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*The Division of Natural Sciences
welcomes you to the 2002 Academic
Festival!*

This Festival has been a tradition in our division since 1995. It is an occasion to celebrate the accomplishments of the past year as well as a chance for our future scholars to practice communicating their ideas and results—in itself an important opportunity for learning.

This year, students from all seven departments and majors of the Natural Sciences Division will present 84 talks and 74 posters. But the actual presentations are just a part of the Festival. The other part is the excitement and enthusiasm you'll no doubt experience as you participate in this process. In short, the Academic Festival is an occasion for us to reaffirm that we are a community of scholars and scholars-in-training.

Organizing the Festival is a labor of love for the Academic Festival Committee, which is made up of representatives from all departments, the Environmental Studies program, and the division. We thank committee members Dave Hansen (Biology), Duane Swank (Chemistry), Coordinator Tosh Kakar (Computer Science and Computer Engineering), Jill Whitman (Environmental Studies), Duncan Foley (Geosciences), Mei Zhu (Mathematics), Richard Louie (Physics), Mathew Hacker and Anita Wahler (Natural Sciences), and Sheila Rothstein, Student Assistant.

Please have a feast of the mind, and (at the lunch), the body!

Chang-li Yiu
Dean of Natural Sciences





Natural Sciences Academic Festival 2002 Schedule

Friday, May 3, 2002

12:00 PM to 2:30 PM.....Poster & Demonstration Check-In, *Rieke Science Center*

12:30 PM to 2:30 PM.....Oral Presentations

2:30 PM to 3:30 PM.....Poster Presentations, Demonstrations, and Break

3:30 PM to 6:00 PM.....Oral Presentations

Saturday, May 4, 2002

8:30 AM to 10:30 AM.....Oral Presentations

10:30 AM to 10:45 AM.....Break

10:45 AM to 12:30 PM.....Oral Presentations

12:30 PM to 1:30 PM.....Lunch, *Rieke Science Center*

1:30 PM to 3:00 PM.....Oral Presentations

3:00 PM to 3:15 PM.....Break

3:15 PM to 5:00 PM.....Oral Presentations



Room Schedule

Friday, May 3rd		
Time	Room	Department
12:30 PM to 2:30 PM	RCTR – 103 (Leraas)	CSCE
	RCTR – 109	Environmental Studies
12:30 PM to 2:40 PM	RCTR – 220	Mathematics
1:00 PM to 2:30 PM	RCTR – 210	Physics
2:30 PM to 3:30 PM	Posters and Demonstrations	
3:30 PM to 6:00 PM	RCTR – 102	Biology
	RCTR – 122	Biology
	RCTR – 103 (Leraas)	CSCE
	RCTR – 109	Environmental Studies
	RCTR – 220	Mathematics

Saturday, May 4th		
Time	Room	Department
8:20 AM to 12:30 PM	RCTR – 102	Biology
	RCTR – 122	Biology
8:30 AM to 12:30 PM	RCTR – 103 (Leraas)	CSCE
8:45 AM to 12:30 PM	RCTR – 220	Mathematics
9:30 AM to 12:30 PM	RCTR – 109	Geosciences
12:30 PM to 1:30 PM	Lunch	
1:30 PM to 5:00 PM	RCTR – 220	Mathematics
	RCTR – 103 (Leraas)	CSCE

Oral Presentation Schedule

Friday, May 3rd

BIOLOGY

Capstone Presentations.....Rieke 102

Friday, May 3rd

Time	Student(s)	Class	Topic
3:30 PM	DeAnna Borchardt	499	The Resistance To <u>Bacillus Thuringiensis</u> Toxins Expressed In Transgenic Cotton In The Pink Bollworm In Arizona: An Ongoing Battle
3:50 PM	Andrew Rothenberger	499	The Eradication And Recovery Of The Gray Wolf (<i>Canis Lupus</i>) And Its Effects On Populations On The Scandinavian Peninsula: An Ecological Perspective
4:10 PM	Jason Schafer	499	Ecological Effects Of Biological Control Agents On Northwestern Ecology
4:30 PM	Erin S. Long	499	The Effects Of No-Till Technology On The Environment, Economic Return, And Conservation Of Water, Soil And Nutrients In Dryland Wheat Crops
4:50 PM	Mike Baylous	499	Erogenic Affects Of Creatin Supplementation On Anaerobic Muscle Activity

Capstone Presentations.....Rieke 122

Friday, May 3rd			
Time	Student(s)	Class	Topic
3:30 PM	Chris Bertholf	499	Collagen: The Link Between Vitamin C And Scurvy Prevention
3:50 PM	Tyler Ensley	499	The Fundamentals Of Human Hypoxia
4:10 PM	Jennifer Jennings	499	Aspects Of Non-Ossifying Fibromas In Humans
4:30 PM	Dekey Lhewa	499	Neural Regulation Of Gonadotropin-Releasing Hormone (Gnrh)
4:50 PM	Emily Yates	499	An Immunological Look At Infections Of The Extraembryonic Membranes In Pregnant Women

COMPUTER SCIENCE AND COMPUTER ENGINEERING

Capstone Presentations.....Rieke 103 (Leraas)

Friday, May 3rd			
Time	Student(s)	Class	Topic
12:30 PM	Melissa Barnett Cassandra Fowler Stephanie Mirie Nika Pelc	499	Computing for Girls Project
1:00 PM	Son Kim Han Lee	499	XML
1:25 PM	Milo Meacham	499	Exploring the Heart of Gameplay
1:45 PM	Espen Nilsen	499	Simple C Header Referencing Editor (SCHRED)
2:05 PM	Mark Anderson Megan Hurt	131	Interplanetary Travel

Friday, May 3rd

Time	Student(s)	Class	Topic
2:20 PM	Eric Finseth Allison Gray Sandeep Rao	131	Landing Systems and Methods for Mars Missions
2:30 PM	Break		
3:30 PM	Nick Dare Kosta Tachtevrenidis	499	DNA Computation
3:55 PM	Andy Dotson	499	Adventures in Online Gaming
4:15 PM	Chih-Huo Chen Emma Nguyen Tam Vuong	499	Use of Genetic Algorithm to Break Vigenere Cipher
4:45 PM	Michael Damone Nathaniel Rowe Abdul Samsondeen	499	HouseKeeper Project
5:15 PM	Ruth Vanderpool	499	Implementing Permutation Group Algorithms

