
and the
Canadian Scientific and Christian Affiliation
George Fox University
Newberg, Oregon
August 1–4, 2008**

Program Contents

General Information

ASA/CSCA Book Room	1
Emergency Phone Numbers	1
Plenary Sessions.....	1
Special Meetings.....	1
Many thanks to	1
The ASA Spirit.....	1

2008 ASA/CSCA Annual Meeting Schedule

Friday, 1 August 2008	2
Saturday, 2 August 2008.....	2
Sunday, 3 August 2008	4
Monday, 4 August 2008.....	5

Abstracts of Plenary Sessions

Thomas Headland.....	6
Douglas S Diekema.....	6
Larry Schweiger	6
Jennifer Wiseman.....	7
C Dean Freudenberger	7
W Kent Fuchs.....	7

Abstracts of Parallel Session I

Jennifer Wiseman.....	8
Carolyn E Anderson	8
David R Clements and Glen Carlson.....	8
Angela T Kantola.....	8
*James J Rusthoven.....	9
Walt Partenheimer.....	9
Gwen L Schmidt.....	10
Jack C Swearingen	10

Abstracts of Parallel Session II

Judith A Toronchuk	11
Hessel Bouma III.....	11
*Jessica R Driesenga and *Brian J Medema	11
*Dan D Engel and *Daniel J Vanden Akker	11
Heather Looy.....	12
*Christine N Prins	12
Keith B Miller	13

Abstracts of Parallel Session III

Lisa McMinn	14
Bill Newsome.....	14
William B Collier	14
Matthew S Stanford.....	15
Judith A Toronchuk and George F R Ellis	15
George L Murphy	15
Gary Patterson	15
Benjamin J McFarland.....	16

Abstracts of Parallel Session IV

Tjalle T Vandergraaf.....	17
Kathleen M Thiessen.....	17
Leslie Wickman	17
A J (Chip) Mansure	18

*Student or early career scientist presenting a paper or poster through donated scholarships.

Jay Hollman.....	18
John A Bloom.....	18
Annabelle Pratt.....	19
Brian T Greuel.....	19
Anne E Carpenter.....	19
Lynn L Billman.....	20
James D Smith.....	20
*Thomas E Robey.....	20

Abstracts of Parallel Session V

Martin L Price.....	21
Carl Resler.....	21
Edward B Davis.....	21
Mark Shelhamer.....	21
David L Dornbos.....	22
David S Newman.....	22
Ronald J Vos.....	23
George W Crosby.....	23
Kirk Bertsche.....	23
Paul H Seely.....	23

Abstracts of Parallel Session VI

David W Opderbeck.....	25
Leonard J Bond.....	25
Philip L Marston.....	25
Kenneth H Funk II.....	26
Ruth Douglas Miller.....	26
Robert B Mann.....	26
Carlos F A Pinkham.....	26
*James J Rusthoven.....	27
Denis O Lamoureux.....	27
Joseph K Sheldon.....	27
William M Jordan.....	28

Abstracts of Poster Session

Campbell, David C.....	29
Carter, Kenneth N, Vaughan M Pultz, and H David Wohlers.....	29
*Chang, Hui-Yiing.....	29
Collier, William B.....	30
Fischer, Dick.....	30
Fischer, Dick.....	30
*Horridge, Blake.....	31
Lange, Paul H and Denise M Dudzinski.....	31
Lechner, Joseph.....	31
Miller, Ian Douglas.....	32
Pearson, Thomas D.....	32
*Top, Sara M.....	32
Williams, Donald L.....	32

Presenters' Abstracts and Contact Information

Anderson, Carolyn E.....	8, 33
Bertsche, Kirk.....	23, 33
Billman, Lynn L.....	20, 33
Bloom, John A.....	18, 33
Bond, Leonard J.....	25, 33
Bouma III, Hessel.....	11, 33
Campbell, David C.....	29, 33
Carpenter, Anne E.....	19, 33
Carter, Kenneth N.....	29, 33
*Chang, Hui-Yiing.....	29, 33
Clements, David R.....	8, 33
Collier, William B.....	30, 33
Crosby, George W.....	23, 33

*Student or early career scientist presenting a paper or poster through donated scholarships.

Daniels, Susan	33
Davis, Edward B.....	21, 33
Diekema, Douglas S.....	6, 33
Dornbos Jr, David L.....	22, 33
*Driesenga, Jessica R.....	11, 33
*Engel, Dan D.....	11, 33
Fischer, Dick.....	30, 33
Freudenberger, C Dean.....	7, 33
Fuchs, W Kent.....	7, 33
Funk II, Kenneth H.....	26, 33
Greuel, Brian T.....	19, 33
Headland, Thomas.....	6, 33
Hollman, Jay.....	18, 33
*Horridge, Blake.....	31, 33
Jordan, William M.....	28, 33
Kantola, Angela T.....	8, 33
Lamoureux, Denis O.....	27, 33
Lange, Paul H.....	31, 33
Lechner, Joseph.....	31, 33
Looy, Heather.....	12, 33
Mann, Robert B.....	26, 33
Mansure, A J (Chip).....	18, 33
Marston, Philip L.....	25, 33
McFarland, Benjamin J.....	16, 33
McMinn, Lisa.....	14, 33
*Medema, Brian J.....	11, 33
Miller, Ian Douglas.....	32, 33
Miller, Keith B.....	13, 34
Miller, Ruth Douglas.....	26, 34
Murphy, George L.....	15, 34
Newman, David S.....	22, 34
Newsome, Bill.....	14, 34
Opderbeck, David W.....	25, 34
Partenheimer, Walt.....	9, 34
Patterson, Gary.....	15, 34
Pearson, Thomas D.....	32, 34
Pinkham, Carlos F A.....	26, 34
Pratt, Annabelle.....	19, 34
Price, Martin L.....	21, 34
*Prins, Christine N.....	12, 34
Resler, Carl.....	21, 34
*Robey, Thomas E.....	20, 34
*Rusthoven, James J.....	9, 27, 34
Schmidt, Gwen L.....	10, 34
Schweiger, Larry.....	6, 34
Seely, Paul H.....	23, 34
Sheldon, Joseph K.....	27, 34
Shelhamer, Mark.....	21, 34
Smith, James D.....	20, 34
Stanford, Matthew S.....	15, 34
Swearengen, Jack C.....	10, 34
Thiessen, Kathleen M.....	17, 34
*Top, Sara M.....	32, 34
Toronchuk, Judith A.....	11, 15, 34
*Vanden Akker, Daniel J.....	11, 34
Vandergraaf, Tjalle T.....	17, 34
Vos, Ronald J.....	23, 34
Wickman, Leslie.....	17, 34
Williams, Donald L.....	32, 34
Wiseman, Jennifer.....	7, 8, 34

ASA Business Meeting Agenda

ASA Business Meeting Agenda.....	35
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*Student or early career scientist presenting a paper or poster through donated scholarships.

General Information

ASA/CSCA Book Room

A book room featuring books of interest to attendees will be in the Edwards-Holman Science Center (EHS), Room 125. Hours are as follows:

Saturday 9:00 AM–4:00 PM
Sunday Closed
Monday 8:30 AM–1:30 PM

George Fox University Bookstore in the Student Union has the following hours:

Friday 8:30 AM–5:30 PM
Saturday Closed
Sunday Closed
Monday 8:30 AM–4:30 PM

Emergency Phone Numbers

Event Services 503.554.2027 (7:00 AM – 10:00 PM)
Overnight 503.554.2090 (10:00 PM – 7:00 AM)

Plenary Sessions

All plenary sessions will be in the Wood-Mar Auditorium.

Friday 7:00 PM “An Exile in Babylon: The Personal Story of a Christian Anthropologist in the Secular Academy”
–Thomas Headland
Saturday 8:30 AM “Love, Justice, and Humility: Reflections on Bioethics and Medicine” –Douglas Diekema
8:00 PM “A Proper Human Response to Global Climate Change” –Larry Schweiger
Sunday 8:30 AM “Our Magnificent Universe: Serving God by Exploring the Cosmos” –Jennifer Wiseman
7:30 PM “Regenerative Design for Sustainable Agriculture: An Unprecedented Challenge”
–C Dean Freudenberger
Monday 8:30 AM “Engineering as Service” –W Kent Fuchs

Special Meetings

Friday 8:30 AM Workshop: “Teaching About the Origins Debate in Churches and Schools” –Hoover 102
8:15 PM Fellowship Mixer –EHS Atrium
Saturday 7:00 AM Publications Breakfast Meeting –Cap and Gown A
12:00 PM Women in Science Luncheon –Cap and Gown A
5:45 PM Banquet –Klages Dining Hall
7:00 PM ASA Business Meeting –Wood-Mar Auditorium
9:00 PM Fellowship Hour –Cap and Gown A/B/C
9:00 PM Students and Early Career Scientists Outing –Off campus
Sunday 12:00 PM Students and Early Career Scientists Luncheon –Cap and Gown A
12:00 PM Fellows Luncheon –Cap and Gown B/C
Monday 7:00 AM CSCA Business Meeting –Cap and Gown A

Many thanks to ...

- Program Co-chairs **John Van Zytveld** and **Arnold Sikkema** and Local Arrangements Chair **Michael Everest**
- Symposium organizers **Hessel Bouma III** and **Heather Looy**
- Students and Early Career Network organizers **Gwen Schmidt** and **Susan Daniels**

We are especially pleased and thankful for the **donors** who contributed to the Students and Early Career Scientists' Scholarship Fund.

The ASA Spirit

The American Scientific Affiliation 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.

2008 ASA/CSCA Annual Meeting Schedule

Friday, 1 August 2008	
8:00 AM	Departure from the Wood-Mar parking lot for field trip to Mt St Helens
8:30 AM	Departure from the Wood-Mar parking lot for the following field trips: <ul style="list-style-type: none"> ◆ Birding near Tillamook ◆ Geology of the Columbia Gorge ◆ Evergreen Air Museum ◆ Energy at Oregon State University ◆ Oregon Trail History and Mt Hood
8:30 AM–4:30 PM	Workshop: “Teaching About the Origins Debate in Churches and Schools,” Ted Davis –Hoover 102
5:30 PM–6:30 PM	Supper –Klages Dining Hall
6:45 PM–7:00 PM	Welcome –Wood-Mar Auditorium Patrick Allen , George Fox University Provost John Van Zytveld and Arnold Sikkema , Program Co-chairs Mike Everest , Local Arrangements Chair
7:00 PM–8:00 PM Plenary I	Plenary Session –Wood-Mar Auditorium Thomas Headland , “An Exile in Babylon: The Personal Story of a Christian Anthropologist in the Secular Academy” Moderated by John Van Zytveld
8:15 PM	Fellowship Mixer –Edwards-Holman Science Center (EHS) Atrium

Saturday, 2 August 2008		
7:00 AM–7:45 AM	Breakfast –Klages Dining Hall	Publications Breakfast Meeting, Arie Leegwater presiding –Cap and Gown A
8:00 AM–8:20 AM	Devotions, Donald Munro –Wood-Mar Auditorium	
8:20 AM–8:30 AM	Announcements and Introduction of Gwen Schmidt and Susan Daniels –Wood-Mar Auditorium	
8:30 AM	Departure from the Wood-Mar parking lot for Outing around Newberg field trip.	
8:30 AM–9:30 AM Plenary II	Plenary Session –Wood-Mar Auditorium Douglas Diekema , “Love, Justice, and Humility: Reflections on Bioethics and Medicine” Moderated by John Van Zytveld	
9:30 AM–10:00 AM	Refreshment Break –EHS Atrium	
10:00 AM–12:00 PM Parallel Session I	I-A. Human Gender, Sexuality and Sex Track A: Gender Issues in the Sciences Hessel Bouma III and Heather Looy , Organizers and Moderators –Wood-Mar Auditorium	I-B. Ecology, Environmental Studies, and Global Warming Lynn Billman , Moderator –Hoover 105
10:00 AM–10:30 AM	Jennifer Wiseman , “Women Looking Up: Uplifting Women Who Study the Heavens and the Earth”	David Clements , “Conservation Science, Doing Right and Walking Humbly: An <i>A Rocha</i> Perspective”
10:30 AM–11:00 AM	Carolyn Anderson , “Perspectives on Gender Issues within the Chemical Sciences”	Angela Kantola , “Loving One Another: Collaborating to Recover Endangered Fishes and Manage Water in the Upper Colorado River Basin”
11:00 AM–11:30 AM	James Rusthoven , “Gender Shifts and Influences on the Culture of Physician Practice”	Walter Partenheimer , “The Greening of PET (Plastics) Manufacture”
11:30 AM–12:00 PM	Gwen Schmidt , “American Culture, Evangelical Subculture, and Women in the Sciences”	Jack Swearingen , “Anything But Trains? A Comparative Analysis of Alternatives Proposed for the Sonoma-Marín Area Rail Transit Project”

Saturday, 2 August 2008			
12:00 PM–1:00 PM	Lunch –Klages Dining Hall		Women in Science Luncheon –Cap and Gown A
1:00 PM–3:00 PM Parallel Session II	II-A. Human Gender, Sexuality and Sex Track B: What the Sciences Tell Us About Gender and Sexuality Hessel Bouma III and Heather Looy , Organizers and Moderators –Wood-Mar Auditorium		II-B. Ecology, Environmental Studies, and Global Warming Jack Swearingen , Moderator –Hoover 105
1:00 PM–1:30 PM	Judith Toronchuk , “Gendered Brains: Women, Men, and Science”	Jennifer Driesenga, Brian Medema , “Calvin College Carbon Emissions Footprint”	
1:30 PM–2:00 PM	Hessel Bouma III , “Neither Male nor Female, God Created Them: Issues in Intersexuality”	Dan Engel, Daniel Vanden Akker , “Calvin College Carbon Neutrality”	
2:00 PM–2:30 PM	Heather Looy , “Sexisms and Phobias: Emotional Valence of Sexual Variations”	Christine Prins , “The First Steps to Sustainability: Characterizing the Plant Communities, Assessing the Rate of Carbon Sequestration, and Building a Model to Apply to a Projection into Future Sustainability”	
2:30 PM–3:00 PM	Panel discussion with symposium speakers and audience		Keith Miller , “Geologic Record of Global Climate Change: Context for Modern Global Warming”
3:00 PM–3:30 PM	Refreshment Break –EHS Atrium Posters should be displayed in the EHS Atrium by the end of this refreshment break and remain up through Sunday.		
3:30 PM–5:30 PM Parallel Session III	III-A. Social Sciences, Anthropology, and Issues of Faith Heather Looy , Moderator –Wood-Mar Auditorium	III-B. The Natural Sciences and Issues of Faith Phyllida Drummond , Moderator –Hoover 105	III-C. Students and Early Career Network Symposium Gwen Schmidt , Organizer and Moderator –EHS 102
3:30 PM–4:00 PM	Lisa McMinn , “Walking Justly and Doing Mercy: Teaching That Moves Beyond Ideas toward Action”	William Collier , “A Visual Roadmap to the Definition of Science and Its Relationship to Christianity”	Featuring invited speaker Bill Newsome from Stanford University, “Being Faithful in the Secular Academy: Addressing the ‘Tough Questions’” Discussion to follow.
4:00 PM–4:30 PM	Matthew Stanford , “Demon or Disorder: Perceptions of Serious Mental Illness in the Local Church”	George Murphy , “Theology and Time Machines”	
4:30 PM–5:00 PM	Judith Toronchuk , “Becoming Human: Phylogeny and Ontogeny of Affective Social Behavior”	Gary Patterson , “An Evangelical Natural Theology”	
5:00 PM–5:30 PM		Benjamin McFarland , “Designing Proteins: The Creative Potential of Enthalpy and Entropy”	
5:45 PM–7:00 PM	Banquet –Klages Dining Hall		
7:00 PM–8:00 PM	ASA Business Meeting –Wood-Mar Auditorium Everyone welcome.		
8:00 PM–9:00 PM Plenary III	Plenary Session –Wood-Mar Auditorium Larry Schweiger , “A Proper Human Response to Global Climate Change” Moderated by John Van Zytveld		
9:00 PM	Fellowship Hour “Make Your Own Sundae” –Cap and Gown A/B/C		
9:00 PM	Students and Early Career Scientists Outing –Off campus, meet Gwen Schmidt in the EHS Atrium		

