PROCEEDINGS OF THE PACIFIC DIVISION
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Volume 23, Part I **June 13, 2004**

85th ANNUAL MEETING OF THE AAAS PACIFIC DIVISION

PROGRAM WITH ABSTRACTS

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Old Main Hall, Utah State University
(USU Photographic Services)

ANNUAL MEETING OF THE AAAS, PACIFIC DIVISION AND ITS AFFILIATED SOCIETIES AND SECTIONS AT UTAH STATE UNIVERSITY LOGAN, UT June 13 - 17, 2004

GENERAL INFORMATION

ORGANIZATIONS, SOCIETIES, and SECTIONS SPONSORING SESSIONS at the ANNUAL MEETING

The following organizations, societies, and Pacific Division sections are sponsoring sessions at the 85th Annual Meeting of the AAAS Pacific Division:

Western Society of Crop Science
Western Society of Soil Science
Agriculture and Horticultural Sciences Section
Anthropology and Archaeology Section
Atmospheric and Oceanographic Sciences Section
Biological Sciences Section
Chemistry Section
Computer and Information Sciences Section
Earth Sciences Section
Ecology and Environmental Sciences Section
Education Section
Engineering and Industrial Sciences Section
Health Sciences Section
History and Philosophy of Science Section
Psychology Section
Social, Economic and Political Sciences Section

UTAH STATE UNIVERSITY and VICINITY

Utah State University (USU) is located in Logan, at the southern end of the 60 mile long and 15 mile wide Cache Valley. Cache Valley is a true graben, in which the relatively level valley floor has dropped downward between a fault at the base of Wellsville Mountain to the west and the East Cache Fault and the prominent Bear River Range to the east. During the Pleistocene, the valley was submerged by an arm of Lake Bonneville, the ice-age predecessor to the Great Salt Lake. For a time, Lake Bonneville's outlet was north through the valley into Idaho. The University is constructed on the large, gravelly delta formed by the Logan River as it entered Lake Bonneville. The delta lies at the Provo level, and wave cut shorelines on the mountains behind the city mark the highest level of Lake Bonneville.

Located at 4,775 feet in elevation, Logan experiences an average high temperature of 79° F during June. Extremes of heat or prolonged hot spells are uncommon. Humidity is low and summer nights are cool, averaging 46 degrees F in June.

The region is also known as "Bridgerland" in honor of the famous fur trapper, scout and guide, Jim Bridger. Bridger went to work for the Rocky Mountain Fur Company at the age of 20, trapping, exploring and guiding expeditions for 46 years. He is credited with the discovery of the Great Salt Lake, although he believed that it was the Pacific Ocean. During the winter of 1824-25 Bridger and the Fur Company were trapping in what was then known as the Willow Valley. Trapping in the valley was excellent that winter, and the bundles of furs were "cached," or hidden, until spring when they could be

sent to eastern markets. Subsequently, the valley became known as the Cache Valley and it became a major rendezvous location for trappers. The first permanent settlement in the valley occurred in 1856 when seven families at Brigham Young's direction settled at what was first named Maughan's Fort and subsequently became the town of Wellsville.

Logan was founded in 1859. It was named by President John P. Wright after the Logan River, which ran by the early encampment, and also an Indian chief named Logan who had been kind to the settlers in the mid-west. The first buildings were two rows of log cabins with dirt floors and sod roofs, built facing each other after the pattern of Salt Lake City. The streets were wide enough for several wagons to pass each other at one time. The log cabins were replaced with native stone structures and finally structures of brick with wood framing. Although there were other settlements in the valley, Logan attracted the greatest number of settlers because of its location and abundant water supply. At the heart of the city is the Logan Latter-Day Saints Temple. Dedicated in 1877, it is the third oldest LDS temple in Utah and the structural and spiritual center of the valley. Downslope from the temple, in the Center Street neighborhood, are many historical homes constructed in the Queen Anne, Neoclassical, Prairie, and Spanish Revival styles.