ENVIRONMENTAL STUDIES

Capstone Presentations..... Rieke 109

Friday, May 3rd

Time	Student(s)	Class	Topic
12:30 PM	Jamie Martin	499	Increase in Global Atmospheric Carbon Dioxide: Implications for Alpine Ecosystems and International Environmental Policy
1:00 PM	Becky Summerer	499	The Future of the Public Health Conditions in East Helena
1:30 PM	Lynn Waller	499	Control of Invasive Species in Bresemann Forest
2:00 PM	Aaron Henderson	499	The European Green Crab (<i>Carcinus Maenas</i>) Is Stronger, Faster, Smarter And It's Here On The Washington Coastline
2:30 PM	Break		

Friday, May 3rd

Time	Student(s)	Class	Topic
3:30 PM	Jewel Buchanan	499	Social Community And Environmental Stewardship: An Audit Of The Waste Management And Procurement Policies At PLU
4:00 PM	Renee Rose	499	Metals Loading Study of Commencement Bay
4:30 PM	Nick Sontag	499	Ceramics Science and Art
TBA	Kristin Hovenkotter	499	Urban Wildlife: Management Strategies in the Northwest

MATHEMATICS

Capstone Presentations.....Rieke 220

Friday, May 3rd

Time	Student(s)	Class	Topic
12:30 PM	Jennifer Makenas	499	Ramsey Theory
1:40 PM	Matt Geballe	499	Hamiltonian And Eulerian Cycles In Graphs
2:40 PM	Break		
3:30 PM	Dawn Schoenenberger	499	Pebbling in Graphs
4:40 PM	Lora Hendricksen	499	Four Color Theorem

PHYSICS

Capstone Presentations.....Rieke 210

Friday, May 3rd

Time	Student(s)	Class	Topic
1:00 PM	Matt Daniels	499	Circuits That Get Chaos In Sync
1:15 PM	G. Mark Griffith	499	Microbarograph
1:30 PM	Heather Russell	499	Zeeman Effect In Mercury
1:45 PM	Ryan Wiley	499	Water Tunnel

Saturday, May 4th

BIOLOGY

Capstone Presentations.....Rieke 102

Saturday, May 4th

Time	Student(s)	Class	Topic
8:20 AM	Anna Borst	499	The Causes And Effects Of Pollution Globally On Marine Mammals And Birds
8:40 AM	Susan N. Gosine	499	Trypanosome Evolution
9:00 AM	Brook Irving	499	Evolution Of The Horse
9:20 AM	Annika Nelson	499	Hirschsprung Disease And Lethal White Foal Syndrome: Related Genetic Mutations
9:40 AM	Aubrey Schulz	499	AIDS And The CCR5 Receptor
10:00 AM	Break		
10:20 AM	Andrea DeLuca	499	The Link Between Poverty And AIDS: A Biological Perspective
10:40 AM	Kristine Johnson	499	Aspects Of HIV
11:00 AM	Michael Petorak	499	The Anthrax Reality
11:20 AM	Tia Woodall	499	Xenotransplantation: Risks And Future Prospects

Capstone Presentations.....Rieke 122

Saturday, May 4th

Time	Student(s)	Class	Topic
8:20 AM	Libby Woodke	499	Improving Immunosuppressants
8:40 AM	Jeanine Morasch	499	Circadian Control Of Reproduction In The Female Rat
9:00 AM	Brea Midthune	499	Genomics And Gene Therapy: The Problems We Have Encountered

Saturday, May 4 th			
Time	Student(s)	Class	Topic
9:20 AM	Peter Lunoe	499	Influenza A: An Investigation Into Crossing The Species Barrier And Pandemic Potential
9:40 AM	Leif Johnson	499	Anthrax
10:00 AM	Break		
10:20 AM	Julie Janiak	499	The Future Of Dna Immunizations Provides New Optimism In Combating Hiv, Feline Leukemia, And Hepatitis B
10:40 AM	Amoura Williams	499	Flatfish Metamorphosis: Morphological And Physiological Transformations
11:00 AM	Gloria Van Eaton	499	Investigation Of The Effect Of Varied Concentrations Of A Plant Toxin, Sparteine, On Growth And Metabolic Rate Of <i>Vanessa Cardui Linnaeus</i> Caterpillars (<i>Lepidoptera: Nymphalidae</i>)
11:20 AM	Jamie Martin	499	Can High Protein Compensate For Toxins In Caterpillar Diet? Response Of Painted Lady Caterpillars <i>Vanessa Cardui</i> (<i>Lepidoptera: Nymphalidae</i>) To Alkaloid Defense (Sparteine) On Protein Variable Regimen

COMPUTER SCIENCE AND ENGINEERING

Capstone Presentations..... Rieke 103 (Leraas)

Saturday, May 4th

Time	Student(s)	Class	Topic
8:30 AM	Michael Blackburn Alison Kelley	499	Adjustable Temperature Stabilizing Unit for Water Fixtures
8:55 AM	Hoa Duong	499	PC Wireless Networking
9:15 AM	Jason Ruiz	499	Quantum S-P Networks
9:35 AM	Danny Blum Scott Cochran	499	Development of Embedded Systems Design Tools for the CSCE Hardware Lab
10:00 AM	Michael Wright Nathan Yocom	499	pGina
10:25 AM	Break		
10:45 AM	Charles Dorner Shane Hall	499	Net-Raid
11:10 AM	Kevin Powell	499	Symmetric Multiprocessing in Linux
11:30 AM	John Schock	499	The Natural Language Instruction Processor
11:55 AM	Scott Shipp Brant Watrous	499	A Logic Language On Steroids: Giving A Basic Understanding Of English Semantics To Logic-Based Computation
12:30 PM	Lunch		
1:30 PM	Jeff Berghammer Phil M. Price	499	D-499 Software-Based Drum Synthesizer
1:55 PM	Mike Ash Brent Chamberlain Bernie Zimmermann	499	Music Department Performance Library Database
2:25 PM	Bryce Bockman	499	MPIGALib

Saturday, May 4th

Time	Student(s)	Class	Topic
2:45 PM	Nikolay Sapov	499	Bump Mapping
3:05 PM	Break		
3:15 PM	Scott Abbott Eric Hartford	499	AKs In The Night
3:40 PM	Simon Zoro	499	Bezier And B-Spline Curve Design
4:00 PM	Troy Eng	499	Development of a Card Game Engine for Windows
4:20 PM	Chris Neiman	499	Torque Gaming Engine
4:40 PM	Jon Williams	499	A Brief Study of Computer Graphics and Animation