Sunday, 3 August 2008			
7:30 AM–8:15 AM	Breakfast –Klages Dining Hall		
8:30 AM–9:30 AM Plenary IV	Plenary Session –Wood-Mar Auditorium Jennifer Wiseman , “Our Magnificent Universe: Serving God by Exploring the Cosmos” Moderated by Arnold Sikkema		
9:45 AM–10:45 AM	Worship Service –Wood-Mar Auditorium John Mahaffy , pastor of the Trinity Presbyterian Church, Newberg, OR Sermon: “Walking Humbly with Your God” based on Micah 6:8 Scripture readings: Micah 6 and 1 John 3:11–24 Pianist: Anna Danese The offering is designated for the Committee on Foreign Missions of the OPC, for mobile outreach immunization clinics based out of the <i>Akisyon A Yesu</i> [Compassion of Jesus] Presbyterian Clinic in South Karamoja, Uganda.		
10:45 AM	Beverage Break –EHS Atrium		
10:45 AM–12:00 PM Poster Session	Poster Session –EHS Atrium ♦ David Campbell , “Biogeography-Implications for Evolution and Conservation” ♦ Kenneth Carter, Jr. , “Forgetful Hearers to Blessed Doers: Does One Size Fit Most in Inculcating Academic Virtue?” ♦ Hui-Yiing Chang , “The Intimate Connection between Physics and Theology” ♦ William Collier , “Teaching the Philosophy and History of Science to Graduate Science Students in a Secular European University: Rehabilitating the Image of Christianity and Science in a Secular Environment” ♦ Dick Fischer , “Historical Adam” ♦ Dick Fischer , “Moderate Theology” ♦ Blake Horridge , “Science in the Sanctuary: The Need for Science Education in the Church” ♦ Paul Lange , “A Medical Science, Faith, and Ethics Practicum” ♦ Joseph Lechner , “What Do We Mean When We Say ‘God Created’?” ♦ Ian Douglas Miller , “Alternative Fuels for Cars” ♦ Thomas Pearson , “Science as ‘Godly Vocation’: A Virtue Ethics Model” ♦ Sara Top , “Corn Rootworm Emergence Trials, 2006 and 2007” ♦ Donald Williams , “Community Service Projects: Doorways for Student Self-Discovery and Service”		
12:00 PM–1:00 PM	Lunch –Klages Dining Hall	Students and Early Career Scientists Luncheon –Cap and Gown A	Fellows Luncheon –Cap and Gown B/C
1:00 PM–3:00 PM Parallel Session IV	IV-A. Alternative Energy Sources and Their Impact; Engineering and Appropriate Technology Martin Price , Moderator –Wood-Mar Auditorium	IV-B. Medicine, Global Infectious Disease, and World Health James Rusthoven , Moderator –Hoover 105	IV-C. Science Teaching—Methods and Expectations Dwight Kimberly , Moderator –EHS 102
1:00 PM–1:30 PM	Tjalle Vandergraaf , “From Each According to his Ability; to Each According to his Needs’: Karl Marx’s Dictum as Applied to Energy Supply and Consumption in a North American Context”	Kathleen Thiessen , “Water Fluoridation in the 21 st Century: Doing Justly in Public Health”	Leslie Wickman , “Faith Integration in the Science Classroom”
1:30 PM–2:00 PM	A J (Chip) Mansure , “Geothermal Energy Update: The Solution, a Contributor, a Diversion, or Part of the Problem?”	Jay Hollman , “Ethical Issues in Health Care Reform”	John Bloom , “Should Intelligent Design Be Taught in Public Schools?”
2:00 PM–2:30 PM	Annabelle Pratt , “Mitigating the Growth of the Internet’s Energy Use through Improved Power Distribution”	Anne Carpenter , “Extracting Information from Images to Tackle Basic Biological Questions and World Health Problems”	Brian Greuel , “Encouraging Excellence and Building Community in the Undergraduate Research Lab”
2:30 PM–3:00 PM	Lynn Billman , “When All Things Can Be Made New: Greensburg, Kansas”	James Smith , “International Scientific Education: The World Needs You! You Can Make a Difference!”	Thomas Robey , “Weblogs as Foundations for Discussions About Science and Christianity”
3:00 PM–3:30 PM	Refreshment Break –EHS Atrium		

Sunday, 3 August 2008			
3:30 PM–6:00 PM Parallel Session	V-A. Sustainable Agriculture and World Hunger Jerry Hess , Moderator –Wood-Mar Auditorium	V-B. The Natural Sciences and Issues of Faith Alison Noble , Moderator –Hoover 105	V-C. Science Careers Panel for Student and Early Career Network Susan Daniels , Organizer and Moderator –EHS 102
3:30 PM–4:00 PM	Martin Price , “Using Science and Technology to Help Subsistence Farmers in Developing Countries”	Edward Davis , “Robert Andrews Millikan (1868–1953): His Religious Life and Thought”	Science Career Presentations: ♦ Matthew Stanford ♦ Anne Carpenter ♦ Annabelle Pratt ♦ Carolyn Anderson ♦ Susan Daniels
4:00 PM–4:30 PM	Carl Resler , “Fertilizing the Ocean with Artificial Upwelling”	Mark Shelhamer , “Divine Action, Sensory Illusions, and Randomness”	
4:30 PM–5:00 PM	David Dornbos , “Comparison of Developed Country Sustainable Agriculture with Subsistence Systems of Cambodia: Which Technologies to Transfer?”	David Newman , “How Do We Correct the Public Perception of Conflict between Scientific and Spiritual Reality?”	
5:00 PM–5:30 PM	Ronald Vos , “New Hope for Africa”	Kirk Bertsche , “A Survey of Modern Radiocarbon Dating”	Questions and Panel Discussion Networking
5:30 PM–6:00 PM	George Crosby , “Managing <i>Moringa</i> for Leaf Biomass Production to Combat Malnutrition”	Paul Seely , “Why Did God Create the Sun on the Fourth Day?”	
6:00 PM–7:30 PM	Dinner –Klages Dining Hall		
7:30 PM–8:30 PM Plenary V	Plenary Session –Wood-Mar Auditorium C Dean Freudenberger , “Regenerative Design for Sustainable Agriculture: An Unprecedented Challenge” Moderated by Arnold Sikkema		

Monday, 4 August 2008			
7:00 AM–7:45 AM	Breakfast –Klages Dining Hall	CSCA Business Meeting –Cap and Gown A	
8:00 AM–8:20 AM	Devotions, John Bloom –Wood-Mar Auditorium		
8:30 AM–9:30 AM Plenary VI	Plenary Session –Wood-Mar Auditorium W Kent Fuchs , “Engineering as Service” Moderated by Arnold Sikkema		
9:30 AM–10:00 AM	Refreshment Break –EHS Atrium		
10:00 AM–12:00 PM Parallel Session VI	VI-A. Ethical Issues in Science and Engineering Michael Foster , Moderator –Wood-Mar Auditorium	VI-B. Scientific and Theological Contributions to Cosmic History and the History of Life Gary Patterson , Moderator –Hoover 105	VI-C. Alternative Energy Sources and Their Impact; Engineering and Appropriate Technology Jack Swearingen , Moderator –EHS 102
10:00 AM–10:30 AM	David Opperbeck , “Deconstructing Jefferson’s Candle: Toward A Critical Realist, Environmental Virtue Ethics Approach to Information Policy”	Philip Marston , “Humility, James Clerk Maxwell’s Perspective on Creation, and the Reaction of His Peers”	Leonard Bond , “Sustainability and an Energy System Approach”
10:30 AM–11:00 AM	Kenneth Funk II , “Technological Distraction”	Robert Mann , “The Puzzle of Existence: A New Question for Science and Theology”	Ruth Douglas Miller , “Wind Turbines for K–12 Education”
11:00 AM–11:30 AM	James Rusthoven , “A Covenantal Model for Understanding the Patient-Supporter Relationship in the Clinical Encounter”	Carlos Pinkham , “Nine Phenomena That Recur throughout Cosmological, Abiological, and Biological Evolution”	Joseph Sheldon , “Reducing Your Footprint: Build Right, Build Green”
11:30 AM–12:00 PM	William Jordan , “The Calling of the Christian Engineer”	Denis Lamoureux , “Evolutionary Creation: A Christian Approach to Evolution”	
12:15 PM–1:00 PM	Lunch –Klages Dining Hall		
8:00 AM–2:00 PM	Check-out. Please leave your completed evaluation form at the ASA registration table.		

Abstracts of Plenary Sessions

PLENARY I: ANTHROPOLOGY

Wood-Mar Auditorium

Friday, 1 August 2008

7:00 PM

An Exile in Babylon: The Personal Story of a Christian Anthropologist in the Secular Academy

Thomas Headland

Thomas Headland, a Christian missionary since 1960 and an elected Fellow of the American Anthropological Association since 1993, will tell how he and his wife gained the friendship of a hunter-gatherer tribe in the Philippines, and later the friendship of many secular anthropologists. Anthropologists have a history of antipathy toward missionaries. Could God use a missionary to crack that barrier? Headland hopes so.

Headland has loved anthropology passionately since a child, and God since his early 20s. While both anthropologists and some Christians see him as an oxymoron, he claims he has never had a minute of conflict between these two loves. He has taught anthropology part-time in two state universities since 1986 because he believes the science of anthropology can be used to better humankind. It can be harnessed for Kingdom work, and it can be used equally in the secular world to bring betterment to human suffering and misunderstanding. He will tell his story in this presentation.

PLENARY II: BIOETHICS AND MEDICINE

Wood-Mar Auditorium

Saturday, 2 August 2008

8:30 AM

Love, Justice, and Humility: Reflections on Bioethics and Medicine

Douglas S Diekema

Ashley X is a profoundly disabled girl with static encephalopathy who was treated with high-dose estrogen to attenuate her final adult height, was given a hysterectomy, and underwent removal of her breast buds. The case was published in the medical literature in October of 2006, and generated international attention and discussion among the public, the medical community, and the bioethics community.

Today, many physicians and institutions are struggling with whether to offer similar treatment when parents request it. At the same time, critics have charged that this form of medical intervention represents the worst of medical hubris and the unwise application of medical technology. The presenter, an author of the original paper, will explore the medical, social, and ethical issues raised by the use of growth attenuation and other controversial treatments in profoundly disabled children. He will address whether the use of growth attenuation therapy can ever be justified and will examine the constraints that should be placed on the use of such treatment. In addition, the case will provide a framework for understanding the bioethical issues that arise in the use of novel and controversial medical treatments.

PLENARY III: GLOBAL WARMING

Wood-Mar Auditorium

Saturday, 2 August 2008

8:00 PM

A Proper Human Response to Global Climate Change

Larry Schweiger

Global climate change is now a highly documented, rapidly unfolding planetary crisis that will affect everyone and will alter the very nature of tomorrow.

In its 2007 report, the Intergovernmental Panel on Climate Change stated that 20–30% of plant and animal species worldwide are “likely to be at increased risk of extinction if increases in average global temperatures exceed 2.2–4.0°F above current levels.” This could happen by the end of the century if we do not stabilize global temperatures by reducing global warming pollution. The IPCC also reports “40–70% of species would have significant extinctions if temperatures increase by more than 7.2°F.” Clearly, global warming is the single biggest threat facing the earth’s natural systems today.

The consequences of climate change will be significant on human communities and will hit the poor the hardest. Sea level rise; more frequent heat waves, droughts, extreme weather events and floods; increases in tropical diseases; and significant reductions in agricultural yields will affect billions worldwide.

Christian moral obligations to God and neighbor require a response to the climate crisis. In the United States, the most important next step is to obtain meaningful climate legislation that will reduce global warming pollution, recharge America’s economy by investing in clean energy technologies and jobs, and invest resources in restoring and protecting natural resources threatened by global warming and helping the poor adapt to the significant harm that global warming will cause.

Scientists who are Christians have a unique opportunity to put forth a Christian moral witness combined with scientific understanding that can inform the development of public policy and help heal the earth.

PLENARY IV: COSMOLOGY

Wood-Mar Auditorium

Sunday, 3 August 2008

8:30 AM

**Our Magnificent Universe:
Serving God by Exploring the Cosmos**

Jennifer Wiseman

Astronomy is allowing us to explore the universe in ways and depths never imagined in all earlier centuries of human history. Our discoveries inspire an humbling awe of Creation. They can also challenge some of our most deeply held assumptions about the nature of the universe, time, and ourselves. I will present some of the most fascinating recent discoveries in astronomy: planets around other stars, new stars in formation, the most powerful explosions in the universe, remnant light from the Big Bang, evidence from billions of years past that the expansion of our universe is accelerating, and theories that our universe may be one of many. Our scientific research addresses exclusively the mechanics of the physical realm of matter and energy and forces. Yet is it possible to serve or understand God better by exploring what's out there from other vantage points as well, that is, from perspectives such as beauty, magnitude, and activity? We will examine these issues together as we explore the universe by viewing spectacular images of space.

PLENARY V: AGRICULTURE

Wood-Mar Auditorium

Sunday, 3 August 2008

7:30 PM

**Regenerative Design for Sustainable Agriculture:
An Unprecedented Challenge**

C Dean Freudenberger

Biblical wisdom unfolds in Gen. 1:26: "Let them have dominion ..." In ancient Hebrew thought, having dominion meant accepting responsibility for the maintenance of justice and righteousness within the sphere of one's influence. It was understood that if a ruler fails this responsibility, then that person forfeits the right to rule. This ancient concept has largely been misunderstood in our time. Thus, one of the tasks before us today is to relate biblical wisdom to contemporary agriculture.

Within the context of our planetary ecological crisis, the concept of sustainability has emerged. It is defined as "meeting the needs of the present without compromising the ability of future generations to meet their own needs." This concept functions as a normative guideline and goal. Consequently, how shall we meet our needs for food and fiber on a regenerative, and therefore sustainable basis, that guarantees the welfare of future generations? How might we develop an agriculture that is economically viable, socially just, and ecologically enhancing?

This is an unprecedented challenge, particularly as prospects of a post-petroleum world are confronted. The role of the scientist (social, physical, biological) is critical. What is required is envisioning and designing our food systems in ways that contribute to the beauty, integrity, and harmony of the myriad biotic communities upon which humanity is totally dependent.

How will we move toward an eco-agriculture? How shall human communities function within the parameters of resource regeneration? What will be the impact of a transition from reductionist thinking to an ecological frame of reference that leads toward accepting the responsibilities of having dominion?

PLENARY VI: ENGINEERING

Wood-Mar Auditorium

Monday, 4 August 2008

8:30 AM

Engineering as Service
W Kent Fuchs

Abstract not available at press time.

Abstracts of Parallel Session I

I-A. HUMAN GENDER, SEXUALITY, AND SEX
Track A: Gender Issues in the Sciences
Wood-Mar Auditorium

Saturday, 2 August 2008

10:00 AM

**Women Looking Up: Uplifting Women Who Study
the Heavens and the Earth**

Jennifer Wiseman

Women throughout history have recognized the beauty of the heavens and have made strong contributions to the study of astronomy. But only recently have professional doors truly opened for women to fully use their scientific skills in astronomy and other sciences as a profession. Currently, a surprisingly large fraction of younger astronomers are Christian women. And roughly half of all scientists seeking to be professionally involved in larger science policy issues are women. What draws these young people to the scientific study of space? What draws them to want to understand and influence the “Big Picture” of science policy? And what special challenges and opportunities do Christian women face as they encounter the sometimes conflicting pressures and expectations of church, family, and academia?