With a population of over 45,000 in 2002, Logan is the commercial and cultural center of the Cache Valley. Downtown Logan has over 200 outlets, and the Cache Valley Mall features over 40 stores. Agriculture continues to dominate the basic economy, and the valley is known as the "garden spot of Utah." However, the city does have over 60 manufacturing industries. Culturally, Logan hosts the Summerfest Art Faire and Jazz Festival, Summer Theater, the Utah Festival Opera, and the Festival of the American West. The Nora Eccles Harrison Museum of Art on the Utah State University campus is a recognized center for 20th century sculpture, ceramics, painting, graphic arts, photography, and American Indian arts in the West.

Recreationally, the region has much to offer. The 40 mile Logan Canyon Scenic Byway provides breathtaking scenery alongside a rushing river. Geological markers, picnic spots and camping facilities are located throughout the canyon. Hiking and biking trails are well marked. Logan has several nearby golf courses. The Roland V. Jensen Living Historical Farm is 6.5 miles southwest of the University on Highway 89. Visitors travel back in time and can see how a farm of 1917 functioned, when farm work was done by horses. In Amalga, about 10 miles north of Logan, the Cache Valley Dairy Association operates one of the world's largest Swiss cheese factories, producing 60,000 pounds of cheese each day. Visitors can take a self-guided tour and sample many varieties of cheese.

Utah State University was founded in 1888 as the Agricultural College of Utah in order to "give young men and women in Utah a liberal education." The institution was subsequently known as the Utah State Agricultural College and, in 1957, was renamed Utah State University. In 1902 the landmark Old Main building, the oldest academic building in Utah in continual use, was completed. In 1983 portions of Old Main were destroyed by fire. The burned areas were subsequently restored and the rest of the building was renovated. R.O.T.C. came to the Agricultural College campus in 1918, with 450 men being trained by the end of World War I. In 1945, toward the end of World War II, a small group of German and Italian prisoners were housed on the Utah State Agricultural campus. The P.O.W. camp was decommissioned in the fall of 1946.

As a Carnegie Foundation Research I Institution, the University currently supports basic and applied research in a wide variety of areas. Total research expenditures in 2003 are projected at 141 million dollars. USU was the first university in the nation to have student experiments aboard NASA space shuttle flights and has flown more shuttle experiments than any other university. University research has resulted in the start-up of over 40 high-technology companies in the Cache Valley. The University has a strong presence in the international arena, with research and education efforts in 23 countries.

In Fall 2003, the student body included 23,474 students, 70 percent of them coming from Utah and about 4.4 percent international students from 84 countries. About 10.7 percent of the student body is enrolled in the 47 doctoral and 102 master's programs offered by the School of Graduate Studies. In 2003, the faculty approved 2,773 bachelor's, 925 master's and 59 doctorate degrees.

The 719 instructional faculty of Utah State University are organized into 41 academic departments within the seven colleges of Agriculture; Business; Education and Human Resources; Engineering; Humanities, Arts, and Social Sciences; Natural Resources; and Science. Extension County Agents are found in each of Utah's 29 counties. Faculty members develop and deliver educational programs based on the needs of local communities.

The 400 acre main campus features stately academic buildings surrounded by carefully groomed landscaping. Old Main Hall is a state arboretum with trees and shrubs native to Utah. Another 7,000 acres located throughout the state are used for agricultural and other research. The University Libraries — Merrill Library, Science and Technology Library, and Quinney Natural Resources Library — house more than 1,400,000 volumes, 13,979 periodicals, 1,200,000 federal publications titles, 76,600 USGS topographic maps covering the entire U.S., 2,203,000 microform items, and other film and video resources.

REGISTRATION

The Registration Center will be in the foyer of the Eccles Science Learning Center (previously Widtsoe Hall and Maeser

Entrance to Eccles Science Learning Center, Utah State University

Lab) on the Utah State University campus. Hours for registration are:
Sunday, 2:00 - 5:00 p.m.
Monday, 8:00 a.m. - 5:00 p.m.
Tuesday, 8:00 a.m. - 5:00 p.m.
Wednesday, 8:00 a.m. - 2:00 p.m.