GEOSCIENCES

Capstone Presentations..... Rieke 109

Saturday, May 4th

Time	Student(s)	Class	Topic
9:30 AM	Kevin A. Freitas	499	Online Accessibility And Information Guide To Pierce County Area Springs For Students Of The Geosciences And Tourists
10:00 AM	Mike Giuliani	499	A Comparison Of Volcanic Massive Sulfides Of Middle Valley, Northern Juan De Fuca Ridge With Kidd Creek, Western Abitibi Subprovince, Canada
10:30 AM	Break		
11:00 AM	Matt Faust	499	Petrology And Origin Of The Resurrection Peninsula Ophiolite
11:30 AM	Ethan Hulme	499	The Wall Site <i>Plesiogulo</i>
12:00 PM	Jamie Sherman	499	Summer Geology Institute For Secondary Science Teachers

MATHEMATICS

Capstone Presentations.....Rieke 220

Saturday, May 4th

Time	Student(s)	Class	Topic
8:45 AM	Robert Swanson	499	Algorithms For Computing Functions
10:00 AM	Ruth Vanderpool	499	Permutation Group Algorithms
11:00 AM	Break		
11:30 AM	Jiho Kim	499	Hensel Lifting in Computer Algebra
12:30 PM	Lunch		
1:30 PM	Tesia Forbes	499	Statistics And The 2000 Election
2:40 PM	Jeff Miles	499	Impossible Geometric Constructions
3:40 PM	Break		
4:00 PM	Robin Barrick	499	Knot Theory

Oral Presentation Submitted Abstracts

BIOLOGY

Chris Bertholf: Collagen: The Link Between Vitamin C and Scurvy Prevention

The discovery, synthesis, and use of vitamin C have allowed the virtual elimination of scurvy. In the context of a brief history of scurvy, I summarize experimentally determined effects of vitamin C and show that deterioration of collagen is responsible for scurvy.

Deanna Borchardt: The Resistance To Bacillus Thuringiensis Toxins Expressed In Transgenic Cotton In The Pink Bollworm In Arizona: An Ongoing Battle

The future of agriculture relies on the state of resistance to transgenic crops. A plan proposed by the Environmental Protection Agency may delay the evolution of resistance. The proposed plan relies on key assumptions that are now being tested.

Anna Borst: The Causes and Effects Of Pollution Globally On Marine Mammals And Birds

Pollution has caused illness, sterility, death, and near extinction of marine mammals and birds. I explore the causes of pollution, their effects on marine mammals and birds, and their link to humans.

Andrea DeLuca: The Link Between Poverty and AIDS: A Biological Perspective

I examine factors of poverty that account for high HIV transmission rates in areas of economic depression. Factors include the pathway for viral transmission via untreated STD ulcerations and the repression of the immune system as a result of parasitic infection and malnutrition.

Tyler Ensley: The Fundamentals of Human Hypoxia

This presentation will explore the condition known as hypoxia, which results from an inadequate supply of oxygen to the body. The types and stages of hypoxia will be discussed with special emphasis being placed on the physiology behind the condition.

Susan N. Gosine: Trypanosome Evolution

This paper will attempt to show the differences and similarities within trypanosomes, using the Serum Resistance Associated (SRA) gene, rRNA, the mini exon and protein encoding genes.

Brook Irving: Evolution Of The Horse

Carbon isotope and microwear analysis of teeth and morphological changes in limbs and other body structures show how horses have changed over millions of years, allowing for an understanding of how the environment has also changed.

Julie Janiak: The Future Of DNA Immunizations Provides New Optimism In Combating HIV, Feline Leukemia, And Hepatitis B

DNA immunizations offer new and exciting possibilities of inducing and enhancing specific immunological responses that exceed traditional vaccines.

Jennifer Jennings: Aspects Of Non-Ossifying Fibromas In Humans

Non-ossifying fibromas are benign bone tumors occurring in up to half of the population. One subtype of this fibroma is the metaphyseal defect, which degrades bone as a cavity would a tooth that eventually leads to a pathological break. Mechanisms of non-ossifying fibromas were researched.

Kristine Johnson: Aspects Of HIV

Why do so many people continue to die as a consequence of HIV infection? I examine how HIV overcomes the immune system, and I discuss strategies for dealing with an infection. Topics include modes of transmission and infection, physiological effects, suppression drugs, and vaccine models.

Leif Johnson: Anthrax

I will begin by presentation with a brief overview of the fundamental aspects of Anthrax, including bacterial information, a brief history and some highlights of the disease. The remainder of my presentation will be used to cover how the Anthrax toxin actually enters and destroys cells.

Dekey Lhewa: Neural Regulation Of Gonadotropin-Releasing Hormone (Gnrh)

Several neural factors have been shown to regulate the secretion of GnRH and hence the female rat reproductive cycle. Neurotensin is one such factor that plays an important role in regulating GnRH secretion. However, the mechanism of GnRH regulation by neurotensin is still under investigation.

Erin S. Long: The Effects Of No-Till Technology On The Environment, Economic Return, And Conservation Of Water, Soil And Nutrients In Dryland Wheat Crops

Wheat producers typically use conventional tillage to control weeds. Reduced tillage systems such as no-till have become more popular as conservation of soil and water has become an ecological concern. The adoption of these reduced tillage practices has been slow due to reduced economic returns in the short run.

Peter Lunoe: Influenza A: An Investigation Into Crossing The Species Barrier And Pandemic Potential

The associations between inter species transfer and pandemic potential of Influenza A is examined. Influenza unique ability to cross between species allows for a unique life history where novel strains continually emerge to which potential hosts have no innate immunity. In addition the future of current treatments and the prospects of new solutions is reviewed.

Jamie Martin: Can High Protein Compensate For Toxins In Caterpillar Diet? Response Of Painted Lady Caterpillars *Vanessa Cardui* (*Lepidoptera: Nymphalidae*) To Alkaloid Defense (Sparteine) On Protein Variable Regimen

I fed caterpillars diets varying in protein and sparteine, an alkaloid present in lupines (a food source), to see if increased levels of dietary protein would reduce the negative effects of the toxin. Survivorship, growth rates and mass give clues.