I will present some historical perspective on the science and faith of Christian women astronomers of the past, and I will share some of my thoughts regarding the calling, opportunities, and needs of today’s Christian women scientists, from my observations in both research science and in federal science policy. Together, we will also explore how ASA can best encourage both women and men who are eager to study the universe and to influence the world for good.

Saturday, 2 August 2008

10:30 AM

**Perspectives on Gender Issues
within the Chemical Sciences**

Carolyn E Anderson

During a hearing this past October before the US House of Representatives, President of the University of Miami and former US Secretary of Health and Human Services Donna E. Shalala commented that “faculty, university leaders, professional and scientific societies, federal agencies, and the federal government” need to unite to ensure that “all of our nation’s people are welcomed and encouraged to excel in science and engineering in our research universities.” This call to arms has been echoed by many in the sciences, and yet, while nearly 52% of bachelor’s degrees and 36% of PhD’s in chemistry were awarded to women in 2006, less than 15% of all tenured or tenure-track chemistry faculty at major research universities are women. These numbers suggest that neither simply getting women to major in chemistry at the undergraduate level nor even continuing on to graduate school is sufficient to significantly change the face of the academy.

**I-B. ECOLOGY, ENVIRONMENTAL STUDIES, AND
GLOBAL WARMING**
Hoover 105

Saturday, 2 August 2008

10:00 AM

**Conservation Science, Doing Right and Walking Humbly:
An A Rocha Perspective**

David R Clements and Glen Carlson

Conservation science is often described as a crisis discipline. It is a goal-oriented field that seeks solutions to the environmental crisis that faces the planet on many fronts. However, it is not immune to many of the crippling issues that haunt all scientific disciplines; studies have shown that many conservation science studies fail to make a difference to environmental preservation in the real world – at least in the short-term; thus it becomes a discipline in crisis rather than a crisis-solving discipline. Against this backdrop, consider the science as practiced by *A Rocha*, an international Christian conservation organization in 18 countries. Can *A Rocha* succeed in avoiding some of the pitfalls through doing right, loving mercy, and walking humbly?

A Rocha Canada was started in 1997, and since that time has developed two centers in British Columbia and Manitoba. *A Rocha* Canada has recently reviewed the science studies conducted over its 10-year history, focused mainly near its West Coast Field Study Centre in Surrey, British Columbia. The studies range from priority species research to species surveys and monitoring, to ecosystem analysis to conservation, and lastly to environmental management plans.

Throughout all of the projects, there is the intent to honor *A Rocha’s* sense of place in working to protect the areas where the Field Study Centres are located. A key aspect of this is to ensure that the projects have the object of contributing to the biotic knowledge with a view to the eventual restoration of the various ecosystems. In all of this, we are carefully weighing whether, in fact, *A Rocha* can find a way to do good conservation science. Key elements must include scientific rigor, strong connections with collaborators, community involvement, and a commitment to make a real difference in terms of the three-way reconciliation process between God, humanity, and creation.

Saturday, 2 August 2008

10:30 AM

**Loving One Another: Collaborating to Recover
Endangered Fishes and Manage Water in the
Upper Colorado River Basin**

Angela T Kantola

The Upper Colorado River Endangered Fish Recovery Program (Recovery Program) is a long-term, collaborative effort to recover four endangered fish species in the upper Colorado River Basin while water use and development continues to meet human needs. The humpback chub, bonytail, Colorado pikeminnow, and razorback sucker are large, long-lived,

Anderson, contd.

This talk, through statistical studies and anecdotes, will aim to highlight some of the issues facing female chemists as they consider careers in the professorate. Several questions that will be considered include the following: What are some of the stumbling blocks women face? How does family and the desire to have children affect their decision? How might we begin to move in a more equitable direction? and How should we, as Christian scientists, be involved with leading this changing landscape?

Saturday, 2 August 2008

11:00 AM

Gender Shifts and Influences on the Culture of Physician Practice

James J Rusthoven

Until recently, the role of physicians in medicine has been dominated by males. Models of the physician-patient relationship have reflected this gender dominance. The paternalistic model, for example, explicitly and implicitly is defined by stereotypic male attitudes, behaviors, and actions including extraordinary service to patients that is often at the expense of time and emotional commitments to other human relationships. Recent data, however, suggest that the current generation of physicians is choosing to work fewer hours or part-time; some studies suggest that female physicians are more likely to work part-time than their male counterparts. There is evidence that such changes in life-style choices may be contributing to shortages in physician hours devoted to patient care in both Canada and the United States.

In the last two decades, women have assumed a greater role in medical practice, as reflected in a dramatic shift in women entering medical school and in becoming the dominant gender in primary-care medicine. It has been suggested that this shift is creating changes in patient-physician relationships, with female physicians working out of a more empathic model, engaging patients more as active partners in their care, and fostering the trend toward newer models of patient care with greater involvement of nonphysician caregivers. Furthermore, research priorities are reflecting more resources devoted to non-interventional aspects of health care often associated with female stereotypic tasks including a greater commitment to research in maintaining good quality of life and optimizing palliative care. From a Christian perspective, the impact of gender shifts on the traditional roles of caregivers, their influence on balancing professional responsibilities to patients with those to other life relationships, and the effect on the science of medicine will be analyzed.

Kantola, contd.

warmwater fish endemic to the Colorado River Basin where they are believed to have thrived for 3 to 5 million years. These fish are now endangered due to human-induced changes to their habitat, including dams, water depletion, and introduction of more than 70 nonnative fish species.

In 1988, a landmark partnership of public and private organizations was established to recover these endangered species while still allowing water use and development in compliance with state water law, the Endangered Species Act (ESA), and interstate water compacts. Partners include state and federal agencies, environmental groups, and water and power users. The Recovery Program is considered a national model demonstrating that public/private partnerships can work to recover endangered species and resolve ESA-related conflicts. Coordination and collaboration among stakeholders is critical to the Recovery Program's success.

As the Recovery Program's assistant director, I see the command to love our neighbor as the key principle underlying this kind of collaboration. Recovery Program partners work together to identify and protect instream flows, restore habitats, manage nonnative fish, stock endangered fish, and conduct research and monitoring needed to reestablish self-sustaining populations of the endangered fish. These recovery efforts provide ESA compliance for more than 1,540 projects providing over 2 million acre-feet of water for human use in the Upper Colorado River. The Recovery Program partnership has made significant strides toward recovering the endangered fish, undertaking recovery actions far beyond the abilities of any one partner acting independently.

Saturday, 2 August 2008

11:00 AM

The Greening of PET (Plastics) Manufacture

Walt Partenheimer

One aim of green technology is to preserve the planet Earth by reducing to sustainable levels the poisons and waste generated by these technologies. One of the largest plastics manufactured is polyethylene terephthalate (PET). Its most visible form is in plastic water bottles. The major component in PET is terephthalic acid (1,4-benzene-dicarboxylic acid).

This talk will give the history of the manufacture of terephthalic acid which demonstrates an enormous increase in "greenness" due to the invention of more selective catalysts which have resulted in large decreases in greenhouse gases (carbon dioxide, carbon monoxide, and methylbromide) and by-product (i.e., waste) formation. The reduction in by-products and higher yields has also resulted in simplification of the commercial plants. The chemistry responsible for these improvements will be briefly outlined. The latest efforts to further enhance this greenness is through the invention of catalysts which allow one to use water as the solvent, rather than the current organic solvent, acetic acid.

Saturday, 2 August 2008

11:30 AM

American Culture, Evangelical Subculture, and Women in the Sciences

Gwen L Schmidt

I personally followed a long and difficult road on my path toward becoming a scientist, and being a woman was one factor which made things all the more difficult. I was always interested in science, and I can see the seeds of my current interests and love of science in my childhood. Yet the attitude in the Christian high school that I attended, the family I grew up in, and the churches I was a part of as a child and adult was that women should submit to their husbands, not have a career, and see their primary role as a wife and mother. Christian service or “ministry” was an exception, of course, but pursuing a career in science wasn’t something I ever considered. To be fair, there were many reasons for this.

Much has been written in the last few decades about women’s roles, but let me highlight some of my own views on the subject. The church seems to be much divided on several aspects of “biblical womanhood.” In many parts of society, as well as the church, men are seen as more competent, more rational, more success-oriented, more likely to “need” fulfillment outside the family. A woman’s role is simply to support her man in pursuing his career or calling. A woman is not seen as a full individual in her own right, but simply as an assistant to her man. For example, in most families, even when both spouses work full time, the woman does significantly more of the housework. There are many other examples from my own life with respect to my family as well as to workplace relationships. Thus one very important way in which we need to support women in science is to work to give women their Christ-given status as being equal. This involves both attitudinal and practical changes.

Saturday, 2 August 2008

11:30 AM

Anything But Trains? A Comparative Analysis of Alternatives Proposed for the Sonoma-Marín Area Rail Transit Project

Jack C Swearingen

Changing America’s commuting habits may be the most difficult part of becoming a sustainable society, if the struggle to establish passenger rail service in San Francisco’s North Bay is representative. Even by California standards, the region is heavily automobile-dependent. Highway 101 – presently the only north-south transportation option – is the fourth most congested freeway in the Bay Area. Moreover, over sixty percent of the greenhouse gases in the two counties are emitted by highway vehicles. Sonoma-Marín Area Rail Transit (SMART) hopes to begin moving passengers by 2010, using self-propelled diesel-hydraulic rail cars that are bio-diesel capable. Critics of the project have suggested numerous alternative technologies, which they claim to be less costly or more beneficial than a rail system. Simple NIMBYism cannot explain their opposition; a worldview of technological optimism – even determinism – is manifest.

This study was conducted in an effort to move the discussion to a more holistic level, by incorporating environmental, social, and aesthetic variables in addition to economic ones. The results validate the technology originally chosen for the project, but without precluding new technologies that may become viable in the future. The assessment procedure should be useful for other sustainability projects that generate opposition from lobbyists and self-interest groups.

Abstracts of Parallel Session II

II-A. HUMAN GENDER, SEXUALITY, AND SEX Track B: What the Sciences Tell Us About Gender and Sexuality

Wood-Mar Auditorium

Saturday, 2 August 2008

1:00 PM

Gendered Brains: Women, Men, and Science

Judith A Toronchuk

This presentation will review and evaluate recent reports of gender differences in brain structure and function. At present there is evidence that chromosomal, hormonal, and environmental factors all contribute to bringing about these differences. However, the statistical and social significance of so-called "typical" differences should be interpreted with caution, given the statistical variation between and within the sexes. While evolutionary psychology suggests possible differential selection pressures acting on males and females to shape the emotional circuitry of aggression and nurturance, it should be kept in mind that we no longer live in an "ancestral environment." And while the pattern of cognitive abilities described by Baron-Cohen as arising from "the extreme male brain" due to genetic predisposition and/or high prenatal testosterone has been shown to be over-represented among scientists, mathematicians, and engineers, it nevertheless occurs in women as well as men. Possible implications for Christian women and men in science will be suggested.

Saturday, 2 August 2008

1:30 PM

Neither Male Nor Female, God Created Them: Issues in Intersexuality

Hessel Bouma III

Between 0.06-1.7% of newborns annually in the United States alone are born with ambiguous genitalia, neither clearly male nor clearly female. Most cases are inherited conditions such as 5- α -reductase deficiency, androgen insensitivity syndrome, congenital adrenal hyperplasia, or one of several trisomic conditions involving the sex chromosomes; the causes of some intersex conditions are unknown. Persons who are intersexed struggle with their gender identities, and present awkward issues for themselves, healthcare practitioners, the Christian community, and society. From the 1970s until recently, most newborns with ambiguous genitalia underwent sex assignment surgery to become males or females structurally (albeit usually with reduced functionality). This practice was based upon a naive hypothesis on the development of sex and gender that was flawed and egregiously misrepresented despite evidence to the contrary. Only in the past decade have follow-up studies documented some of the serious problems this practice created and led to new recommendations for the treatment of newborns with ambiguous genitalia. From a Christian perspective,

II-B. ECOLOGY, ENVIRONMENTAL STUDIES, AND GLOBAL WARMING

Hoover 105

Saturday, 2 August 2008

1:00 PM

Calvin College Carbon Emissions Footprint

Jessica R Driesenga and Brian J Medema

Global climate change, caused by anthropogenic carbon emissions, is an increasingly irrefutable outcome of our modern way of life. Since CO₂ is one of the leading greenhouse gasses, it is important to decrease our carbon emissions in any way we can. Calvin College has taken note of the impending environmental crisis and has begun to look into ways to reduce our carbon footprint. In order to glorify our Creator and love our neighbor, we must be good stewards of the creation and protect the global environment both for ourselves and for other inhabitants in the creation.

As a combined engineering and ecology student project, the first step we took toward reducing our CO₂ emissions was to determine the carbon footprint of our campus. We measured how much carbon our campus directly or indirectly releases into the atmosphere as well as how much CO₂ is sequestered by our campus's natural areas. To accurately assess our carbon footprint, we evaluated five different aspects of Calvin's CO₂ activity, in accordance with the college's Sustainability Statement: Land and Water Use, Energy Use and Purchasing, Construction, Waste Management, and Transportation.

In our analysis, we found that Calvin College emits approximately 66,400 metric tons of CO₂ into the atmosphere each year, but only sequesters 51 metric tons annually. We found that energy use (both electricity and building heating) and transportation activities (commuter traffic, campus vehicles, and college-sponsored air travel) account for approximately 95% of Calvin's CO₂ emissions.

Saturday, 2 August 2008

1:30 PM

Calvin College Carbon Neutrality

Dan D Engel and Daniel J Vanden Akker

Many individuals and industries have recently pledged to reduce their CO₂ emissions; Calvin College, in an effort to be more responsible stewards of God's creation, has begun to investigate carbon neutrality as well. In a semester-long class project, ecology and engineering students found that Calvin College annually emits more than 66,000 metric tons of CO₂ into the atmosphere, while sequestering only 51 metric tons of CO₂.

To reduce Calvin's carbon footprint, a plan was developed to identify measures Calvin College could take to become carbon neutral, balancing the amount of carbon emitted by Calvin's activities with the amount of CO₂. We found that our best options to achieve carbon neutrality were decreasing

Bouma, contd.

this presentation will explore issues of sex and gender identity, sex and gender development, the biomedical and ethical issues raised by persons who are intersexed, and the particular challenges persons who are intersexed pose for the Christian community.

Saturday, 2 August 2008

2:00 PM

**Sexisms and Phobias:
Emotional Valence of Sexual Variations**

Heather Looy

Issues of human sexuality generate strong emotional reactions. They have torn apart churches and polarized political discussions. Research has shown that emotions both significantly influence, and are influenced by, our moral judgments, and that emotions are a crucial aspect of truly rational decision-making. For Christians the question becomes: to what extent do, and should, emotions affect our theologies of sexuality? I will review the research on emotions and moral judgments, particularly in relation to sexual variations, and explore the implications of this research for the ways in which we communicate and make decisions about issues of sexuality in our churches and in the polis.

Driesenga and Engel, contd.

energy consumption especially from fossil fuel sources, increasing energy efficiency, increasing carbon sequestration, purchasing renewable energy such as wind turbines, purchasing carbon offsets, and educating the Calvin College community about sustainable living. Complete CO₂ sequestration to offset emissions was not a viable option as the maximum sequestration potential of Calvin's campus is only 328 metric tons annually.

After further research, a specific plan of action was proposed that includes building wind turbines, purchasing carbon offsets, renovating the buildings to use energy more efficiently, and increasing parking fees. Increasing parking fees may function to decrease commuter traffic, though perhaps not substantially, and would also generate income for supporting future green options. Combined, these activities would cost about \$8.5 million, and would result in Calvin College achieving carbon neutrality for 35 years. Beyond 35 years, money saved by energy savings could be used to fund newer technology and programs to sustain carbon neutrality in the future.