About field trips: Advance registration was required for all field trips due to limited seating in the vans and the need to inform some destinations of numbers of people arriving. However, space may be available on some of the excursions. If you are interested in one or more trips, inquire at the Registration Desk to see if space is still available. Please remember that at least one member of a family group requesting a field trip must be a paid meeting registrant.

The fees for registration are Professional, $80; Teachers K - 14, $60; Students, $40; Retired and Emeritus, $60; Participating Spouse, $40; One-day, $60.

ACCOMMODATIONS and FOOD SERVICE

Residence Halls: Housing is available in the Utah State University residence halls for $15/night double or $25/night single. The residence halls consist of apartments with shared bathroom, living and dining areas, and three bedrooms. Each bedroom has two single beds and can accommodate a maximum of two persons per room. If you rent an entire apartment (all three bedrooms), you will be the only one in the apartment. If you rent one bedroom (single or double), you (and your roommate if applicable) will not have the entire apartment to yourself. If you rent a shared room and do not specify a roommate, a roommate will be assigned to your bedroom. Please be aware that individual bedroom doors do not have locks. Bedding is provided (sheets, blanket, pillow, pillowcase). No maid service or towels are provided. Elevators, ice machines, air conditioning, extra pillows, and blankets are not available. Individual apartment phones are also not available. However, pay phones are within walking distance. **No smoking is allowed in the facilities, including the bedrooms.**

Contacting residence hall staff: Should you need to contact residence hall staff, please call USU Housing Services, 800-863-1085 or 435-797-0277.

University Inn: The University Inn is a full-service hotel operating on the University of Utah campus. It is located within a five minute walk of all rooms used in this meeting. Amenities include free covered parking, free Aggie Ice Cream token for every guest, 24-hour guest services, all rooms non-smoking, access to USU fitness facilities, swimming pools, and outdoor tennis courts, full-size iron and ironing board, hair dryer, in-room coffee and hot chocolate, computer data port, cable TV with movie channels, a study table or desk, and electronic key access. Almost all rooms have two queen beds. Please note that **all rooms are non-smoking. The University Inn will assess a $199 cleaning fee to any lodging room that has been smoked in.**

Check-in time begins at 3:00 p.m. and check-out time is no later than 12:00 p.m. If you arrive prior to 3:00 p.m., the University Inn staff will make every attempt to accommodate you. However, in the event that rooms are not available, arrangements will be made to store your luggage until your room is available. In order to contact University Inn staff, call 800-231-5634 or 435-797-0017.

On-Campus Dining: The Taggart Student Center offers a variety of dining opportunities. The HUB, located on the east end of the bottom floor of the Taggart Student Center, has eight dining choices and is open for breakfast, lunch, and dinner. Varieties include Taco Time, Pizza Hut, Teriyaki Stix, Hogi Yogi, Sunset Strips, the Grill, fresh gourmet coffee at Cafe Ibis, and Aggie Ice Cream. The QUICKSTOP is at the west end of the Taggart Student Center, bottom floor, and offers a quick pick-up for small grocery items, a snack, or fast meal. CAROUSEL SQUARE offers casual dining, with a choice of Mexican entrees, wraps, a sandwich bar, a salad bar, and the MAIN DISH, which features daily entree specials. The Carousel Square also has fresh pasta and daily vegetarian specials. It is located on the second floor of the Taggart Student Center. The SKYROOM, located on the fourth floor of the Taggart Student Center, offers a full menu of fresh, chef-prepared entrees on Monday, Wednesday, and Friday. On Tuesday and Thursday they offer an all-you-care-to-eat buffet.

There is also a variety of restaurants, from fast food to elegant dining, in the vicinity of the University campus and a short distance away in downtown Logan.