Brea Midthune: Genomics And Gene Therapy: The Problems We Have Encountered

The Human Genome Project has allowed us to see great advancement in gene therapy. We have seen select success stories, however, this endeavor has proved to be much more complex and problematic than scientists had anticipated.

Jeanine Morasch: Circadian Control Of Reproduction In The Female Rat

The biological clock plays an important role in communicating time-of-day information to GnRH neurons in the female rat. Recent advances have been made in understanding the cellular mechanisms by which this information is conveyed and GnRH secretion is influenced.

Annika Nelson: Hirschsprung Disease And Lethal White Foal Syndrome: Related Genetic Mutations

Hirschsprung Disease in humans and Lethal White Foal Syndrome in equines are genetic variants of each other. The recessive mutations of each lead to malfunction of neural crest cell development of the enteric nervous system, and failure of peristalsis in the intestine.

Michael Petorak: The Anthrax Reality

The bacterium *Bacillus anthracis* causes dangerous (often deadly) diseases. Recent studies show that the organism produces a protective antigen and reveal how an infection affects a patient physiologically. This information should provide a basis for development of effective treatments.

Andrew Rothenberger: The Eradication And Recovery Of The Gray Wolf (*Canis Lupus*) And Its Effects On The Populations On The Scandinavian Peninsula: An Ecological Perspective

In the spring of 1966, the Scandinavian gray wolf (*Canis lupus*) population was functionally extinct. Colonizers migrated from a Finnish-Russian population. Since 1966 the Scandinavian moose (*Alces alces*) population exploded exponentially creating major problems in Scandinavia. Only recently has the moose population stabilized, and analysis shows the gray wolf contributed to the moose population control

Jason Schafer: Ecological Effects Of Biological Control Agents On Northwestern Ecology

Non-native biological control agents are being used as an alternative to purely chemical and cultural controls in plant protection. Two root-boring beetles have successfully aided in the effort to control the noxious weed, *Centaurea maculosa*, a weed of ecological and economic importance.

Aubrey Schulz: Aids And The CCR5 Receptor

Individuals homozygous for a mutant 32 bp deletion at the CCR5 receptor exhibit a high level of resistance to HIV. The non-random dispersal of the allele has been affected by evolution and has the potential to impact natural selection and the medical community at large.

Gloria Van Eaton: Investigation Of The Effect Of Varied Concentrations Of A Plant Toxin, Sparteine, On Growth And Metabolic Rate Of *Vanessa Cardui Linnaeus* Caterpillars (*Lepidoptera: Nymphalidae*).

I raised three groups of caterpillars on low protein artificial diets containing 0%, 1% and 2% sparteine, respectively. Groups fed diets containing sparteine showed lower survivorship and slower growth than those fed diets containing no sparteine.

Amoura Williams: Flatfish Metamorphosis: Morphological and Physiological Transformations

Flatfish begin life as bilaterally symmetrical organisms, but during the process of metamorphosis are transformed into asymmetrical organisms. Recent research has clarified the morphological and physiological events in this transformation.

Tia Woodall: Xenotransplantation: Risks and Future Prospects

I consider risks and benefits of pig organs as replacement organs in humans. I examine how pigs might be genetically modified to make them more suitable organ donors, as well as ways to minimize the chance of organ rejection after transgenic pig parts have been transplanted into human recipients.

Libby Woodke: Improving Immunosuppressants

Immunosuppressants are a necessity to maintain the life of an organ transplant. But current immunosuppressants have side effects, toxins, and a rate of failure. How is technology today looking to improve them and prolong the survival of the transplanted organ?

Emily Yates: An Immunological Look At Infections Of The Extraembryonic Membranes In Pregnant Women.

More than one third of pre-term labors are caused by bacterial infection. Since current tests are not efficient in detecting infections, more research is needed. Studying bacterial behaviors and the immune system can detect infections.

COMPUTER SCIENCE AND COMPUTER ENGINEERING

Scott Abbott & Eric Hartford: AKs In The Night

This project will be the development of a two player, turn based strategy game using C++ and DirectX in a two-dimensional format. Instead of being the ultimate strategy game ever developed, the goal will be to learn to implement DirectX and GUI's in C++, with the game being a demonstration of what we have learned.

Mark Anderson & Megan Hurt: Interplanetary Travel

We will present an informative discussion of prominent strategies for interplanetary travel. A short simulation will be included.

Mike Ash, Brent Chamberlain, & Bernie Zimmermann: Music Department Performance Library Database

A complex database system and dynamic web application that allows faculty, staff, and students to retrieve and manage information on pieces of music available in the department library. This will provide consistency and reliability that currently is not available in the cataloging system.

Melissa Barnett, Cassandra Fowler, Stephanie Mirie, & Nika Pelc: Computing for Girls Project

Statistics show that girls' interest in computers dramatically decreases around ages 11-14. One suggested remedy is to design software specifically for girls of that age. Our goal is to develop an entertaining and educational web site to promote girls' interest in computers and related fields.

Jeff Berghammer & Phil M. Price: D-499 Software-Based Drum Synthesizer

The goal of this project was to develop a software-based drum synthesizer, capable of producing high-fidelity drum and percussion sounds in various rhythmic configurations. This application was developed using Microsoft Visual C++ and Microsoft DirectX.

Michael Blackburn & Alison Kelley: Adjustable Temperature Stabilizing Unit for Water Fixtures

This device is designed to monitor and adjust the outlet temperature of a water fixture to maintain it at a user defined level. It is implemented using a microcontroller, input keypad, temperature sensor, seven segment displays, and stepper motors.

Danny Blum & Scott Cochran: Development of Embedded Systems Design Tools for the CSCE Hardware Lab

This project deals with the development of additional hardware lab tools. PLD and microcontroller programmers have been constructed, as well as an application board, which incorporates PLDs and microcontrollers. This board will be exhibited as a tachometer for a line-following robot.

Bryce Bockman: MPIGALib

MPIGALib is a library created for the development of genetic algorithms in a Beowulf computing environment. Experimental work has been done in applying the library to the Traveling Salesman Problem.

Chih-Huo Chen, Emma Nguyen, & Tam Vuong: Use of Genetic Algorithm to Break Vigenere Cipher

One important aspect of security is the ability to hide data and information in the form a cipher. It is important to discover the weakness of a cipher before it can be exploited. This project determines if a genetic algorithm can compromise Vigenere cipher.