Saturday, 2 August 2008

2:00 PM

The First Steps to Sustainability
Christine N Prins

As more and more people are hopping onboard with the theory that global warming is a reality which may forever affect the everyday way of life, there has been a push toward reducing the amount of the greenhouse gas CO₂ emitted both on a personal and corporate level. This focus has been primarily on the preventative side of affecting CO₂ levels instead of attempting to reduce the levels of carbon already existing in the atmosphere.

One study conducted at Calvin College estimated the annual amount of CO₂ emitted on the campus, and proposed several ways to reduce the output. In addition to reducing the up front amount of CO₂ emitted, the CO₂ levels already existing in the atmosphere need to be reduced. The earth has been naturally reducing the amount of CO₂ emitted by its breathing animals for many years, using well-studied plant physiology.

In parallel to the study already conducted at Calvin College, the goal was to estimate the amount of CO₂ reduced from the atmosphere by the institution's green space. The study of the plant area estimated just how much CO₂ the plants were up-taking for that annual growing season. The estimation was calculated from a designed model integrating Gap Light Analysis, accurate light intensity data, shadows from overlying canopies, and species-specific light use curves. Identifying and testing, with many replicates, representative plants from different plant communities developed the curves.

The model was constructed around the specifics of the variables designed for the Calvin College green space and can be used in subsequent years, and can also be expanded to other institutions who invest in gathering the necessary data. The hope is to use this information to push for CO₂ neutral campuses, businesses, and maybe even households, to combat the continuous rise in the amount of the greenhouse gas CO₂.

Saturday, 2 August 2008

2:30 PM

Human Gender, Sexuality, and Sex Panel Discussion

The symposium speakers from Tracks A and B will field questions from the audience and respond to one another.

Saturday, 2 August 2008

2:30 PM

Geologic Record of Global Climate Change: Context for Modern Global Warming

Keith B Miller

Over Earth's history, the global climate has changed dramatically at several different time scales. These changes have occurred in response to a variety of forcing mechanisms, and positive and negative feedback systems. One of the primary drivers of climate change is the amount and distribution of solar radiation received by the earth's surface. Factors affecting the amount of solar radiation range from the increase in solar luminosity throughout Earth's 4.5-billion-year history, to periodic variations in Earth's orbit and axial tilt at scales of 10's to 100's of thousands of years, to short-term small changes in luminosity associated with the intensity of solar storms.

Another major driver is the concentration of greenhouse gases—especially CO₂ and methane. These concentrations also change at a variety of time scales from billions of years to hundreds or thousands of years. Of special importance are processes that store or sequester carbon, and those that release it into the atmosphere. The balance of the sources and sinks for atmospheric carbon is critical for stabilizing Earth's global climate.

The geologic record provides valuable information about the behavior of Earth's climate system in the past. In particular, it gives insight into the magnitude, rate, and causes of past climate change. This record has suggested that positive and negative feedback systems have occurred that have led to both runaway cooling and runaway warming. Two especially important feedback processes have been changes in Earth's albedo (reflectivity) and changes in ocean circulation patterns. Past "greenhouse" periods, some of which likely resulted in global extinction events, can help us better understand the possible outcomes of current warming.

Abstracts of Parallel Session III

**III-A. SOCIAL SCIENCES,
ANTHROPOLOGY, AND
ISSUES OF FAITH**
Wood-Mar Auditorium

Saturday, 2 August 2008 3:30 PM

**Walking Justly and Doing Mercy:
Teaching That Moves
Beyond Ideas toward Action**
Lisa McMinn

In the late 1950s, sociologist C. W. Mills introduced the “sociological imagination,” a conceptual tool he hoped would stretch beyond the classroom into broader public discourse.

The sociological imagination connects personal troubles to public issues by helping students and others see how their own personal crises are related to something bigger and more systemic, and then to figure out necessary questions which will eventually lead to helpful action.

Mills was not popular with his contemporaries. They preferred the role of the analyzing social critic who could consider, for instance, negative impacts on ecological systems coming from cultural, political, and economic beliefs, but not get overly active in doing much about it. The assumption was that students would fill in the blanks on their own, in their own way.

When academics are told that they live in ivory towers, they have not just been complimented for how smart they are. More likely they have been chastised for a lack of congruence between the world of ideas (and ideals) and their eating habits, consuming patterns, and lack of civic engagement. They defend their ivory tower in the name of objectivity—and keep silent in the classroom on matters of personal conviction because they agree with Max Weber, who believed it inappropriate to use the classroom as a pulpit or political platform to discuss one’s values.

This presentation offers examples and approaches of appropriately applying Mills’ sociological imagination to help students grapple with controversial political and theological questions related to ecology, including personal

**III-B. THE NATURAL SCIENCES AND
ISSUES OF FAITH**
Hoover 105

Saturday, 2 August 2008 3:30 PM

**A Visual Roadmap to the
Definition of Science and
Its Relationship to Christianity**
William B Collier

It is well known among philosophers of science and some scientists that demarcation criteria which distinguish between science and non-science are difficult, if not impossible to find. This presentation will attempt to “visually” examine why finding these criteria are so difficult, and lead us to the idea that what is common between different scientists’ personal definitions of science is useful for tracing out “visually” why historians of science and practitioners of science so frequently disagree on what science really is. This lack of demarcation criteria makes life difficult for the scientist who is a Christian, who wishes to teach and practice science from a Christian or theistic point of view.

This presentation suggests that a return to the beginnings of modern science, the medieval period and its perspective on the universe, may yield some very useful clues on how we scientists as Christians should view our universe, and how best to investigate it.

**III-C. STUDENTS AND EARLY CAREER
NETWORK SYMPOSIUM**
Gwen Schmidt, Organizer
EHS 102

Saturday, 2 August 2008 3:30 PM

**Being Faithful in the
Secular Academy:
Addressing the “Tough Questions”**
Bill Newsome

When scientific colleagues learn about my religious faith, I receive all sorts of reactions ranging from simple incomprehension communicated by a puzzled or embarrassed expression, to surprise or even hostility, all the way to occasional expressions of genuine openness and even sympathy.

My more extroverted colleagues will often challenge me with questions such as, “How can a smart guy like you believe all that stuff?” or “I don’t get it; you must use a different part of your brain when you do that,” or “But Bill, this is so different from your normal way of thinking.”

Across 30 years in academia, I have tried to devise authentic ways of communicating my reasons for faith to my colleagues, and this presentation will focus on some of the talking points I have developed.

There will be plenty of time for audience members to share their thoughts and perspectives on this important issue as well.

McMinn, *contd.*

rights and responsibilities, the “our” problems and “their” problems challenge, and the task of creating sustainable practices for the future. This presentation will encourage professors to move students beyond the ivory tower of ideals and ideas into the everyday realms of social, political, and personal action which involve doing right, walking justly, and loving mercy.

Saturday, 2 August 2008

4:00 PM

Demon or Disorder: Perceptions of Serious Mental Illness in the Local Church

Matthew S Stanford

Research has consistently shown that clergy, not mental health professionals, are the most common source of help sought in times of psychological distress. Because of this, psychologists have tended to view clergy as mental health “gatekeepers.” In this role, clergy are thought to function as a referral source for psychologists who then provide direct mental health services to the client. Due in part to limited training in the recognition of serious mental illness and/or misguided beliefs about the origin of these disorders, this process appears to be inefficient at best.

In this presentation, data from two studies that assessed the attitudes and perceptions encountered by mentally ill Christians in the local church will be reported. Previous research in this area has tended to survey individuals in full-time ministry about their knowledge and views of mental illness. Few studies to date have attempted to gather data directly from individuals diagnosed with mental illness who have sought assistance from the church in relation to their disorder. The results suggest that individuals in the local church are denying or dismissing a high percentage (approximately 30–40%) of mental disorder diagnoses.

Analysis of these data found that conservative and charismatic congregations were most likely to deny a mental disorder diagnosis and that women more than men had their diagnoses dismissed. It was also found that when the church denied the existence of an individual’s mental disorder, the person was then more likely to be told that the cause of his or her psychological problems was either personal sin or demonic involvement and that the person should stop taking medication for treatment. Given that a religious support system can play a vital role in recovery from serious mental illness, these results suggest that continued education is needed if the Christian and mental health communities are to collaborate effectively.

Saturday, 2 August 2008

4:30 PM

Becoming Human: Phylogeny and Ontogeny of Affective Social Behavior

Judith A Toronchuk and George F R Ellis

Previous studies have shown that humans share basic emotional operating systems with other vertebrates. We suggest here that the basic emotional systems of nurturance, attachment, play, and dominance provide valenced states necessary for infant learning and set the stage for fully human adult behavior. The development of an embodied

Saturday, 2 August 2008

4:00 PM

Theology and Time Machines

George L Murphy

In recent years, theologians have given a good deal of attention to eschatology and the significance of the future for our understanding of creation and the present world. Ted Peters in particular has emphasized the concept of prolepsis, “the invasion of the present by the power of what is yet to come,” and, in his recent book *Anticipating Omega* has argued for a “retroactive ontology” and the idea that God should be seen as creating from the future. In this presentation, we will begin by describing briefly these concepts, their theological rationales, and some of their implications.

The chance that there might be connections between such ideas and scientific theories that consider the possibility of transmission of signals backward in time immediately suggests itself. We will consider such possibilities in theoretical physics as the uses of advanced potentials in electrodynamics, “time machine” solutions of Einstein’s equations, superluminal speeds of hydrodynamic waves in models of dark energy, particles which always travel faster than light (tachyons), and the transactional interpretation of quantum mechanics.

We will then reflect on ways in which these theoretical constructs, if actually realized in our universe, might be of interest for theology. New ways of describing God’s action in the world are opened up. In particular, the propagation of signals backward in time might be related to Robert John Russell’s suggestion that the resurrection of Jesus Christ was the first instance of a new law of nature. But even the bare possibility of such effects can provide analogies between Christian faith and today’s physics which can help us in speaking of and proclaiming the resurrection, in the spirit of 1 Cor. 15:35–44.

Saturday, 2 August 2008

4:30 AM

An Evangelical Natural Theology

Gary Patterson

As part of my forthcoming book, *An Evangelical Stance: A Professor in Dialogue with His Faith*, there is a chapter on the evangelical natural theology. We live in a universe of great complexity and heterogeneity. In order to understand what God has actually created, we need to look carefully and thoughtfully at the physical world. Modern cosmology is a rapidly changing field; we should be ready to follow the Truth, wherever it may be found, but not in a hurry to embrace every new thing. We should be truly open to the past and the present so that we can construct our best provisional picture of reality. Profound and widely applicable theories, like thermodynamics, provide deep insight into the nature of our world. Wise Christians know and respect theories with no known exceptions; the second law of thermodynamics should be respected! Wise Christians respect fields such as nuclear chemistry that have well-established empirical bases and precise theories based in the best current physical theories. The physical world can be described in terms of two basic concepts: structure and dynamics. Wise Christians respect

Toronchuk and Ellis, contd.

spirituality is a human distinctive that can only emerge in nurturant interaction with other persons, human and divine. Development of the human brain requires an extended childhood, which in turn necessitated evolution of neural circuitry for adults to provide nurturance and instruction, and parallel circuitry in children to seek out and respond to care.

In humans, shared mother-infant attention is necessary for the development of a theory of mind; and mother-infant communication likely provided the emotional motivation for evolution of language. In many mammals, development of adult behaviors and social roles is dependent on juvenile play. There is evidence that play should be considered a basic emotional program in our ancestral lineage and, therefore, necessary for normal cognitive development. The emotional play circuitry of higher primates aids development of a notion of reciprocity and fairness, factors necessary for morality in humans.

We also propose that a genetically determined emotional system concerned with territoriality, dominance, and subordination influences human moral behavior, although it often competes with nurturant tendencies. In order that social groups function without being dominated by conflict, hominins developed complex behaviors and cultural rituals to maintain ties, settle disputes, and reconcile with others. Expansion of prefrontal and cingulate cortices likely enabled progressive development of these features, and hence, of human morality.

In summary, social interaction, a process that necessarily engages primary affective systems, calls forth personhood in infants and allows development of human distinctives, such as language and spirituality. This is an example of top-down action from society to its constituent individuals.

Patterson, contd.

the actual dynamic nature of our world and rejoice in God's goodness. A deep understanding of the "moral nature of the universe" leads Christians to appreciate even more the person and work of Jesus Christ.

Saturday, 2 August 2008

5:00 PM

**Designing Proteins:
The Creative Potential of Enthalpy and Entropy**
Benjamin J McFarland

We now know enough about protein structure that we can computationally design new proteins from scratch. This involves predicting which 1-dimensional amino acid sequence will fold into a specific 3-dimensional protein structure (the inverse folding problem). We can also stabilize protein-protein interactions for biological benefit.

Several interesting implications emerge from biochemists' experience in designing the two components of thermodynamic free energy: enthalpy and entropy. Designed proteins are much more enthalpically stable than native proteins, but designed proteins also exhibit rough folding pathways and sub-domain folding fragments that suggest that enthalpy isn't everything. Another experiment shows that random, stable proteins have creative potential: A pool of random, enthalpically stabilized proteins contained enzymes for four different chemical reactions, suggesting that proteins can easily gain and change functions. Stable proteins are enzymes waiting to happen and are part of a universe full of potential fruitfulness. Other experiments have shown how protein-protein interactions can be stabilized by optimizing +/- charges and/or packing.

We have applied these principles in our laboratory to redesign interaction entropy with the goal of stabilizing protein-protein interactions from the immune system, creating tighter interactions that may activate immunity against cancer. We thought that stabilizing one of the proteins would produce a more stable protein-protein interaction, but we were wrong. Instead, we found that destabilizing one of the proteins increased the amount of protein-protein binding, so that mild destabilization of one partner drove the interaction to greater completion because of an entropy-enthalpy compensation effect. In other words, entropy has creative potential. Because destabilizing a protein and presumably increasing its disorder can drive beneficial reactions, I suspect that chemical randomness in the development or origins of life could have produced beneficial, meaningful, even predictable results in the biochemical creation and evolution of life.

Abstracts of Parallel Session IV

IV-A. ALTERNATIVE ENERGY SOURCES AND THEIR IMPACT; ENGINEERING AND APPROPRIATE TECHNOLOGY
Wood-Mar Auditorium

Sunday, 3 August 2008

1:00 PM

**“From Each According to His Ability; to Each According to His Needs”:
Karl Marx’s Dictum as Applied to
Energy Supply and Consumption
in a North American Context**
Tjalle T Vandergraaf

The development of the North American society with its high standard of living is, to a large extent, the result of the availability of abundant, cheap, and, generally portable, energy sources. In contrast to much of Europe, Japan, and rapidly developing economies of countries such as India and China, North American society is characterized by low density urban areas, private transport, and a dependence on off-shore consumer items and, increasingly, food. A combination of dwindling fossil fuel resources and an increase in demand for these resources by developing economies is expected to have a major impact on the lifestyle of North Americans. The burden of these changes is likely to be felt disproportionately by the poor. An optimization of the remaining resources and their use is needed, not only for responsible stewardship, but also to limit the burden on those mostly affected.

On the energy supply side of the equation, the current energy sources used will be discussed, with emphasis on the Canadian situation and suggestions made for alternative energy conversion systems and their potential impacts on society and the environment. On the energy consumption side of the equation, alternatives for the current consumption will be discussed, again with emphasis on the Canadian situation but with application to North American society.