Taggart Student Center (L.) and University Inn (R.)

Local off-campus accommodations: There are many hotels and motels in the Logan area. Nearby options include:

- **Alta Manor Suites**
  45 East 500 North, Logan, UT
  435-752-0808
- **Anniversary Inn Bed & Breakfast**
  169 East Center St., Logan, UT
  435-752-3443
- **Baugh Mansion**
  164 West 100 North, Logan, UT
  435-750-5860
- **Baugh Motel Best Western**
  153 South Main Street, Logan, UT
  435-752-5220 or 800-528-1234
- **Clint's Bed & Breakfast**
  165 North State St., Richmond, UT
  435-258-3768
- **Comfort Inn**
  447 North Main St., Logan, UT
  435-752-9141 or 800-424-6423
- **Crystal Inn**
  853 South Hwy. 89/91, Logan, UT
  435-752-0707
- **Days Inn**
  364 South Main St., Logan, UT
  435-753-5623
- **Logan House Inn**
  168 North 100 East, Logan, UT
  435-752-7727
- **Providence Inn Bed & Breakfast**
  10 South Main St., Providence, UT
  435-752-3432
- **Sherwood Hills Best Western**
  Hwy. 89/91, Wellsville, UT
  435-245-5054
- **Super 8 Motel**
  865 South Main St., Logan, UT
  435-753-8883
- **Weston Inn Best Western**
  250 North Main St., Logan, UT
  435-752-5700

Note that the AAAS Pacific Division presents the above hotels and motels for information only, not as an endorsement for any specific commercial enterprise.

TRANSPORTATION and CAMPUS PARKING

By Automobile: Utah State University is located 83 miles northeast of Salt Lake City and 20 miles south of the Utah-Idaho border. From Salt Lake City, drive north on I-5 past Ogden and Willard and take exit 364 to Logan via Hwy 89/91. Continue through the scenic Sardine Canyon. Hwy 89 becomes Main Street in Logan. Turn right on 400 North. Continue to 700 East and turn left. Continue up the hill, curving to the right. After going through the intersection at the top of the hill, the Parking Terrace will appear on the right. The University Inn and Taggart Student Union are behind the parking lot and adjacent to the Parking Terrace. To check in at the University Inn, turn right into the parking lot and proceed through the gate to the end of the lot.

By Air: Logan is not served by a commercial carrier. However, Salt Lake City is served by major airlines. Car rentals are available at the airport. Cache Valley Limousine Airport Service offers shuttle service from the airport to Logan. As of May 8, 2004, the cost of the limousine service for one person was $44 one-way or $78 round trip. For two persons traveling together the cost was $59 one-way and $98 round-trip, and for three persons traveling together the cost was $74 one-way and $118 round-trip, a significant per-person savings over the single person rate. The trip takes about 1.5 hours. Reservations should be made at least a day in advance by calling 800-658-8526 or 435-563-6400.

Parking: Validation parking for the Parking Terrace will be provided to registrants staying in the University Inn. Registrants staying in the University Residence Halls will be given complementary passes for the adjacent parking lot, about a five minute walk to the Eccles Science Learning Center. Others may park in the Parking Terrace and pay the daily fee, currently $5.00.

MEETING ROOMS

Sessions will meet in the new Eccles Science Learning Center, the Agricultural Sciences Building, the Taggart Student Center, and the University Inn. Each meeting room will be equipped with a 35 mm slide projector, an overhead projector, and a standard computer projector. Speakers requiring other specialized equipment must have made their requests when they submitted their abstracts. Specialized equipment can only be provided if available. If rental costs are incurred for specialized equipment, payment is the responsibility of the requestor.

A Speaker's Preview Room, complete with projection equipment, is in Agricultural Sciences 315 and will be available M, T, and W from 8:00 a.m. - 3:30 p.m.