Michael Damone, Nathaniel Rowe, & Abdul Samsondeen: HouseKeeper Project

This project is a comprehensive home management system. It provides a graphical floor plan stored in XML format, a MySQL front end to the household inventory and a hardware-monitoring unit. Java is utilized for drawing the graphics, connecting to MySQL using JDBC, and interfacing with the user.

Nick Dare & Kosta Tachtevrenidis: DNA Computation

DNA Computing is the combination of Molecular Biology and Computation Theory to produce a new field of computing. Our project is to create a simulator showing how DNA Computing would work and tackle a few np-complete problems (Traveling Salesman, Boolean Satisfiability).

Charles Dorner & Shane Hall: Net-Raid

Net-Raid is a system designed to allow for reliable, redundant file storage on a network. This system adopts Peer-to-Peer concepts similar to those found in Freenet and Gnutella.

Andy Dotson: Adventures in Online Gaming

The focus of my project has been to create a 3D Virtual Community using DirectX 8 that focuses on TCP/IP connectivity, sound, input, user authentication, position storing and recall, chat, and graphics.

Hoa Duong: PC Wireless Networking

PC wireless networking is a system that has at least two computers, which communicate with each other, and access to the Internet without cabling.

Troy Eng: Development of a Card Game Engine for Windows

Computer game engines potentially give software developers more time to focus on game content rather than technical details. Likewise, I have created a card game engine that can be used to shorten the development time for card games.

Eric Finseth, Allison Gray, & Sandeep Rao: Landing Systems and Methods for Mars Missions

An effective landing system is crucial for extraterrestrial exploration. This project presents research on past and present implementations of the material components of the landing subsystems of Mars landers, and a recommendation for future landers.

Son Kim & Han Lee: XML

XML (eXtensible Markup Language) is a markup language for documents containing structured information. By using XML, we gain access to a large and growing community of tools and engineers, experienced in the technology. XML is not always the best solution, but it is always worth considering.

Milo Meacham: Exploring the Heart of Gameplay

Can a new computer game be fun in a modern age without having modern visuals or production values? We will attempt to make a simple, 2-d puzzle game to try to answer this. It will not rely on technical flair but should still be fun to play.

Chris Neiman: Torque Gaming Engine

A medieval style game has been developed using the Torque Gaming Engine. The game was made using tools: 3DS MAX 4, Adobe Photoshop, and MS Visual Studio 6.0. The process of game development and creation will be discussed.

Espen Nilsen: Simple C Header Referencing Editor (SCHRED)

In this project I will investigate alternative options for GUI design. I will co-design and develop a new widget library, Ewl, and put it to use by creating a C/C++ editor.

Kevin Powell: Symmetric Multiprocessing in Linux

A threaded test suite was written to perform basic functions on a multiprocessor system. These tests were run in both single- and dual-processor configurations on a Linux-based system to show the overhead of SMP.

Jason Ruiz: Quantum S-P Networks

In the not so distant future, silicon based computing technology will become obsolete. Newer, faster technologies will emerge, and with them new forms of encryption for security. On the forefront of the encryption advances, are S-P Networks.

Nikolay Sapov: Bump Mapping

Bump mapping is a technique of enhancing the appearance of the objects without complicating their basic geometrical structure. Theory and practical implementation of the bump mapping effect using real time rendering and ray tracing is the focus of the project.

John Schock: The Natural Language Instruction Processor

The Natural Language Instruction Processor is a system designed to translate English text into Bash shell script by coupling traditional compiler design with a database of English language information.

Scott Shipp & Brant Watrous: A Logic Language On Steroids: Giving A Basic Understanding Of English Semantics To Logic-Based Computation

Models of simple sentences act as logical proofs, deeming an input to be reasonable (having correct semantics) or unreasonable.

Ruth Vanderpool: Implementing Permutation Group Algorithms

Representing permutation groups on n letters with arbitrary generators can inflate runtimes of basic calculations to $n!$. Two algorithms are examined that use stabilizing subgroups to reduce this work to $O(n^5)$ though their actual runtimes vary drastically.

Jon Williams: A Brief Study of Computer Graphics and Animation

Discussion and explanation of general concepts associated with computer graphics and animation, including specific examples from 3D Studio Max and Anim8or 3D Modeler.

Michael Wright & Nathan Yocom: pGina

pGina uses plug-in technology to replace authentication in Windows clients to allow for ANY method of authentication, existing or future.

Simon Zoro: Bezier And B-Spline Curve Design

This project is a program written in Java that is drawing Bezier and B-spline curve. The user is allowed to plot some points and choose what type of curve he wants to draw. This program is running using windows operating systems.

ENVIRONMENTAL STUDIES**Jewel Buchanan: Social Community And Environmental Stewardship: An Audit Of The Waste Management And Procurement Policies At PLU**

With the goal to evaluate PLU's sustainability, this project audits its waste management and procurement policies, while integrating the ideologies of the sociological community and interdisciplinary aspects of education, environment and society.

Aaron Henderson: The European Green Crab (*Carcinus Maenas*) Is Stronger, Faster, Smarter And It's Here On The Washington Coastline

The European Green Crab (*Carcinus maenas*) has invaded the Washington coastline with a history of settlement all over the world. It is superior in speed, hunting, and reproduction when compared to most crabs, and poses a major threat to local ecosystems of the coast and the Dungeness crab fishery.

Kristin Hovenkotter: Urban Wildlife: Management Strategies in the Northwest

In the Northwest, the close proximity of rapidly expanding urban areas to nature creates the need for city wild animal management. What are good methods for Portland and Tacoma regarding urban wildlife planning and policy?

Jamie Martin: Increase in Global Atmospheric Carbon Dioxide: Implications for Alpine Ecosystems and International Environmental Policy

Levels of CO₂ in our atmosphere are increasing. The alpine may be the first ecosystem to show measurable response to this trend. Do we know enough science to make appropriate policy? By the time we know enough, will it be too late?

Renee Rose: Metals Loading Study of Commencement Bay

For the last century, industrial activities and pollutant discharges have contaminated Commencement Bay. This study totaled actual and permitted loads of toxic metal discharges. Should the federal-state permitting process be more stringent?

Nick Sontag: Ceramics Science and Art

From the dishes we eat off of to the nose cone of the space shuttle, ceramics have played an integral part of human development. The discovery was mastered by artists and then studied by scientist, without this combination many of our modern conveniences would not exist.