Recommendations will be made to match the potential of current and alternative energy sources and energy conversion systems to the requirements of energy consumer, paraphrasing Karl Marx’s dictum, “From each according to his

IV-B. MEDICINE, GLOBAL INFECTIOUS DISEASE, AND WORLD HEALTH
Hoover 105

Sunday, 3 August 2008

1:00 PM

**Water Fluoridation in the 21st Century:
Doing Justly in Public Health**
Kathleen M Thiessen

The Centers for Disease Control and Prevention lists community water fluoridation among the top ten public health achievements of the 20th century. The American Dental Association (ADA) considers water fluoridation to be the “single most effective public health measure to prevent tooth decay” and a “powerful strategy to reduce disparities in tooth decay among different populations.” Yet a major review of fluoridation by the University of York (England) found it “surprising” that “little high quality research has been undertaken” and reported little evidence that water fluoridation reduces socioeconomic disparities.

The National Research Council (NRC) concluded in 2006 that the Environmental Protection Agency’s (EPA) standard for fluoride in drinking water is not protective of human health. The EPA also has a pesticide standard based on the nonprotective drinking water standard. The ADA, while stating publicly that the NRC report has no relevance to water fluoridation, has used that report as a basis to suggest that fluoride-free water be used to prepare infant formula.

Community water fluoridation has been actively promoted for more than 60 years as a safe and effective way to reduce tooth decay. Throughout that time, a number of scientists and physicians have consistently opposed water fluoridation, often at the expense of reputations or careers. Recently, more than 1,200 scientific, medical, and dental professionals have called on Congress to put an end to water fluoridation.

This presentation summarizes historical and recent evidence about the benefits, safety, and costs of water fluoridation.

IV-C. SCIENCE TEACHING—METHODS AND EXPECTATIONS
EHS 102

Sunday, 3 August 2008

1:00 PM

**Faith Integration in the
Science Classroom**
Leslie Wickman

As Christian instructors of science, many of us have a passionate desire to help students wrestle through the issues of science and faith that we wrestled with mostly in isolation in secular schools and universities, as well as within the professional working world. There are a wide variety of ways that faith and learning can be integrated in the sciences, including the methods listed below:

(1) *Excellence*: doing everything, including science, to the best of one’s ability, as unto God; (2) *Ethics*: practicing science according to biblical morality (e.g., human dignity, respect for life, freedom); (3) *Stewardship*: exploring the Christian role as accountable stewards for the gifts with which God has entrusted us (e.g., caring for nature/environment, developing individual gifts and talents); (4) *Exploration*: investigating the wonders of creation (marveling at the order expressed in the “laws of nature,” as well as the design, complexity, and comprehensibility of nature; wondering how God did it; trying to grasp the improbability of it all); (5) *Hermeneutics*: searching out the context and intention of biblical passages relating to origins and other scientific concepts; (6) *Worldview*: examining the truth-claims of alternative worldviews vis-à-vis the Christian perspective relative to efficacy, utility, reason, and logic.

Through the thoughtful implementation of each of these methods, students may come to understand that the truth about nature and the truth about nature’s Creator must complement, not contradict, each other since the Creator-God is One, and as such is the source of all truth. A lack of understanding about either science or theology can make students feel that

Vandergraaf, contd.

ability; to each according to his needs" to read, "From each energy sources according to its suitability; to each consumer according to his or her requirements."

Sunday, 3 August 2008

1:30 PM

**Geothermal Energy Update:
The Solution, a Contributor,
a Diversion, or Part of the Problem?**

A J (Chip) Mansure

Energy production and utilization technologies are intrinsically neither good nor evil. All energy technologies, including geothermal energy, have pro's and con's and can be helpful or abused. There is no single, simple answer to what is biblical energy policy; however, many biblical principles apply to making good energy policy decisions. These need to be applied not just to the desired outcome, but also to the process getting to the outcome. Too often we make energy decisions based on emotion, "Will supporting this position make me feel good?" The history of geothermal energy shows that emotion does not lead to wise energy choices.

There are valid, nonparamount, biblical mandates for how to make biblical choices, "Anyone, then, who knows the good he ought to do and doesn't do it sins." Also, ignorance is no excuse. In the Torah, we are called to repent of sin committed in ignorance. Furthermore, we are told to "silence the talk of foolish men." Thus, we are called to debate for informed, intelligent energy decisions consistent with other biblical mandates.

Governments, industry, and consumers are making daily energy production and utilization choices and establishing the energy policy. "All have sinned." But, the biggest hurdle to making biblical energy decisions is not industry or government; it is the need for informed, intelligent consumers and media. A review of geothermal energy provides evidence of this. Too many dreams of sustainable, renewable, and environmentally friendly energy economies do not consider the transition from here to there. Is the transition nondisruptive, that is, is the transition "just, healing, caring, etc." or does it exasperate inequities? Geothermal energy will be reviewed as a study of

Thiessen, contd.

Current fluoride exposures in the US are compared with levels at which various health effects can occur in at least some individuals. Interactions of water fluoridation and socioeconomic factors are discussed. Doing justly in matters of public health requires that policy and practice be based honestly and responsibly on the best available evidence.

Sunday, 3 August 2008

1:30 PM

Ethical Issues in Health Care Reform

Jay Hollman

Health care reform is a political and economic issue but at a deeper level, it is an ethical issue as well. There are three medical ethical issues that are especially relevant to reform: justice, dignity, and stewardship. Our current mixed system of private, employer insurance and government funding through Medicare and Medicaid leaves nearly 1 in 5 citizens uninsured. Many are working poor who make too much to qualify for Medicaid. The poor in Medicaid must stay in poverty to maintain their benefit or dishonestly work in a cash economy. Court decisions, *Estelle v. Gamble* and others, have mandated that prisoners have access to health care. Giving care to prisoners while denying it to the working poor constitutes a major injustice in our health care system.

Human dignity is an important concept in medical ethics. Linking disability to a secure income and health care through Medicare and Medicaid has inadvertently created a perverse incentive. The ability to perform useful work is an important part of most definitions of dignity. Restoration of this ability is the goal of medical health care. Reform efforts should break the link between health care access and maintenance of disability, a destructive linkage that rewards poor health and denies dignity to many potential workers.

Stewardship is a relative new concept in medical ethics but is applicable to the current health care finance system which has allowed health care costs to grow at unsustainable rates. Medicare is growing annually 2.5% faster than inflation. If nothing is done to moderate growth, Medicare and Medicaid will have grown

Wickman, contd.

they must choose one or the other, but a deeper, more complete understanding of each enables us to embrace both without contradiction. If we can simply begin a discussion with the notion that absolute truth exists about both God and nature, then most rational people will agree that those absolute truths cannot logically contradict each other. Therefore, the more we correctly understand about each topic of study, the better our understanding will be of the entire picture.

Sunday, 3 August 2008

1:30 PM

**Should Intelligent Design
Be Taught in Public Schools?**

John A Bloom

Intelligent Design Theory (ID) recently has become the lightning rod for controversy regarding the teaching of evolution in public schools. This is striking because the major proponents of ID all acknowledge that the theory is not well-enough established to require its inclusion in school curricula. What actually are at stake in this controversy – whether it includes the ID label or not – are critical issues like the definition and limitations of science; the academic freedom of teachers and students to criticize a prevailing scientific theory; and the realization that scientific models may not be religiously neutral, especially when they attempt to explain how things originated by appealing only to natural means.

I will suggest that the pedagogy of teaching science can better serve the public by recognizing the difference between "how things work" and "how things originated" questions, and by showing how controversy and personal worldviews were essential in shaping the discipline. To attract the next generation of first-rank scientists, science educators need to teach more than dogma, and to foster a spirit of inquiry and a desire to follow evidence wherever it leads.

Mansure, contd.

making informed, intelligent energy decisions.

Sunday, 3 August 2008

2:00 PM

Mitigating the Growth of the Internet's Energy Use through Improved Power Distribution

Annabelle Pratt

As our reliance on the Internet for purposes of business and entertainment grows, the physical infrastructure supporting these activities has to grow. In order for us to pull up a Web page or send an email at will, computers are kept running continuously in large facilities called data centers. The largest of these facilities requires enough electricity to power thousands of homes.

The EPA released a report in 2007 that estimates the total energy use of data centers to be 1.5% of the total electricity use of the US. If the status quo is maintained, the energy use is expected to nearly double by 2011, necessitating the addition of 10 new power plants. To make matters worse, in a typical data center, less than half of the power delivered to the facility reaches the compute load, which includes microprocessors, memory, and disk drives. The rest of the power is lost in power conversion and distribution. Therefore, one way to mitigate the growth in energy use is to improve power delivery within the facility.

Traditionally, power distribution is an alternating current in data centers, and the EPA identified a change to direct current distribution as a potential energy saving technology. It also allows for more efficient interconnection to renewable sources such as photovoltaics and fuel cells by eliminating the need to convert their output to alternating current.

This talk will cover the fundamentals of data center energy use and power distribution as well as report on progress in the development of efficient direct current distribution for data centers, including some small-scale demonstrations. It will also discuss the challenges that remain for its implementation, including the establishment of standards, the availability of commercial equipment, and industry support needed for volume penetration of this technology to lower cost.

Hollman, contd.

from 4.8% of the gross domestic product (GDP) to 22% in 2050. This occurs at a time of enormous waste in the current health care delivery system. Stewardship demands that we limit health care costs to the growth of the GDP so that we do not spend the next generation's resources on the current generation of Medicare recipients.

Sunday, 3 August 2008

2:00 PM

Extracting Information from Images to Tackle Basic Biological Questions and World Health Problems

Anne E Carpenter

Biological images, for example, from microscopy, contain rich information about the state of cells and/or organisms and are often an important part of experiments to address a multitude of basic biological questions and world health problems. Yet, in biology, most of these images are examined by eye and not quantified or mined to their full potential.

We have developed the first free, open-source software designed for flexible, high-throughput biological image analysis, CellProfiler (www.cellprofiler.org). CellProfiler automatically identifies objects in digital images (cells, worms, colonies of microorganisms, etc.) and records a full spectrum of measurements for each object, including location within the image, size, shape, color intensity, degree of correlation between colors, texture (smoothness), and number of neighbors. CellProfiler, therefore, can address a variety of biological questions quantitatively, including cell count, shape, size, amount of protein/DNA per cell, and location of cellular components.

Most recently, we have developed and released another open-source software package, called CellProfiler Analyst (www.cellprofiler.org). In addition to enabling data exploration for the rich information from huge image-based biological experiments, it uses machine-learning algorithms together with biologists' intuition to "learn" to automatically measure subtle and complex phenotypes in millions of cells.

Researchers around the world are using these tools. In resource-poor areas, this

Sunday, 3 August 2008

2:00 PM

Encouraging Excellence and Building Community in the Undergraduate Research Lab

Brian T Greuel

When it comes to receiving a grade for a semester-long research project, many students seem to believe the concept of "grace" should trump "approved workmanship" or "good stewardship of time and resources." In their minds, as long as they show up for the minimum number of hours each week, and appear to be putting forth effort, the results of their experiments should not really matter. Having a research experience that can bolster their résumés is often more important to them than completing a piece of work that might somehow add to the body of knowledge in their discipline and better the human condition. How does one encourage undergraduate students to strive for excellence and a higher degree of personal accountability in the research lab without sacrificing the building of community within the group?

In a Christian college setting, there are many things a faculty member can do. First of all, students should learn that pursuing excellence in the research lab is a way they can honor and worship their Creator. More pragmatically, students need a clearer idea of what it means to achieve excellence in the lab rather than simply adopting a time clock mentality. A detailed rubric or syllabus that carefully outlines the various evaluation criteria can be very effective in increasing student motivation if distributed at the beginning of the semester. Individualized learning contracts with each student might also be helpful. Breaking up each project into smaller achievable goals that have well-defined "next actions" can make the overall project seem less intimidating to students and increase their independence in the lab.

To build community, shared experiences are essential. Social events in the professor's home, well-planned lab meetings that begin with a devotional, and attendance at regional or national conferences can provide wonderful opportunities to bond as a group.

Sunday, 3 August 2008

2:30 PM

**When All Things Can Be Made New:
Greensburg, Kansas**

Lynn L Billman

On May 4, 2007, a class 5 tornado destroyed 90% of the farming community of Greensburg, Kansas. Ten people died. The rest came out of their shelters in the darkness of that spring night to find their entire community virtually a huge pile of rubble. When the smoke cleared, a few voices (not all) spoke out, "We will rebuild, and we should rebuild in a new way, to be a model community of sustainability and alternative energy."

To some governmental agencies and others, Greensburg represented a unique opportunity to try to re-create a community with the core human values they had before, but with a renewed sensitivity to the environment and the potential of new energy sources. The Department of Energy provided funding for a team of experts from the National Renewable Energy Laboratory to provide technical assistance on all levels within the community. This work began in earnest in August 2007. I will report on what has been accomplished in one year in that unique situation, including the technical approaches, the responses of the community, and the human factors that come into play "when all things can be made new."

Carpenter, contd.

free software combined with inexpensive digital cameras enables cutting-edge research. In institutes where automation is available for high-throughput screening, the software is being used to better understand the molecular pathways underlying disease and to identify chemicals to treat world health problems. This presentation will focus on presenting the applications of the software to diverse biological problems.

Sunday, 3 August 2008

2:30 PM

**International Scientific Education:
The World Needs You!**

You Can Make a Difference!

James D Smith

This session will present the rationale for educators to be involved in teaching in an overseas setting, especially in less developed countries and creative access nations. We will discuss opportunities available, especially for basic science and research people, who often feel there is no place to use their skills in a mission setting. We will discuss the preparation needed and the rewards received in the area of education.

Although my experience is in the medical setting with Medical Education International (MEI), we are getting more requests for basic science and research oriented educators to come and teach. I am sure opportunities would be available in all areas of science at a university level. The main goal is to make friends with faculty and students to show the love of Christ. In this setting, we have the possibility of influencing a generation for good, who will become leaders in their setting for the next 30-40 years.

Sunday, 3 August 2008

2:30 PM

**Weblogs as Foundations
for Discussions About
Science and Christianity**

Thomas E Robey

If communicating science to nonscientists is difficult, communicating Christian ideas to non-Christian scientists is virtually impossible. One under-utilized platform for this is the weblog. Blogs have become ubiquitous venues for discussing topics ranging from politics to personal stories and from celebrity news to science. Bloggers' tendencies to emphasize opinion over fact have been countered by attempts in some blogging communities to regulate truth of fact (ScienceBlogs) and honesty of opinion (DailyKos). The growing prevalence and quality of both political and science blogs offers an opportunity for Christian bloggers to enter online conversations where they represent the integrity of their faith and the fidelity of their science.

In parallel with greater public acceptance of blogging, weblogs are increasingly used as teaching aides to elicit thoughtful responses from more students than often participate in class periods. To assess this trend, students were asked to evaluate blog-based science and ethics learning platforms at the high school, college, and graduate school levels using an online survey. All respondents indicated that blogging benefitted their learning, and only novice participants (with little Internet experience) had misgivings about their experience. Most students reported feeling better prepared to better defend opinions publicly.

Translating the utility of blogs in a closed academic setting into a larger public venue is not without its challenges, especially when topics of science and religion are discussed. Preparing students and teachers for the harsh, online criticism that meets even measured comments about religion requires reminders of patience and humility. The reward is a regular group of contributors who respect opinions for their honesty even if they disagree with the conclusions. It is at this level and with these individuals that scientists and Christians can find new common ground.

Abstracts of Parallel Session V

V-A. SUSTAINABLE AGRICULTURE AND WORLD HUNGER Wood-Mar Auditorium

Sunday, 3 August 2008 3:30 PM

Using Science and Technology to Help Subsistence Farmers in Developing Countries

Martin L Price

The vision statement of ECHO is "To bring glory to God and a blessing to humankind by using science and technology to help the poor." Over the past 27 years, ECHO has fulfilled this vision by specializing in helping others (missionaries, churches, nonprofit organizations, Peace Corps volunteers, and scientists) to be more effective and innovative in their work.