POSTER SESSIONS

Posters will be assigned display spaces of 40 in. X 60 in. (1 m X 1.5 m). Requests for additional space must have been made in advance. *By action of the Pacific Division Council in order to assure fairness, all student posters must fit within the assigned display space of 40 in. X 60 in. to be eligible for student Awards of Excellence. A request for extra space will disqualify a student from the award competition.*

Posters will be grouped by discipline and subject matter. Presenters should set up their posters no less than 15 minutes before the beginning of their presentation session. Presenters are expected to be available to discuss their work for at least

one hour during the time their poster is on display. Posters should remain in place until the close of the session, and be removed within 15 minutes of that time. Student posters will be judged for awards of excellence. Students must be present during the judging of posters. Additional information is found on page 29.

SPECIAL EVENTS

Sunday Evening Welcome Wagon and Cracker Barrel Mixer, hosted by the Pacific Division and its affiliated societies and sections. All registrants and their families are invited to enjoy the conviviality of this social on June 13, immediately following the evening lecture, at about 8:00 p.m. A selection of soft drinks, chips and pretzels, and good conversation will be available. It will be held in the foyer next to Eccles Science Learning Center 007 (WIDT 007).

Monday Evening USU President's Reception. Utah State University President *Kermit L. Hall* will welcome conferees at an informal hosted reception following the AAASPD Presidential Lecture, about 8:00 to 9:30 p.m., in the foyer of Eccles Science Learning Center. All participants and their families are invited to enjoy this relaxed occasion. Non-registered family members are welcome, but must be accompanied by a registrant. Please wear your registration badge.

Tuesday Evening Reception, Banquet, and Announcement of the Winners of the Student Awards for Excellence. The no-host Divisional Dinner will be held Tuesday evening beginning at 6:00 p.m. at the Bullen Center, 43 South Main Street in Logan. The cost is $25 per person and you must have purchased your ticket in advance. Students who are in competition for an Award of Excellence are invited to attend as guests of the Division. Dinner will be preceded by a reception. Wine, beer and a variety of soft drinks will be available, starting about 6:00 p.m. Following dinner, Division representatives will announce the names of student winners of affiliated society and sectional Awards of Excellence and also winners of the Division's Laurence M. Klauber Award for Excellence (unrestricted), Geraldine K. Lindsay Award for Excellence in the Natural Sciences, J. Thomas Dutro, Jr. Award for Excellence in the Geosciences, Rita W. Peterson Award for Excellence in Science Education, the President's Award for Excellence (unrestricted), the Best Poster Award (for poster presentations only but otherwise unrestricted), and the AAAS–Robert I. Larus Travel Award, which provides for travel and other expenses for the awardee to attend the 2005 annual meeting of AAAS in Washington, D.C., February 17 - 22, in order to present his/her winning presentation as a poster.

The Klauber, Lindsay, Dutro, Presidents', Best Poster, Peterson, and AAAS–Larus awards are given to those students whose presentations are judged the most significant in the advancement or understanding of science. Eligible students must: (1) register for the meeting, (2) present the paper or poster, and (3) be the principal research investigator. Student presentations, oral and poster, are judged on their abstracts, content, style of delivery or presentation, and audiovisual aids and/or handouts (if used). The evaluation forms (oral and poster) are posted on the Division's website.

Following the presentation of student awards will be a talk, by Dr. Jan Sojka, Assistant Director of the Center for Atmospheric and Space Scicnces and Professor of Physics at Utah State University, on the USU "Get Away Special" space shuttle program.

Business Meeting of the Council of the Pacific Division. The Council of the AAAS, Pacific Division will hold its annual breakfast and business meeting at 7:00 a.m. on Wednesday, June 16, in the Center Colony Room at the Taggart Student Center. The Council will elect officers, discuss programs for the 2005 and 2006 annual meetings, and transact such other business as is required by the Division's By-Laws.

STUDENT AWARDS for EXCELLENCE

The AAAS, Pacific Division offers each affiliated society and section participating in the annual meeting the opportunity to recognize outstanding student participants through the presentation of awards of excellence and cash prizes of $175 for first place and $100 for second place. Societies often supplement these awards with their own cash prizes.