Becky Summerer: The Future of the Public Health Conditions in East Helena

After 110 years of operation in East Helena, Montana, the Asarco lead smelter has tainted the town with high lead and arsenic levels. Remediation efforts have lowered levels; yet, cleanup programs are still necessary to maintain a healthy community.

Lynn Waller: Control of Invasive Species in Bresemann Forest

Biodiversity is vital for the long-term sustainability of our Earth's ecosystem, which is destroyed by the introduction of invasive species. With collaboration among stakeholders biodiversity can be preserved for future generations.

GEOSCIENCES

Matt Faust: Petrology and Origin of the Resurrection Peninsula Ophiolite

The Resurrection Peninsula ophiolite is a remote, well-exposed sequence, which may be a remnant of a recently theorized plate. This study combines research and original petrologic work on the rocks in the context of their probable origins.

Kevin A. Freitas: Online Accessibility And Information Guide To Pierce County Area Springs For Students Of The Geosciences And Tourists

Where are area springs? How accessible are they? Are they an endangered resource? Data research and visits to sites in the field suggest public parks and roadside exposures as the most suitable settings for accessible springs—where they still exist.

Mike Giuliani: A Comparison Of Volcanic Massive Sulfides Of Middle Valley, Northern Juan de Fuca Ride With Kidd Creek, Western Abitibi Subprovince, Canada

Volcanic massive sulfides of areas young and old are economically important. Researching the comparison between the young and older forming sulfides was the purpose of the report. Similarities in sulfide composition with differences in age and longevity of the hydrothermal systems resulted in the young and older sulfide deposits.

Ethan Hulme: The Wall Site *Plesiogulo*

The first large extinct wolverine *Plesiogulo* in Utah was discovered by an amateur collector and reported to Ashley National Forest. Further exploration in 2000 yielded a partial left mandible and nearly complete left radius; with the summer of 2001 recovering multiple phalanges, long bones, teeth and a possible crushed skull.

Jamie Sherman: Summer Geology Institute For Secondary Science Teachers

Geoscience education is being phased out. Can a field trip institute fight this loss? Six school districts were surveyed and four local field trips were designed. My findings show this loss is not from lack of interest, but a lack in field experience.

MATHEMATICS**Robin Barrick: Knot Theory**

The field of knot theory is mainly concerned with how to tell two different knots apart. This talk focuses on the development of knot invariants such as colorability and the Alexander polynomial.

Tesia Forbes: Statistics and the 2000 Election

Mathematical methods used in a sociological study of the correlations between concentrated poverty, social isolation and political participation. Analysis of demographic variables influencing participation by Florida residents in the 2000 election. Least-squares method, multivariate regression and more.

Matthew Geballe: Hamiltonian and Eulerian Cycles in Graphs

Hamiltonian cycles in graphs have many real-world applications. However, their existence in graphs can be hard to establish. Algorithms were developed for finding Hamiltonian cycles in complete n-partite graphs.

Jiho Kim: Hensel Lifting in Computer Algebra

Newton's iteration, well known for its analytical applications, can be applied in an algebraic setting. The process, called Hensel lifting, uses Newton's iteration and is the basis for many modern algorithms in computer algebra.

Jennifer Makenas: Ramsey Theory

How many people must be at a party to ensure at least three mutual acquaintances or three mutual strangers will be in attendance? We answer this and many other exciting questions in Ramsey Theory.

Jeff Miles: Impossible Geometric Constructions

For centuries, attempts were made to solve the three classic geometric construction problems of squaring the circle, doubling the cube, and trisecting the angle. We now know these constructions to be impossible, and we will take a look at why.

Dawn Schoenenberger: Pebbling in Graphs

Participate in pebbling graphs! Hear about basic concepts and definitions of graphs. Results regarding the pebbling number of various graphs are presented. We will also look at new pebbling steps and how they compare with known results of pebbling.

Robert Swanson: Algorithms for Computing Functions

Visual approaches used to find and approximate elementary functions generally leads to inefficient algorithms that are not being implemented in today's computer systems. We will explore new modified algorithms that are both intuitive and accurate.

Ruth Vanderpool: Permutation Group Algorithms

Using arbitrary generators to represent permutation groups on n letters gives little information about a group. Generators linked to stabilizing subgroups however can not only represent the group but also ease access to fundamental group properties.

<i>PHYSICS</i>

Matt Daniels: Circuits That Get Chaos In Sync

This experiment focuses on producing synchronized chaos in two similar circuits. When this syncing occurs the circuits produce strange and beautiful patterns known as attractors. Come and see what all that chaos theory from Jurassic Park means!

G. Mark Griffith: Microbarograph

We can see waves crashing on a beach, and in a pond we can see the smallest ripples. These waves seem quite obvious, and not particularly exciting. In this study, a microbarograph is used to investigate waves in the atmosphere all around us.

Heather Russell: Zeeman Effect In Mercury

When electrons drop to lower energy levels, photons are emitted at specific wavelengths, and in a magnetic field these spectral lines split. This phenomenon is known as the Zeeman effect. In this project, Fabry-Perot interferometry is used to study this effect in mercury.

Ryan Wiley: Water Tunnel

This custom apparatus will measure the drag and lift forces on a hand-shaped object moving through water. Discussion will focus on applications of this data to optimize a swimming stroke: the front crawl.

Poster Presentations

Note: An asterisk (*) next to the poster number indicates a tabletop poster. Those without an asterisk are wall posters.

BIOLOGY

Poster #	Student(s)	Class	Topic
*1	Jillian Foglesong Matt Smith Melissa Wollan	491	Immunocytochemical Localization of Delta Opioid Receptors in Neuroendocrine Neurons in the Rat Hypothalamus

CHEMISTRY

Poster #	Student(s)	Class	Topic
*2 – 9		336	Organic Special Projects Laboratory
*10 – 24		338	Special Laboratory Projects by Analytical Chemistry Students
*25	Floyd Bangerter	344	Reproducing The Puzzle Pieces Of The Human Body: Comparing Semi-Empirical Approximation Methods Using DNA/RNA Base Pairs
*26	Devin Busse	344	Quantum Mechanics Made Easy With Computers: A Comparison Of Semi-Empirical Calculations Of Heats Of Formation
*27	Marvetta Levy	344	Trends In Molecular Mechanics For An Amino Acid System
*28	Patrick A. Pastor	344	Finding The "Best" Modeling Mechanics Force Field For Modeling The Formation Of The Desmosine Cross-Link In Elastin
*29 – 32		405	Special Projects Or Laboratory Projects By Biochemistry Students