This slide-illustrated talk will briefly introduce the audience to our subtropical "textbook farm" in SW Florida and describe the various ways we have found to carry out this vision: (1) Operating a seed bank of underutilized tropical plants that are not widely known but have special potential for some difficult farming conditions; (2) Developing an educational farm that has the widest collection of both common and lesser known tropical crops; (3) Offering specialized training (internships, for-credit courses, informal study) for those doing or preparing for such work; (4) Seeking out and presenting to this "overseas network" new options that they might consider in their work with the poor; and (5) Providing low-budget research ideas for undergraduate colleges, the results of which would be a help to the poor.

Sunday, 3 August 2008 4:00 PM

Fertilizing the Ocean with Artificial Upwelling

Carl Resler

Congress is currently considering the National Offshore Aquaculture Act that would lease plots of ocean for fish farming. This bill was written last year by NOAA (the National Oceanic and Atmospheric Administration) and is

V-B. THE NATURAL SCIENCES AND ISSUES OF FAITH Hoover 105

Sunday, 3 August 2008 3:30 PM

Robert Andrews Millikan (1868–1953): His Religious Life and Thought

Edward B Davis

Robert Andrews Millikan, the second American to receive the Nobel Prize for Physics, was the most famous scientist in the United States during the period between the two world wars. The author of many excellent scientific papers on fundamental aspects of atomic theory, he also wrote several textbooks. It was as a strongly committed liberal Christian writer of many articles and four books for popular audiences, however, that we consider him in this presentation.

Millikan's popular works all reflect his attraction to religious "modernism," an approach taken by many liberal Protestants of his generation. The "modernists" stressed Christian unity over denominational differences, liberal attitudes over traditional doctrines, the religion of Jesus instead of the Jesus of religion, and divine immanence at the expense of divine transcendence.

Millikan's involvement with the nondenominational Neighborhood Church in Pasadena, his response to William Jennings Bryan's antievolution crusade, and his numerous writings about science and religion made him the perfect public spokesperson for a "modernist" view of science. Overall, the message he conveyed is best captured by his statement that "the spirit of religion" and "the spirit of science" are "the two supreme elements in human progress."

Sunday, 3 August 2008 4:00 PM

Divine Action, Sensory Illusions, and Randomness

Mark Shelhamer

As scientists and Christians, how are we to understand God's interaction with the world? A central tenet of science is the removal of supernatural explanations for

V-C. SCIENCE CAREERS PANEL FOR STUDENTS AND EARLY CAREER NETWORK EHS 102

Sunday, 3 August 2008 3:30 PM

Science Careers Panel

The Science Careers Panel will feature

- **Matthew Stanford** –Professor of psychology, neuroscience, and biomedical studies at Baylor University
- **Anne Carpenter** –Director of the Imaging Platform at the Broad Institute of Harvard and MIT
- **Annabelle Pratt** –Senior Power Architect at Intel
- **Carolyn Anderson** –Assistant professor of chemistry at Calvin College
- **Susan Daniels** –Health Scientist Administrator, National Institute of Allergy and Infectious Diseases (NIAID) / National Institutes of Health (NIH)

who will give short talks covering:

- Their career paths
- What their jobs entail
- What skills and experience are needed to enter/succeed in that career
- How faith and science come together for them personally in that career

After the short talks, there will be a panel discussion to engage questions from the audience, followed by opportunities to network.

Resler, *contd.*

designed to alleviate the problem of overfishing. I hope to convince you that this bill is unnecessary due to a new technology that will fertilize the euphotic zone of the ocean with deep ocean water and thereby enhance the natural fish stocks. This process is powered by wave energy and mimics the natural process of oceanic upwelling that is responsible for fifty percent of the fisheries' catch worldwide. When the process is expanded to large areas of the ocean, it has the added benefits of (1) cooling the ocean surface, (2) sequestering carbon dioxide by facilitating the growth of marine life, and (3) reducing wave height resulting in a calmer ocean. Because the deep ocean is so vast, harnessing this untapped source of nutrients may eventually lead to a greater food source from the sea than that from the land. Humpback steaks, anyone?

Sunday, 3 August 2008

4:30 PM

Comparison of Developed Country Sustainable Agriculture with Subsistence Systems of Cambodia: Which Technologies to Transfer?

David L Dornbos Jr

Of the 6.2 billion people comprising our global society, 854 million continue to suffer from chronic hunger. A small percentage of people experience under nutrition in the US where industrial food production models dominate, but more than one-third of 14 million Cambodians suffer from under nutrition where 85% of the people are subsistence farmers. Might the high food production efficiency of the US be coupled with sustainable food production techniques to encourage the rapid export of these food production models to less fortunate places?

On closer inspection, some aspects of industrialized food production systems might apply to places like Cambodia while others certainly do not, and if employed, could actually cause significant harm to the environment, the food producers, and their society. Pesticides and fertilizers in the context of the two production systems provide specific examples. Economic calculators of Integrated Pest Management have minimized pesticide use in large western monocultures. Application of similar calculators in a Cambodian context may have value, but must consider unique factors and cost structures where smaller field size, available labor sources, and natural pathogens or predators provide alternative control of some pests. Lack of a cash economy may prevent the purchase of even the least expensive, off-patent pesticide.

Finally, insufficient agronomic data of even the most prominent yield-loss drivers currently prevents meaningful economic modeling. Fertilization with inorganic products represents an economic impossibility for many Cambodians, whereas use of composts, green manures, or nitrogen fixers provides significant opportunity to improve plant nutrition and yield. Introduction of new ideas, such as the system of rice intensification (SRI), in local context and consistent with sound agronomic and ecological principles will provide local entrepreneurs with test cases for adopting potentially viable and sustainable food production processes to enhance productivity.

Shelhamer, *contd.*

physical events, while a central premise of our faith is belief in a supernatural being. While many have reconciled these views, it is a question that should not be dismissed lightly.

How can God work in a world where physical laws are operating? I address this question from two directions. The first approach is through sensory illusions. We are all familiar with optical illusions, but there are many others, including illusions of pitch, motion, and even timing. If our sensory processes are so easily fooled, then our perception of the world must surely be incomplete. Thus, is a "God of the gaps" no longer a God who acts in the spaces between our knowledge of physical principles, but rather one who acts in the spaces between our sensory systems?

The second approach is through the principle of randomness. Christians in science surely appreciate, and often draw inspiration from, the beauty and elegance of physical laws. This is true also for mathematical laws, which offer powerful explanations of the physical world and demonstrate its underlying order. There are rules governing randomness as well, and these too are beautiful and orderly. Christians will sometimes say that "there are no such things as coincidences" – even those with scientific training are often averse to ascribing (possibly life-changing) accidental occurrences to mere chance. Yet, if God has ordained the laws of randomness just as much as the deterministic laws of physics, we must expect coincidences. This is but one example where these ideas might help us in reconciling science and faith in a more holistic worldview.

Sunday, 3 August 2008

4:30 PM

How Do We Correct the Public Perception of Conflict between Scientific and Spiritual Reality?

David S Newman

"Scientific truth" has displaced "spiritual truth" in the secular academic establishment and in the mind of much of the public. Serious public discussion of spiritual matters is a rarity, and too much of it is either polemical or sensationalist. Based in part on a book-in-progress, this presentation will consider some of the issues which must be addressed if a more constructive public climate for discourse about faith and spiritual reality and its relationship to science is to occur. The audience will be asked to participate in a brief discussion of the work which must be done to address this problem.

The issues can be summarized as follows:

1. The physical sciences and the life and earth sciences have been forced to abandon strict logical determinism in favor of probabilistic reasoning. The initial and ongoing influence of a Creator or the existence of spirit can neither be ruled out nor affirmed by these sciences.
2. Early behavioral scientists, most notably Herbert Spencer, Edward Tylor, and their disciples, indulged in a great deal of "armchair theorizing" which contributed to the current public climate. The Boas-Sapir school of ethnology introduced a more cautious and empirical approach. But behavioral science still regards theory as more prestigious than experiment or observation.

Sunday, 3 August 2008

5:00 PM

New Hope for Africa

Ronald J Vos

Approximately 40,000 people die daily from starvation or hunger-related causes around the world. As a continent, Africa has an inordinate share of these deaths. The part of the African continent south of the Sahara is the only remaining region of the world where per capita food production has remained stagnant over the last 40 years. About 180 million Africans, up 100% since 1970, do not have access to sufficient food to lead healthy and productive lives, making them more susceptible to the ravages of malaria, HIV-AIDS, and tuberculosis.

Absolute poverty, characterized by incomes of less than US \$1 per person per day is coupled with an increasingly damaged natural resource base. Causes for this situation include a history of European colonialism; a Christian missionary emphasis on saving the soul and ignoring material issues; and the promotion of an industrial, high input form of agriculture that is inappropriate for a large part of Africa. Efforts focused on child survival, coping with HIV-AIDS, improving governance, increasing foreign investment, breaking trade barriers, and providing debt relief are all necessary, but they are insufficient because they do not directly address agriculture, the economic sector that engages 70% of all Africans. A sustainable agriculture that is economically profitable, socially just, environmentally sound, and builds community can go a long way toward addressing these challenges.

Since the new millennium, renewed interest in sustainable agriculture by the Christian community has begun to address the aforementioned challenges. Especially encouraging is the interest by emerging African Christian colleges and established Christian organizations like ECHO, Au Sable, and IAPCHE in promoting sustainable agricultural practices.

Sunday, 3 August 2008

5:30 PM

Managing *Moringa* for Leaf Biomass Production to Combat Malnutrition

George W Crosby

Moringa (*Moringa oleifera* Lam.) is being promoted in developing regions of the world to help combat malnutrition. The health benefits associated with the consumption of moringa leaf powder are well documented, and moringa has been identified as a priority species for food security in sub-Saharan Africa. Grown as a perennial vegetable tree, moringa possesses a monopodial growth habit, typically produces little leaf biomass, and must be pruned in some way to promote branching and leaf production.

Little horticultural research has been devoted to the cultivation of underutilized crops, and recommendations regarding moringa pruning strategies are primarily anecdotal. The objective of this study was to identify iterative moringa regrowth patterns following pruning to establish guidelines to maximize leaf production in the field. Experiments were conducted at the State University of New York at Cobleskill, NY, during the summer of 2006. Dry weights increased with increasing acropetal nodal point of decapitation up to node 6 (15 cm), although decapitation to 30 cm (12 nodes) produced

Newman, contd.

3. The existence of spiritual reality and, in particular, of spiritual beings with self-awareness and intentionality similar to that of humans is a subject that behavioral scientists are afraid to touch. Rather than taking a truly agnostic position, the "scientific" assumption is that some other explanation of extraordinary phenomena is required.

Many Christians are afraid to discuss this issue outside the context of their faith or some highly circumscribed and limited interfaith dialogues, but a few courageous ethnographers, Christian and non-Christian, have published accounts of such phenomena, a few of which will be presented.

Sunday, 3 August 2008

5:00 PM

A Survey of Modern Radiocarbon Dating

Kirk Bertsche

Radiocarbon dating has undergone a quiet revolution over the past 30 years. The original method of Libby relied on counting nuclear decays. This has been almost entirely replaced by "accelerator mass spectrometry" (AMS) which relies on counting atoms directly. AMS has enabled radiocarbon dating of much smaller and somewhat older samples. This talk will summarize the current state of the art of radiocarbon dating, highlighting the AMS methods and capabilities. We will touch on calibration methods (tree rings and lake varves), applications of biblical interest, and critiques by the Institute of Creation Research RATE project.

Sunday, 3 August 2008

5:30 PM

Why Did God Create the Sun on the Fourth Day?

Paul H Seely

The creation of the sun in Genesis 1 after the creation of the earth and plants has long been a thorn in the flesh of scientifically informed Christians. The conflict with astronomy and geology is acute. Proffered solutions to this conflict have either offered forced interpretations of the biblical text or exaggerated the literary character of Genesis 1. These solutions have largely missed the fact that Genesis 1 is built upon ancient Near Eastern concepts of the natural world. When those concepts are taken into account, it is easy to understand why the sun could not be created until the fourth day. There is no real conflict with true science because the divine author was accommodating the "science" of the times, not teaching it. The historic interpretation of Genesis 1 can thus be maintained without any pressure to accept its incorporated science.

Crosby, contd.

more than twice the dry weight compared with those decapitated to 40 cm (16 nodes). Pinching resulted in little regrowth and low dry weights. The number of lateral buds released decreased, and stem length and dry weights increased with increasing stem diameter. Bud release of twice-decapitated plants (6.7/plant) was more than twice that of once-decapitated plants (2.7/plant). The release of buds from apical dominance was repressible by applying exogenous auxin ($5000 \text{ mg} \cdot \text{L}^{-1}$ IAA) to the cut surface of stumps of the decapitated seedlings. The percentage of stem removed was more important than the actual height to which seedlings were decapitated in order to maximize regrowth of moringa seedlings. The results of this study have been used to develop guidelines for managing moringa trees for leaf biomass production at Western Uganda Baptist Theological College, East Africa.

Abstracts of Parallel Session VI

VI-A. ETHICAL ISSUES IN SCIENCE AND ENGINEERING

Wood-Mar Auditorium

Monday, August 4, 2008

10:00 AM

Deconstructing Jefferson's Candle: Toward a Critical Realist, Environmental Virtue Ethics Approach to Information Policy

David W Opperbeck

Contemporary legal theory concerning access to scientific and technical information is a curious jumble. It marries a Jeffersonian Enlightenment view of "Nature" with postmodern notions of the social construction of "authorship" through Shannon information theory. The result is that legal theory consistently observes the dogma that information is fundamentally a nonrival economic commodity, even while it seeks to expose the power relationships that underlie debates about access to information. The fruit of this strange marriage of foundationalist epistemology, anti-realist ontology, and questionable historiography is a set of intractable arguments that inevitably devolve into unanswerable empirical questions.

In this presentation, I introduce critical realism to the information policy debate. Critical realism presents a way forward between the bi-polar positivists-postmodernist renditions of intellectual property. From a critical realist perspective, scientific and technical information is not merely an input, a commodity, and/or a code word for a power play. It can be all of those things, but at some level, information also is the skeleton of all human communities. In this sense, information is "infrastructure": we create information that creates communities. This perspective suggests a normative structure for information policy drawn from environmental virtue ethics.

VI-B. SCIENTIFIC AND THEOLOGICAL CONTRIBUTIONS TO COSMIC HISTORY AND THE HISTORY OF LIFE

Hoover 105

Monday, 4 August 2008

10:00 AM

Humility, James Clerk Maxwell's Perspective on Creation, and the Reaction of His Peers

Philip L Marston

The Christian physicist James Clerk Maxwell (1831-1879) profoundly influenced modern science. It is easily forgotten that his early biographers quoted creation related material from his 1873 British Association address "Molecules," and they noted this address was perhaps his most "often quoted" writing.

My presentation examines recent findings concerning Maxwell's perspective on creation and early reactions to his views. The emphasis is on material outside the scope of standard references and is based partly on material from obscure sources.

Reactions range from a declaration of Maxwell's "arrogance" (by one of his harshest critics) to recognition of Maxwell as an example of a Christian scientist. Understanding the climate of the times (as illustrated by critic John Tyndall's assertion: "We claim, and we shall wrest from theology, the entire domain of cosmological theory") may have lessons for current discussions of the "cosmic landscape" string theory hypothesis. Maxwell was understood by his peers to be in opposition to Tyndall's perspective.

Maxwell gave thoughtful anonymous comments on what eventually became known as the "heat death" of the universe in an 1874 publication. Even prior to 1873, there was interest in the theological implications of an address given by Maxwell at the 1870 British Association meeting. In my research, I have also examined attributes of the principal chapel Maxwell and his wife attended during the 1860s while residing in London [*American Journal of Physics* 75 (2007): 731-40].