In 2004, seven Division-wide awards are available: Laurence M. Klauber Award for Excellence (unrestricted); Geraldine K. Lindsay Award for Excellence in the Natural Sciences; J. Thomas Dutro, Jr. Award for Excellence in the Geosciences; Presidents' Award for Excellence (unrestricted); Rita W. Peterson Award for Excellence in Science Education; Best Poster Award (for posters only but otherwise unrestricted); and the AAAS-Robert I. Larus Travel Award, which provides travel and other expenses for the awardee to attend the 2005 annual meeting of AAAS in Washington, D.C., February 17 - 22, 2005, for the purpose of presenting his/her paper as a poster.

The Klauber, Lindsay, Dutro, Presidents', Peterson, Best Poster, and Larus awards are given to those students whose presentations are judged the most significant in the advancement or understanding of science. To be eligible, a student must (1) be registered for the meeting, (2) be the principal research investigator on the project, and (3) present the paper or poster. Student presentations, oral and poster, are judged on their abstracts, content, style of delivery or presentation, and audiovisual aids and/or handouts (if used). The evaluation forms for both oral and poster presentations are posted on the Division's website. Students who are in competition for awards are invited to be the Division's guests at the Division Banquet Tuesday evening, June 15. Festivities

that evening include the presentation of student awards. Tickets must have been reserved in advance on the Registration Form and picked up by noon on Tuesday.

PUBLIC LECTURES

Members of the general public are invited to attend these special lectures at no cost.

Sunday, June 13
7:00 p.m.
Eccles Science Learning Center 007 (WIDT 007)

"Using Ecological Insight to Promote Drug Discovery and Conservation in Tropical Forests," *Dr. Phyllis Coley* (Department of Biology, University of Utah, 257 S 1400 EAST, Salt Lake City, UT 84112).

Monday, June 14
12:15 p.m.
Taggart Student Center, Walnut Room.

"Cerebral Laterality and Cerebral Dominance: Fact or Fiction?" *Dr. Fred C.C. Peng* (Neurological Institute, Department of Neurosurgery, Veterans General Hospital–Taipei, Taipai, Taiwan 11217).

Monday, June 14
7:30 p.m.
Eccles Science Learning Center 007 (WIDT 007)

Annual Presidential Lecture, *Dr. William B.N. Berry* (Department of Earth and Planetary Sciences, 307 McCone Hall, University of California, Berkeley, CA 94720-4767), President of the Pacific Division.

Tuesday, June 15
12:15 p.m.
Taggart Student Center, Walnut Room

"Beyond Global Warming: Global Cooling and the Next Ice Age," *Aden B. Meinel[1] and Marjorie P. Meinel[2]* ([1]Professor Emeritus, Department of Astronomy and the Optical Sciences Center, University of Arizona, Tucson, AZ, and Emeritus Distinguished Scientist, Jet Propulsion Laboratory, Observational Systems Division, California Institute of Technology, Pasadena, CA; [2]Retired, Jet Propulsion Laboratory, Observational Systems Division, California Institute of Technology, Pasadena, CA).

Wednesday, June 16
12:15 p.m.
Taggart Student Center, Walnut Room

"Command Strategies of the 9-11 Terrorist Attack on the World Trade Towers," *Mr. Henry Oman* (Consulting Engineer, 19221 Normandy Park Drive SW, Seattle, WA 98166).

Wednesday, June 16
7:30 p.m.
Eccles Science Learning Center, Room 053

"An overview of Yellowstone Park: 1872-2004," *Drs. J. Thomas Dutro[1] and Alan E. Leviton[2]* ([1]US Geological Survey, Room E 308, National Museum of Natural History, MRC-137, Washington D.C. 20560-0137, [2]Department of Herpetology, California Academy of Sciences, 875 Howard St., San Francisco, CA 94103).