Poster #	Student(s)	Class	Topic
33 – 38		435	Laboratory Projects By Instrumental Analysis Students
*39	Alayne Brown	Research	Structure/Function Assessment Of RNA Probes Against Defined Nucleoside Targets

ENVIRONMENTAL STUDIES

Poster #	Student(s)	Class	Topic
40 – 46	Darren Alkire Courtney Berner Aaron Binger Eric Brady Jewel Buchanan Eric Friesth Ryan Greco Natalie Gulsrud Andrea McFarland Ben Morris Jens Olsgaard Jenelle Santie Dawn Shaw Kim Smith Leah Sprain John Voigt	350	Investigating The Environmental Health Of The Clover Creek Watershed
*47	Melanie Anderson	425	Welcome To The Community Of Crystal Waters
*48	Benjamin Carlson	425	Is This The Best We Can Do?
*49	Kim Glidden	425	Sustainable Living: Energy Conservation
*50	Gillian Hanson	425	Is Organically Grown Food More Nutritious Than That Of Food Grown Conventionally?
*51	Jennifer M. Harsch	425	Life Lessons With Cows: Black Angus Cattle In Australia
*52	Adriana Koessler	425	Australia Bushfoods
*53	Emily Yates	425	Why Are Kangaroos In Their Backyard

GEOSCIENCES

Poster #	Student(s)	Class	Topic
*54	Sarah Ervine Erika Helm	201	Denali: How to Build a Big Mountain Rapidly Using Tools You Have Lying Around the Planet
*55	Kim Fowler Hans-Petter Grav Jon Payne	201	Mesa Verde Exposed
*56	Courtney Johnson Melissa J. Maloney Jody Phipps	201	Arches National Park: The Sculpting of a Landscape
*57	Janet Killam Christina Sonnichsen Jamie-lyn Willoughby	201	Crater Lake National Park
*58	Michelle Kolby John Michels Carlee Smith	201	Zion: A Ripple Through Time
*59	Crystal Krippaehne Tina Schoelkopf Mark Watson	201	Yosemite: An Ever-Changing Formation
*60	Jodi Landon Michelle Mead Jeff Tompkins	201	Lassen: All Plugged Up
*61	Shelby Morris Janet Sizelove Bernie Zimmermann	201	The Missing Link: Secrets of the Grand Canyon
*62	Katie Olsen Rich Vigorito	201	Badlands National Park
*63	Kelly Sprake Stephen L. Vaughn	201	The Geologic Structure of the Hawaiian Island Hot Spot
64	Darren Alkire Gil Pepin	350	Juan de Fuca Plate Tectonic History

Poster #	Student(s)	Class	Topic
65	Matt Faust Abby Gray	350	Hydrothermal Circulation and Ridge Chemistry of the Juan de Fuca Ridge
66	Megan MacDonald Stacia Tellefson Denise Thompson	350	Juan de Fuca Ridge System Geomorphology
67	Laura Medsker Erin Muske	350	Sedimentation of the Juan de Fuca Plate
68	Ben Morris Andrew Orr Christian Pitzer	350	Cascadia Subduction Zone Processes and Related Features
*69	Darren Alkire	390	Grand Teton Overthrust Belt
*70	Benjamin Morris	390	Geyser Processes and Predictability
*71	Andrew Orr	390	Mt. Borah
*72	Gil Pepin	390	The Great Rift of Idaho
*73	Jody Phipps	390	Geothermal Activity Around Mammoth Hot Springs
*74	Denise Thompson	390	Tectonic Models for Progression of the Yellowstone Caldera

Demonstrations

COMPUTER SCIENCE AND COMPUTER ENGINEERING

Room	Student(s)	Class	Topic
Rieke 222	Melissa Barnett Cassandra Fowler Stephanie Mirie Nika Pelc	499	Computing for Girls Project
Rieke 222	Michael Blackburn Alison Kelley	499	Adjustable Temperature Stabilizing Unit for Water Fixtures
Rieke 222	Danny Blum Scott Cochran	499	Development of Embedded Systems Design Tools for the CSCE Hardware Lab
Rieke 222	Michael Damone Nathaniel Rowe Abdul Samsondeen	499	HouseKeeper Project

Poster Presentation and Demonstration Submitted Abstracts

BIOLOGY

Jillian Foglesong, Matt Smith, & Melissa Wollan: Immunocytochemical Localization of Delta Opioid Receptors in Neuroendocrine Neurons in the Rat Hypothalamus

To determine if GnRH and/or dopaminergic neurons are direct targets of enkephalin, dual-label immunofluorescence was used to simultaneously localize delta opioid receptor (DOR) and GnRH or tyrosine hydroxylase (TH) proteins. Preliminary results demonstrate that GnRH- but not TH-containing neurons contain DOR immunoreactivity.

COMPUTER SCIENCE AND COMPUTER ENGINEERING

Melissa Barnett, Cassandra Fowler, Stephanie Mirie, & Nika Pelc: Computing for Girls Project

Statistics show that girls' interest in computers dramatically decreases around ages 11-14. One suggested remedy is to design software specifically for girls of that age. Our goal is to develop an entertaining and educational web site to promote girls' interest in computers and related fields.

Michael Blackburn & Alison Kelley: Adjustable Temperature Stabilizing Unit for Water Fixtures

This device is designed to monitor and adjust the outlet temperature of a water fixture to maintain it at a user defined level. It is implemented using a microcontroller, input keypad, temperature sensor, seven segment displays, and stepper motors.

Danny Blum & Scott Cochran: Development of Embedded Systems Design Tools for the CSCE Hardware Lab

This project deals with the development of additional hardware lab tools. PLD and microcontroller programmers have been constructed, as well as an application board, which incorporates PLDs and microcontrollers. This board will be exhibited as a tachometer for a line-following robot.

Michael Damone, Nathaniel Rowe, & Abdul Samsondeen: HouseKeeper Project

This project is a comprehensive home management system. It provides a graphical floor plan stored in XML format, a MySQL front end to the household inventory and a hardware-monitoring unit. Java is utilized for drawing the graphics, connecting to MySQL using JDBC, and interfacing with the user.