VI-C. ALTERNATIVE ENERGY SOURCES AND THEIR IMPACT; ENGINEERING AND APPROPRIATE TECHNOLOGY

EHS 102

Monday, August 4, 2008

10:00 AM

Sustainability and an Energy System Approach

Leonard J Bond

The recent UN Bali conference, the Evangelical Climate Initiative and the Cornwall Alliance statements serve to illustrate the lack of consensus between the US and the vast majority of other nations and within the USA Christian community regarding global stewardship/sustainability and climate change. Christians have a responsibility to care for the poor, the widow and the disadvantaged: they also have a responsibility to respect God's creation.

This presentation will briefly review the current and future trends for US and global energy consumption. It will then discuss an energy system approach applied to key parameters that drive energy use and its relationship to achieving sustainability.

We live in a closed system – space ship Earth. God has given us our intellect and abilities to use to his glory. As trustees of the planet we have a responsibility to pass it to future generations in a state that is fit for life. We need to understand the effects of the key parameters that drive the future climate: population, standard of living and energy supply on the earth.

A simple model, the cattle ranch, will be used to derive some guiding principles. These are then used to guide choices in achieving a sustainable planet with a New Energy Economy by 2100. Two options emerge as bounding cases: the first uses innovation and scientific creativity together with development of a global consensus to manage the system; the second leaves humankind heading like lemmings over the cliff, with disruption of climate systems, famine, and major geo-political disruption.

Monday, August 4, 2008 10:30 AM

Technological Distraction
Kenneth H Funk II

We are all familiar with the many things that distract our attention from what we should be attending and, usually, there are no serious consequences when distractions occur. But driving distractions and distractions in the cockpit and operating room can be fatal. Psychological and engineering theories and models of attention and task management provide some explanations for why these perceptual and cognitive failures take place in terms of the salience of distracting stimuli as well as the perceived urgency and importance of the potential tasks they represent. These theories and models provide not only metaphors but also possible explanations of a more complex and important phenomenon, technological distraction.

Technological objects create many opportunities to realize good things, and therefore make possible many worthwhile activities to which to attend. Technology also is the source of derivative goods (among them, efficiency, productivity, and speed) whose pursuit occupies our time and attention. Furthermore, technological objects themselves necessitate activities to acquire, use, and maintain them. So technology creates many activities to occupy our attention, far more than we can hope to pursue satisfactorily to completion, and though some of these activities may be directed to the realization of the highest good, which is communion with God, most of them are directed to transient, material ends. Moreover, the salience of technological objects and the urgency that they so often impart to our lives tend to draw our attention away from the highest good toward activities directed to things of lesser value.

Perhaps the greatest danger of technology is its capacity to distract us from God and his kingdom. In its incredible capacity to realize the lower good of the human and subhuman creation, technology can divert us from the *summum bonum*. But there are practical steps we can take to reduce technological distraction.

Monday, 4 August 2008 10:30 AM

The Puzzle of Existence: A New Question for Science and Theology
Robert B Mann

The puzzle of existence is perhaps the oldest question addressed by both science and theology: why is there something rather than nothing? In the past few decades, scientific research (mainly in cosmology) has generated a new question for each: why is there something rather than everything?

This question has emerged because it has become clear that our cosmos is not a typical specimen out of a set of logically possible alternatives. Rather, the conditions for life as we know it are very special, depending sensitively upon the values of a large number of constants of nature whose empirical values superficially appear irrelevant.

Is this atypicality indicative of some kind of transcendent superintelligence, or is it best explained by embedding our cosmos in a much larger structure, in which its special features inevitably occur due to statistical flukes? Or are there alternative modes of explanation that go beyond the scientific approach while paying due diligence to the integrity of the scientific method? This talk shall point out the challenges that the new puzzle of existence poses for both science and theology, with particular attention paid to Christian theology.

Monday, 4 August 2008 11:00 AM

Nine Phenomena That Recur throughout Cosmological, Abiological, and Biological Evolution
Carlos F A Pinkham

The literature of cosmological, abiological, and biological evolution is replete with terms such as "necessary condition," "contingent order," "multitude," "laws," "rules," "preadaptation," "preferred pathway," "convergence," and "parallelism." It is proposed that these terms are informal proxies for nine phenomena that begin to reveal the algorithm behind how God created humankind.

The phenomena emerged with the numerous fundamental constants, forces,

Bond, contd.

This presentation concludes with an encouragement to Christians who are scientists and technologists to provide thought leadership towards achieving a sustainable planet and to use their God-given skills to try to innovate and manage global energy and resources, because business as usual is not an option.

Monday, August 4, 2008 10:30 AM

Wind Turbines for K-12 Education
Ruth Douglas Miller

The realities of global warming and fossil fuel shortage demand that humans learn to obtain energy from renewable sources, and (in the developed world, at least) to use less energy. The changes in lifestyles and in understanding energy production and use are profound, and can be difficult to master and accept.

In Kansas at least, wind power is a subject of considerable controversy: many people are concerned about the turbines' appearance, impact on wildlife and so on. The Wind for Schools (WfS) program initiated by the National Renewable Energy Laboratory (NREL) is one attempt to help teachers and school children understand and embrace the idea of wind power as a significant source of electrical energy. Through the WfS program school districts in Kansas apply to receive a 1.9-kW wind turbine at a substantial discount from retail cost. Along with the discount, schools receive help in obtaining green financing and free or reduced-cost installation through partnership with their local utility and community. In return, schools agree to incorporate the turbine in their teaching, using available energy curricula and/or developing their own.

Five other states also participate in the WfS program, though each state's implementation is slightly different. NREL hopes to expand it gradually across the whole country. The primary goal of the program is to increase understanding, and thus acceptance, of wind power among rural Americans. Though the turbines are too small to make a significant dent in the electricity bills of the schools, they are ideal for individual households, and hopefully their presence will encourage all members of the community to consider

Monday, August 4, 2008

11:00 AM

A Covenantal Model for Understanding the Patient-Supporter Relationship in the Clinical Encounter
James J Rusthoven

Among the different relationships which characterize clinical encounters in medical practice, the one most described is that involving physicians and patients. Several models have been described which differ in their allocation of power and influence between physician and patient in the management of illness. Some have evoked a covenantal ethic in an attempt to assign a core of promise and fidelity to this relationship. However, the historical and metaphysical justification for prescribing a covenantal model varies, with some appealing to the ancient Greek code of Hippocrates while others claim authority in the biblical revelation of the covenant established by God with humankind. This latter basis for envisioning a covenantal model for clinical relationships has a firm foundation in Reformed theology, wherein two theological currents developed based on the concept of a pre-Fall covenant made between Adam and God and a concept of a post-Fall covenant with God's chosen people.

The patient-supporter relationship is also an integral part of medical practice but about which little has been written. Unlike the physician-patient relationship where the patient is considered vulnerable and the physician empowered to have greater influence on decisions, in the patient-supporter relationship, the patient draws solace and strength from a supporter or community of supporters who can provide empathy and deliberative power on behalf of the patient in the clinical encounter.

In this presentation, a biblical covenant model will be described with which the patient-supporter relationship can be understood as fidelity between a person or community and the vulnerable patient. Its basis is found in the agape love of God for humankind and in the biblical concept of mutual support between members of a community of believers pledged confessionally at baptism. The implications for such a model for both Christian and non-Christian communities of faith will be explored.

Pinkham, contd.

and masses that provided the universe with its properties. These phenomena continued to manifest in accord with these properties through the evolutionary steps that led to us. The phenomena include the following: (1) The evolution of intelligent life hinges on "requisite singularities." (2) Critical conditions in the universe operate at "precise peaks" and (3) with "compelling detractors" around these peaks to ensure that (4) each requisite singularity will occur preferentially as an "optimal solution" to design considerations. (5) They further operate such that each requisite singularity will occur in an "ample sample." (6) Thus the requisite singularity will be found by natural selection with "statistical certainty." (7) Once found, each requisite singularity results in "narrowing options" for future evolution. (8) This gives rise to an "essential sequencing" of requisite singularities. Finally, (9) the above often results in an "intricate simplicity" of requisite singularities.

Selected examples of how these phenomena work in evolution at different levels of complexity are provided, and an appeal to discover more is made.

Monday, 4 August 2008

11:30 AM

Evolutionary Creation: A Christian Approach to Evolution
Denis O Lamoureux

The term "evolutionary creation" has emerged in order to recognize born-again Christians who accepted evolution. Regrettably, "theistic evolution" has become a catch-all category that includes pantheists (process theology), naturalistic pantheists, new-age pagans, and even deists. Evolutionary creation asserts that the Father, Son, and Holy Spirit created the universe and life through an ordained, sustained, and intelligent design-reflecting evolutionary process.

This position fully embraces both the religious beliefs of historic evangelical Christianity and the scientific theories of cosmological, geological, and biological evolution. It contends that God

Miller, contd.

small-scale wind as a positive asset to their homes, farms and town. Participation in this program is a vital service to God's creation, helping our rural communities understand the value of this renewable resource.

Monday, August 4, 2008

11:00 AM

Reducing Your Footprint: Build Right, Build Green
Joseph K Sheldon

There comes a time to practice what you preach. The stark reality of global climate change has altered the landscape. It is a moral imperative that the ecological footprint of new construction be minimized. After 36 years of teaching in the environmental field, retirement has provided the opportunity for me to put my money where my mouth has been.

After moving from Pennsylvania to Washington State, we are in the process of building on a five-acre lot adjacent to the 180 acre Au Sable Institute of Environmental Studies campus on Whidbey Island. The property is certified as a Backyard Wildlife Habitat by the National Wildlife Federation. The new home utilizes state-of-the-art green construction. Our goal: a zero energy, carbon neutral home at an affordable price.

Ted Clifton of Clifton View Homes is the architect/builder and a recognized expert in green home construction. Features of the home are (1) structurally integrated panel construction, (2) in-floor radiant heating employing a geothermal (ground source) heat pump, (3) Energy Star lighting and appliances, (4) finished/stained concrete floors with natural fiber (100% wool) area rugs, (5) HEPA filter ventilation system for fresh air flow, (6) low VOC paints and finishes, (7) construction material with zero to low VOC content, (8) a photovoltaic array for electrical generation, (9) wheel chair accessible throughout to extend our years of enjoyment, and (10) landscaping with native species. The new home will serve as a model of affordable green construction within the building green community of western Washington and Au Sable Institute.

Monday, August 4, 2008

11:30 AM

The Calling of the Christian Engineer

William M Jordan

The concept of vocation has been largely lost in our modern culture. Many people think it only means a career in full time Christian ministry or an education obtained at a vocational/technical school. However, vocation for the Christian engineer should mean much more.

In his excellent paper in *Christian Scholars Review*, Byron Newberry writes that vocation refers to a "divine call or summons to live a life of transcendent purpose-to use one's distinct gifts in the service of God's people and for the stewardship of God's creation." Newberry's paper discusses the difficulties in trying to install this concept of vocation in contemporary engineering education.

This presentation expands upon Newberry's work by discussing some specific things God may be calling the 21st century engineer to do. Among the topics we will discuss are:

1. How does God call a Christian engineer? How do we recognize it when it happens?
2. What can we infer from the Bible about the nature of technology and how can it be used to better society?
3. In a world with large numbers of very poor people, does our calling require us to use our engineering skills to better the lives of the poor?

Some engineers believe that by making a substantial income and giving some of it to good causes they have done enough. Other engineers believe they have been called to work full time in the developing world with groups like Living Water or Bridging the Gap-Africa. Other engineers may donate a few weeks of their time each year helping out groups like Engineers without Borders or Engineering Ministries International. Frequently Christian engineers help out with international service projects because it feels like a nice thing to do.

This presentation will go beyond this superficial perspective to help Christian engineers understand their calling.

Lamoureux, contd.

established and maintains the laws of nature, including the mechanisms of a teleological evolution. Notably, this view of origins argues that humanity evolved from pre-human ancestors and through this process the image of God and human sin were mysteriously manifested. Evolutionary creationists experience God's presence and love in their lives. In particular, these Christians have a personal relationship with the Lord Jesus that includes miraculous signs and wonders.

Evolutionary creation recognizes that the relationship between Scripture and science is a key to developing a Christian view of origins. In particular, this position asserts that the opening chapters of the Bible feature an ancient understanding of history and science. In this way, the Holy Spirit accommodated by using ancient categories as a vessel to transport inerrant and infallible foundations of the Christian faith: the universe and life were made by the God of the Bible; the creation is very good; only men and women are created in the image of God; the Lord intended us to be in relationships with one another and, in particular, with him; everyone has fallen into sin; God judges humans for their sinfulness; and he has chosen a special people through which to bless the entire world.

To recast the 17th century aphorism popularized by Galileo ("The intention of the Holy Spirit is to teach us how one goes to heaven and not how heaven goes"), evolutionary creationists encourage their brothers and sisters in Christ to appreciate this aphorism: "The intention of the Bible is to teach us that God is the Creator, and not how the Father, Son, and Holy Spirit created."

Abstracts of Poster Session

Posters should be hung up by 3:30 PM, Saturday, in the EHS Atrium, and remain up through Sunday evening. Authors will be available to discuss their work during the Poster Session, Sunday, 3 August 2008, from 10:45 AM–12:00 PM.

Sunday, 3 August 2008

10:45 AM–12:00 PM

Biogeography-Implications for Evolution and Conservation

David C Campbell

Although biogeographic patterns were an important stimulus to Darwin's and Wallace's thinking on evolution, the degree to which biogeographic barriers have produced distinctive faunas and floras in different parts of the world remains underappreciated. This is especially the case in popular presentations, but even scientific classification sometimes fails to take geography into account. Many examples have been detected historically, but now new data are revealing many more. In particular, molecular phylogenetic analyses reveal extensive cryptic differentiation associated with geographic boundaries in many groups of organisms. These patterns generally match with evolutionary expectations. Also, accurate understanding of biogeographic patterns in organisms is critical for conservation.

My research on snails in the genus *Juga* from northwestern North America and freshwater mussels in the genus *Toxolasma* from southeastern North America shows that current classification lumps different species and obscures the geographic patterns. As a result, rare species are not properly recognized, the need to protect multiple river systems is concealed, and the potential impact of global change is underestimated. On a global scale, snails in the families Lymnaeidae and Planorbidae show more regional patterns than is currently recognized. These include important vectors of human and livestock diseases. Better understanding of relationships will help determine which species pose threats, allowing more targeted control.

Sunday, 3 August 2008

10:45 AM–12:00 PM

Forgetful Hearers to Blessed Doers: Does One Size Fit Most in Inculcating Academic Virtue?

Kenneth N Carter,
Vaughan M Pultz, and H David Wohlers

College chemistry teachers know that the cram-and-purge approach doesn't work. However, many students have been deceived by years of illusory "success" in ephemeral surface learning, ossifying into what Carol Dweck calls "entity theorists," who believe that ability is essentially unchangeable, and being smart means not having to study hard. In truth, steady, connected learning, and actively engaged conceptual and quantitative reasoning are required for gaining durable competence and deep understanding. The phrase "active learning" might seem redundant. How, though, is effectual activity fostered where self-theories militate against humble, confident growth?

Educational research and NSF initiatives (e.g., POGIL, Process Oriented Guided Inquiry Learning) notwithstanding, lecturing continues to predominate in general chemistry classrooms. Lecturing can engage deep learning, but many of our incoming students have not yet developed the requisite habits, dispositions, and skills. What then? Richard Paul and Linda Elder of the Foundation for Critical Thinking promote the role of "coach," rather than "giver of information," and use of class time for "active engagement in disciplined performance" by students, not by faculty! In the final chapter of *The Learning Paradigm College*, aptly titled "The Golden Rule," John Tagg states that we cannot effect transformation to a "hot learning economy" as isolated individuals, but only as we individually and corporately heed the call to be and do what we want our students to be and do.