TOURS of the USU CENTER for INTEGRATED BIOSYSTEMS

The Center for Integrated BioSystems at Utah State University leads a progressive, interdisciplinary effort in research, core services, and biotechnology education serving agriculture and life sciences. The Center is a consortium of faculty, technical and office staff housed in a central facility on the USU campus. We collaborate and train scientists in academia, industry and national laboratories. The mission of the Center is to enhance society through the discovery and use of knowledge in functional genomics, proteomics, bionetworks and bioinformatics via a biosystems perspective.

We invite you to come and visit our facility during the AAAS Pacific Division meeting. We will give interested groups a guided, 20 – 30 minute tour of the facility. The times are:

Wednesday, 12:00 p.m.
Wednesday, 1:00 p.m.
Wednesday, 4:00 p.m.

Please meet in front of the Biotechnology Center, which is behind the Agricultural Sciences Building. Advance notice is not required.

For a tour at another time, please inquire at the front desk of the Biotechnology Center.

FIELD TRIPS

All field trips are open to meeting registrants and their families. Due to limited space, advance registration is required for all trips. Occasionally, cancellations occur. If you are interested in one or more of these excursions, check at the Registration Desk on availability of space.

All field trips depart from and return to the open parking lot immediately in front of the University Inn (not the parking structure next to the University Inn). Plan on arriving a few minutes early. It's always a good idea to bring along a day pack and extra water, especially if the weather is warm. Please dress according to the weather and bring a hat and sun screen. Depending on the activities of the field trip, you may want to include a pair of binoculars and/or other items.

If you are going on one of the Sunday field trips, Pacific Division staff will be providing drivers with lists of participants so you do not need to worry about picking up your registration packet in advance. Registration will stay open until at least 5:00 p.m. on Sunday, perhaps a bit later to allow field trippers the opportunity to pick up their registration packets upon their return. Otherwise, registration will be open at 8:00 a.m. on Monday.

SUNDAY

(1) Preston Valley Trail. Sunday, June 13: 9:00 a.m. — mid-afternoon. Departs from the parking lot in front of the University Inn.

Fee: $20, which includes transportation, field guide and sack lunch.

Led by Mary Barkworth and Michael Piep (Department of Biology and Intermountain Herbarium, Utah State University), the Preston Valley Trail has probably more plant species per linear foot than any other trail near to Utah State University that is open in mid-June. It is narrow and winds up the north side of the ridge separating Green Canyon from Logan Canyon. We shall take it slowly, and possibly break into two groups – one continuing to the ridge and the other stopping lower down. The trail starts at about 5,900 feet in elevation in a shady maple area, winds to open slopes with mountain mahogany, then around and around to Douglas fir, breaking out at the top to a wonderful view over both canyons at an elevation of about 8,100 feet. The views are superb all the way up so those who decide not to go to the top will still have a great day. Bring a day pack for lunch and water. Birders will want to bring binoculars. Don't forget to dress for the weather and bring a hat, sunscreen, and closed-toe shoes.

(2) History of local Indians, Mountain Men and early Mormon Settlements. Sunday, June 13: 8:00 a.m. — 5:00 p.m. Departs from the parking lot in front of the University Inn.

Fee: $35, which includes transportation and sack lunch. Raspberry shakes, if available, are on your own.

Ross Peterson, Professor of History and Director of the Intermountain Center for Regional Studies will lead this trip, which heads up through Logan Canyon to Bear Lake, with a brief stop at the lake for raspberry shakes. We will then travel north along Bear Lake before turning south over the Wasatch Mountains into Cache Valley to the site of the Bear River Massacre.

(3) Idaho Museum of Natural History. Sunday, June 13: 9:00 a.m. — 4:00 p.m. Departs from the parking lot in front of the University Inn at 9:00 a.m.

Fee: $35, which includes transportation, entry to the museum, and sack lunch.

This trip will follow the Lake Bonneville channel north to the Idaho Museum of Natural History.