ENVIRONMENTAL STUDIES

Darren Alkire, Courtney Berner, Aaron Binger, Eric Brady, Jewel Buchanan, Eric Friesth, Ryan Greco, Natalie Gulsrud, Andrea McFarland, Ben Morris, Jens Olsgaard, Jenelle Santie, Dawn Shaw, Kim Smith, Leah Sprain, & John Voigt: ENVT 350 – Environmental Methods of Investigation

The health of the Clover Creek watershed is assessed by examining human activity in the watershed and the state of the creek. Chemical, physical characteristics, biological data for the creek as well as population, land use, economic activity and resources data in the watershed are presented.

Melanie Anderson, Benjamin Carlson, Kim Glidden, Gillian Hanson, Jennifer M. Harsch, Adriana Koessler, & Emily Yates: ENVT 425 – Crystal Waters

Students from the “Ecology, Community and Culture in Australia” course examine sustainability issues, including alternative fuel cars, organically grown food, permaculture versus globalization, energy conservation, raising cattle and kangaroos, and Australian bushfoods.

GEOSCIENCES

Darren Alkire: Grand Teton Overthrust Belt

The poster that I am doing is on the Grand Teton over thrust belt. My poster will show what processes took place to cause the over thrust belt, when they happened, and what they look like. The poster will also cover the effect of the belt on surrounding areas and the geologic composition of the over thrust belt.

Darren Alkire, Matt Faust, Abby Gray, Megan MacDonald, Laura Medsker, Ben Morris, Erin Muske, Andrew Orr, Gil Pepin, Christian Pitzer, Stacia Tellefson, & Denise Thompson: GEOS 350 – Marine Geology

The marine geology of the Juan de Fuca plate is investigated through studies of various aspects of the region. Topics include: sedimentation processes, plate tectonic history, subduction zone processes, hydrothermal circulation and ridge morphology.

Sarah Ervine & Erika Helm: Denali: How to Build a Big Mountain Rapidly Using Tools You Have Lying Around the Planet

This poster looks at the role of movement along the Denali Fault System and glaciation in the creation of the terrain of Denali National Park. We will be focusing our attention on Mt. McKinley itself because it is the biggest mountain in North America.

Kim Fowler, Hans-Petter Grav, & Jon Payne: Mesa Verde Exposed

The green table, Mesa Verde, provided the Anasazi people with life’s necessities, but by 1300 AD they had abandoned their cliff dwellings due to drought. Water had previously deposited sediment and helped form the mesa and its cliffs.

Courtney Johnson, Melissa J. Maloney, & Jody Phipps: Arches National Park: The Sculpting of a Landscape

The formations in Arches National Park provide an excellent example of the effects of weathering and erosion in a relatively dry environment. The arches and other formations seen today represent a slice of geologic history that is 200 million years old.

Janet Killam, Christina Sonnichsen, & Jamie-lyn Willoughby: Crater Lake National Park

Crater Lake National Park, founded in 1902, is located on top of Mt. Mazama. Mt. Mazama erupted about 7000 years ago, causing its summit to collapse inward. This formed the caldera that took 250 years to fill with rain and snow; creating the deepest lake in North America, Crater Lake.

Michelle Kolby, John Michels, & Carlee Smith: Zion: A Ripple Through Time

Flash floods rampage through the vertical walls of the Narrows and landslides roar down the canyon hillsides. The processes of erosion created and are continually carving and forming Zion National Park in southern Utah. Through the downcutting and widening of the Virgin River or through the undercutting caused by the drainage of rainwater Zion is constantly changing with time.

Crystal Krippaehne, Tina Schoelkopf, & Mark Watson: Yosemite: An Ever-Changing Formation

The Yosemite Valley has astonishing rock formations. Mineral composition, joint structure of the rock, and the length of glacial exposure from the last ice age all contribute to the rock formation. Erosion, gravity, and rock falls continue to change the geology of Yosemite.

Benjamin Morris: Geyser Processes and Predictability

Geysers are a major part of hydrothermal systems. Many geysers erupt on a fairly predictable schedule. This predictability may change over time for many reasons, including earthquakes and movement of magma.

Shelby Morris, Janet Sizelove, & Bernie Zimmermann: The Missing Link: Secrets of the Grand Canyon

Although there is an abundance of geologic information available in the rocky cliffs of the Grand Canyon, its history is being eroded away by the power of the Colorado River. Every rock from the Mesozoic Era has been turned into sand and washed away.

Katie Olsen & Rich Vigorito: Badlands National Park

Badlands National Park is an earth sculpture. Wind and water has changed the sedimentary rocks known as The Badlands for 77 million years. The Badlands is full of geologic examples including erosion, volcanism, tectonics, mass movement plus others.

Andrew Orr: Mt. Borah

Mt. Borah is a record of geologic history for southeast Idaho. It is located in the Lost River Range. The range's formation was geologically normal. The deformation caused by the Bruneau-Jarbidge hotspot and events like the 1983 earthquake are unique.

Gil Pepin: The Great Rift of Idaho

The Great Rift is made up of three lava fields: Wapi, King's Bowl, and Craters of the Moon. With a deep mantle source of about 60 km, there are crystal fractionated lavas, contaminated lavas and a uncontaminated basalt which came up through about 60 lava flows, 25 cinder cones, and 8+ fissure systems all driven by tension in the extending crust and deep mantle pressure.

Jody Phipps: Geothermal Activity Around Mammoth Hot Springs

Mammoth Hot Springs is one of the few rimstone pools that exist above ground. Made of travertine, they build a landscape similar to a cave that has been turned inside out. The waters flow across the surface sculpting magnificent travertine terraces.

Kelly Sprake & Stephen L. Vaughn: The Geologic Structure of the Hawaiian Island Hot Spot

We will describe the Hawaiian Island Volcanoes and their creation by the volcanic hot spot, using detailed information on the hot spot, volcano shapes, lava types, mineral composition, and their constructive and destructive processes.

Denise Thompson: Tectonic Models for Progression of the Yellowstone Caldera

The NW US hosts expressions of geologic processes that can be found nowhere else in the world as they are seen on the North American Continent. This project is a literature review of the models that seek to explain the tectonic foundation of the surface expressions.

Jodi Landon, Michelle Mead, & Jeff Tompkins: Lassen: All Plugged Up

Lassen Peak, CA is the only non-stratovolcano in the Cascade Range. Last active in 1917, it is a dacitic plug dome that produces thick magma flows. It also has an active, high-temperature hydrothermal system, which is the most varied outside Yellowstone.