In a milieu where points have become the proxy, as if their conferral were a free energy change driving a nonspontaneous reaction, can (or should?) assessment and evaluation be disentangled? Seeking to walk faithfully in Christ, acting from just and prudent love rather than unmindful fear, we three diverse chemists have adopted different approaches, ranging from detailed lecture coupled with biweekly testing, to POGIL, online homework, and SII (Strengths, Improvements, Insights) reports. Results invite humility.

Sunday, 3 August 2008

10:45 AM–12:00 PM

The Intimate Connection between Physics and Theology

Hui-Yiing Chang

Knowledge of physics is an indispensable tool in interpreting the Bible. The fundamental physical principles reflect the nature of God's Kingdom and his work. The application of classical and modern theories of physics reflects the absolute nature of God and how he allows relativism in the intermediate process to glorify himself ultimately. The triune nature of God is reflected in the dimensions of existence. The hierarchical and coherent nature of physical principles refutes randomness, but reflects the predetermination of spiritual phenomena. The reconciliation of simplicity with sophistication describes the elegant nature of God and the Gospel, as well as the infinite ways it can be elaborated to glorify God endlessly.

Physical phenomena, although appearing to progress in straight lines, really progress in curves when viewed in their entirety. The straight progress depicts the intermediate stage in God's Kingdom, and the curve, its fulfillment. The asymptotic increase explains the seemingly hopelessness of Christ's redemptive work and its ultimate triumph as it soars to infinity. Our lens of vision could be adjusted to varying degrees of temporal and spatial specificity to accommodate a larger view of God's plan.

The mystical synchronization of beauty and goodness exists in God's Kingdom and physical theories. The contrast of physical progress in the opposite direction immediately preceding the onset of a new state is analogous to spiritual phenomena, where aesthetic and logical principles are fulfilled. In conclusion, it is wise to advocate the instruction of physics at the different levels of education.

Sunday, 3 August 2008

10:45 AM–12:00 PM

Teaching the Philosophy and History of Science to Graduate Science Students in a Secular European University: Rehabilitating the Image of Christianity and Science in a Secular Environment

William B Collier

An unusual opportunity for the integration of Christian worldview and secular university teaching occurred during my 2005–2006 sabbatical year. The department chair, my faculty host at my Budapest university, asked me to teach a seminar class on the philosophy and history of science to Hungarian graduate and upper-level undergraduate chemistry students. Most likely this would be the only specific class on the philosophy and history of science that these students would ever take. I had two hours per week for 12 weeks to communicate what would normally take four semesters. Thus the choice of topics, the approach taken, and the depth needed was crucial.

Typically, the foundational classes of a discipline are the ones that lend themselves to Christian worldview inclusion in a secular context the best. So the class was structured to be very selective in topics, and go deep as fast as possible. Significant movement away from a secular mindset to a more open spiritual one was seen in some students. The mixture of correctional scientific history, critical analysis of core scientific philosophical problems, and the presentation of select relevant intelligent design materials provide a good offensive challenge to the secular mindset of European university students.

In this postmodern world, it is important that we "convert" the mind along with the heart and soul, if we wish to convey genuine truth. I will discuss the resources used, class structure, what happened, and how this approach could be adapted to other disciplines. In addition, I will discuss another individual that was changed by this class, the teacher.

Sunday, 3 August 2008

10:45 AM–12:00 PM

Historical Adam
Dick Fischer

Human beings are related by common ancestry that extends back in time beyond 100,000 years. If Genesis accurately presents the surrounding environment in the beginning chapters, and if weight is given to recent archaeological findings, Adam's niche in time and space is about 5000 to 4000 BC in Southern Mesopotamia, present-day Iraq. Thus Adam would appear in the flow of humanity rather than at the apex.

Although Adam very well may have been specially created by God, intermarriages between the covenant line of Adam and the indigenous populations assure even Adam's descendants a link to the distant past. All this can be deduced not only from archaeological finds and ancient cuneiform tablets, but from clues in the Scriptures as well. On the assumption that Adam was a real life, flesh-and-blood personality living in the Neolithic Period whose mission was to usher in a new era of accountability, the task becomes discerning when and where he lived. The biblical text tells us, and recent findings in archaeology support the contention, that he lived prior to the fifth millennium BC near the junction of the Tigris and Euphrates. More specifically, he dwelled in the ancient fishing village of Eridu, the Sumerian "sacred city," now called Abu-Shahreïn.

A legendary figure found in Akkadian texts corresponds to Adam in many respects. Adapa, or Adamu, was described in various Semitic languages scattered throughout the Near East. Described as "blameless," "clean of hands," "anointer," and "observer of laws." Adapa/Adamu was a priest and seer, a profoundly wise man, who lived in Eridu located on the Persian Gulf. The name "Adamu" in Akkadian was perpetuated among Semitic generations over three thousand years in memory of their legendary forefather. Excerpts, figures and photographs are taken from the book, *Historical Genesis from Adam to Abraham* — www.historicalgenesis.com.

Sunday, 3 August 2008

10:45 AM–12:00 PM

Moderate Theology
Dick Fischer

Predominantly, Christians use one of two methods of apology, either conservative or liberal, and believers tend to be polarized between these opposite extremes. Although there are more distinctions between conservative and liberal positions than how to interpret Genesis 1–11, primarily it is this difficulty that constitutes the largest stumbling block. As is often the case, "something in the middle" may be superior to the extremes. The benefits of adopting a Moderate Theology (MT) would be wide ranging. MT takes a high view of Scripture and accepts a literal interpretation of Genesis. It takes full account of the current revelations of modern science that are commonly accepted within the scientific community. MT restores credibility to the historical integrity of the Genesis narrative.

1. Moderate Theology and impact on Genesis 1. Genesis 1–11 is considered the factual history of the Semites, not the entire human race.
2. A literal interpretation of Genesis 1–11 is advocated coupled with sound, consistent exegesis, and mindful of archaic Hebrew language peculiarities.
3. Scripture considered inerrant in the autographs, but suffers from errors in transmission, translation, and interpretation.
4. KJV is preferred translation, though needs revision in light of historical evidence.
5. The "days" of creation are seen as days of God's time, not mortal's time.

6. Adam is considered to be the federal head of the human race, the biological head of the Semitic race, and the first to receive God's covenant.
7. Faith alone has proved insufficient for understanding.
8. Scripture can be clarified by Scripture, and Bible interpreters need to consider revelations of modern science and ancient history.
9. Impartial, unbiased data and evidence should guide us in formulating theories of understanding, both theological and scientific.
10. Scientific theories are best left to credentialed scientists. Modern science poses no threat to Genesis 1-11, correctly interpreted in accord with the history of the ancient Near East.

Sunday, 3 August 2008

10:45 AM-12:00 PM

**Science in the Sanctuary:
The Need for Science Education in the Church**
Blake Horridge

The church, like all other parts of our culture, is deeply impacted by the developments of modern science. Unfortunately, many churches and church leaders have not been equipped to respond intelligently and faithfully to current and upcoming scientific issues, such as stem cell research and genetic manipulation. Many of these same people, however, feel a desire to know more about these issues but feel overwhelmed by their own feelings of ignorance. Others do not see why they should care about issues that are not overtly confronting their churches. Therefore, this poster seeks to help show scientists how to bring their discipline into the church for the benefit of its leaders and members, with an emphasis on addressing the reluctance of those in the church to learn about science for the same reasons listed above.

This model centers on helping scientists to guide clergy and laypersons to ask the right kinds of questions about science and about their own faith, which they, as nonscientists, may not think to ask. For example, "What should I do if a scientific issue is not specifically addressed in the Scriptures?" or "What difference does it make who is doing the science that might be in question?" The goal in all of this is to help those in the church to get a better understanding of these scientific issues from those with expertise in various fields. With this understanding, the hope is that ministries such as preaching, teaching, counseling, and evangelism will be affected in positive ways.

Sunday, 3 August 2008

10:45 AM-12:00 PM

A Medical Science, Faith, and Ethics Practicum
Paul H Lange and Denise M Dudzinski

Funding from the Center for Theology and Natural Sciences (CTNS) allowed us to offer a course in the medical school entitled "Medical Science, Faith, and Ethics Practicum." The objective was to study relationships between medical science, faith, and ethics from a variety of religious and scientific perspectives to enhance dialogue about the interface of science and religion. We introduced participants to religion,

science/ethics interfaces through lectures, reading assignments, and experiential learning on the following topics: (1) neurobiology and concepts of mind and soul, e.g., intraoperative open brain stimulation; (2) artificial reproductive technologies (IVF); (3) medical genetics and stem cell research (molecular cloning); (4) end-of-life care; and (5) organ procurement and transplantation.

Over a year (04/05), multidisciplinary faculty and students met for five half-day "practicums," exchanging scientific, ethical, and faith perspectives. Speakers from science and faith traditions were featured to orient the group to scientific and religious vantage points. With the reading assignments and lectures as a foundation, students and faculty broke into small groups for round table discussions of "real-world" cases and films of the actual medical environments. Internationally renowned scholars and local religious leaders participated, and the small group discussions allowed students a chance for sustained engagement with medical and faith leaders. Also students were required to explore a religious tradition other than their own by attending a service, reading selections from the canon, and researching the tradition's perspectives on medicine.

In this poster, details of the course will be presented, including the syllabus constructed, the success and failures of the endeavor, and why we believe this "practicum" approach to the real world of medical activity has great potential to enrich communication between medical science and faith/value traditions.

Sunday, 3 August 2008

10:45 AM-12:00 PM

What Do We Mean When We Say "God Created"?
Joseph Lechner

Origins, and teaching concerning origins, continue to be contentious issues in 2008. Although a broad spectrum of interpretations have been proposed, public debate is both oversimplified and highly polarized. "Creationists" believe in a very recent creation of the universe and of living things that transpired in one solar week, and that the creation events transcend natural explanation. "Evolutionists" believe in a very lengthy, random, purposeless sequence of natural events. According to many young-earth adherents, one is either white (creationist) or black (evolutionist) with no possible intermediate shades of gray. Bible-believing scientists who attempt to find reasonable common ground are suspected of compromising their faith. A central issue in the origins dialog is whether God ever employs natural means to achieve his purposes. Both scripture and everyday colloquial expressions seem to acknowledge that he does; however, for many young-earth adherents, a naturalistic explanation for an event is tantamount to "God was not involved."

In a chapel talk presented at Mount Vernon Nazarene University in fall 2007, I examined the Hebrew verbs used in Genesis 1. "*Bara*" (translated "create") is used sparingly. Whenever "*bara*" appears in the Old Testament, God is the subject of the verb. Significantly, "*bara*" in Genesis 1 describes events that transcend our scientific understanding. However, the creation account includes many other action verbs that do not connote direct divine intervention. Earth "sprouted" green

plants; the ocean “teemed” with life. The usage of Hebrew verbs in Genesis 1 appears to leave room for natural processes as a part of God’s creative activity. Young-earth adherents need to be reassured that “natural” events are still God-owned and God-sent. Until they embrace this concept, it is very difficult for them to explore scientific evidence that might contradict cherished tenets. In the chapel talk, ASA was introduced as a venue where believers with contrasting views concerning origins may meet in Christian fellowship to exchange ideas.

Sunday, 3 August 2008

10:45 AM–12:00 PM

Alternative Fuels for Cars

Ian Douglas Miller

We are running out of petroleum. We get lots of things from it: gas, plastic, diesel, and any number of other things. By far, the most important item we get from it is gas. Petroleum can sustain the demand for plastics, medicines, tar, etc. but it cannot sustain the enormous demand we put on it for gas. That, plus global warming, means we must find another way to power cars. An average American “needs” a car that can sustain 60 mph, can run for 200 miles without refueling, costs less than \$20,000, meets all safety standards, and can go from 0 to 60 mph in 10 sec. So, what kind of fuel can power a car that meets these criteria, has few harmful emissions, and does 50+ mpg? Here are some options: rechargeable electric, solar, fuel cell, compressed air, gas and electric hybrid, ethanol, and natural gas. Some of these are on the market, some are in development, and some are just ideas. Comparing these options, this poster will decide which is the most practical “car of the future.”

Sunday, 3 August 2008

10:45 AM–12:00 PM

Science as “Godly Vocation”: A Virtue Ethics Model

Thomas D Pearson

The commonplace understanding of science is that scientific inquiry is defined by its object and its method: the natural world is examined under the auspices of a rigorous set of protocols that involve observation, testing, and confirmation. The ethical issues that may arise in connection with the scientific endeavor – whether they be private moral issues of individual conduct or public issues of societal impact – while they are important, are typically considered extraneous to the “doing of science” itself. As a result, when those engaged in the pursuits of science and technology are confronted with congested ethical situations, the tendency is to try to import personal, privately-held ethical commitments (familial, religious, philosophical, etc.) from the outside into the discipline, and to attempt to make them fit the highly specialized episodes that often occur in these contexts. But these efforts to transplant private ethical convictions into professional environments invariably leads to moral failure. Why? This poster seeks to address this question, and to present a proposal for understanding how the scientific professions themselves may be seen as ethical communities of practice, in which there are standards of moral excellence inherent in carrying out the activities of scientific inquiry.

This notion of a “professional community of practice” is derived from the traditional Christian affirmation of “godly vocations,” especially as presented by Martin Luther. The Christian description of a “godly vocation” is remarkably similar to contemporary portrayals of virtue ethics, in which the domain of our public practices, such as science, contain within themselves substantial resources for the achievement of ethical excellence and virtuous conduct. The argument will be made that this approach is more promising than the alternative of trying to accommodate our personal moralities within our professional settings.

Sunday, 3 August 2008

10:45 AM–12:00 PM

Corn Rootworm Emergence Trials, 2006 and 2007

Sara M Top

Western corn rootworm (*Diabrotica virgifera*) larvae, feeding on corn roots, weaken the plant. A corn-soybean crop rotation, until recently, prevented root feeding. In the eastern corn belt, variant western corn rootworm beetles were found to lay eggs in rotational crops which resulted in damage to the corn crop.

A two-year study at Dordt College’s Agriculture Stewardship center has documented the existence of the egg-laying variant in Northwest Iowa. Over 85% of the rootworm beetles caught in emergence traps in multi-year rotational cornfields were variant adults. In an organic production system, the evaluation of root systems and yields showed no significant difference in either root injury or grain production. A comparison of resistant and nonresistant hybrids with or without insecticides showed decreased adult emergence with insecticide and resistant hybrids. No significant difference in root injury or yields were observed. Our data suggest that rotations alone may be insufficient to protect corn from rootworm injury in Northwest Iowa.

Sunday, 3 August 2008

10:45 AM–12:00 PM

Community Service Projects: Doorways for Student Self-Discovery and Service

Donald L Williams

This poster will highlight a wide range of interrelations utilized to create and employ service-learning, community service activities relevant to scientific disciplines at a small campus. Projects highlighted will provide (1) objectives and overview of the projects, (2) interrelationships used, and (3) future benefits for both the students and the areas being served. Specific examples of service-learning projects will include volunteering with state wildlife agencies, trash pickups of various forms, working with local grade schools, and other projects that combine several campus constituencies, including program-related clubs, major’s classes, general education classes, and student services staff.

The overarching intent will be to show that service-learning activities, while encouraging student volunteerism, can also provide valuable teaching and learning experiences that open new doors for students in the sciences, even on a small campus. Examples of assignment and self-reporting forms will be provided.

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ASA Business Meeting Agenda

Saturday, August 2, 2008, 7:00–8:00 PM, Wood-Mar Auditorium

1. Call to order and opening prayer
2. Future meetings
3. Nominees for 2009 Council vacancy
4. Secretary/Treasurer report
5. Introduction of newly elected Fellows
6. Recognition of fifty years of ASA Membership
7. Remembrances
8. State of the ASA
9. Offering for the ASA
10. President's comments
11. Closing prayer