WEDNESDAY

(4) Wasatch Formation. Wednesday, June 16: 9:00 a.m. — 5:00 p.m. Departs from the parking lot in front of the University Inn at 9:00 a.m.

Fee: $25, which includes transportation and sack lunch.

Sponsored by the Western Society of Soil Science and led by Dr. Janis Boettinger (Department of Plants, Soils, and Biometeorology at USU), this field trip departs from the parking lot in front of the University Inn at 9:00 a.m, travelling up Logan Canyon to view glaciation in the Wasatch Formation, forest soils, glacial moraines, and ancient tropical soils.

THURSDAY — SATURDAY

(5) Yellowstone National Park. Thursday, June 17 — Saturday, June 19. Departs from the parking lot in front of the University Inn at 8:00 a.m. on Thursday. Returns about 5:00 p.m. on Saturday. Participants are advised to make arrangements for Saturday night in advance.

Fee: $275, which includes transportation by charter tour bus, written materials, and lunches. Other meals and items of personal nature are the responsibility of participants. Double occupancy only. If you are traveling alone, we will make every attempt to match you with another single participant of the appropriate gender. If we are unable to match you, we will refund the entire amount you paid for the trip. Minimum 18, maximum 25 participants.

Led by J. Thomas Dutro, Jr., retired from the U.S. Geological Survey and National Museum of Natural History (Smithsonian) and Alan E. Leviton, Chair of the Herpetology Department and Director of Scientific Publications at the California Academy of Sciences, 875 Howard St., San Francisco, CA. We depart Logan and travel north, entering Yellowstone National Park through the west entrance at West Yellowstone, Montana. Both nights will be spent at Old Faithful Inn. Thursday afternoon and Friday we will tour the two main loops of Yellowstone, observing the many hot springs and other signs of volcanic activity. Saturday morning we will depart Yellowstone, again through the west entrance, and return to Logan after a detour to Craters of the Moon National Monument.

notes

GENERAL SESSIONS

Sunday, June 13

EVENING PUBLIC LECTURE

Eccles Science Learning Center 007 (WIDT 007)
7:00 p.m.

"Using Ecological Insight to Promote Drug Discovery and Conservation in Tropical Forests," *Dr. Phyllis Coley* (Department of Biology, University of Utah, 257 S 1400 EAST, Salt Lake City, UT 84112).

WELCOME WAGON/CRACKER BARREL

Foyer in front of WIDT 007 (see above)
7:45 p.m.

Hosted by the AAAS Pacific Division and its affiliated societies and sections, all registrants and their families are invited to enjoy the conviviality of this event. A selection of soft drinks, chips, pretzels and good conversation will be available.

Monday, June 14

NOON PUBLIC LECTURE

Taggart Student Center, Walnut Room
12:15 p.m.

"Cerebral Laterality and Cerebral Dominance: Fact or Fiction?" *Dr. Fred C.C. Peng* (Neurological Institute, Department of Neurosurgery, Veterans General Hospital–Taipei, Taipai, Taiwan 11217).

AAASPD PRESIDENTIAL LECTURE

Eccles Science Learning Center 007 (WIDT 007)
7:30 p.m.

Annual Presidential Lecture, *Dr. William B.N. Berry* (Department of Earth and Planetary Sciences, 307 McCone Hall, University of California, Berkeley, CA 94720-4767), President of the Pacific Division.

USU PRESIDENT'S RECEPTION

Foyer of Eccles Science Learning Center
8:15 p.m.

Utah State University President, Dr. Kermit L. Hall, will welcome conferees at an informal, hosted reception. All registrants and their families are invited to enjoy this relaxed occasion. Non-registered family members are welcome, but must be accompanied by a registrant. Please wear your registration badge.

Tuesday, June 15

NOON PUBLIC LECTURE

Taggart Student Center, Walnut Room
12:15 p.m.

"Beyond Global Warming: Global Cooling and the Next Ice Age," *Aden B. Meinel[1] and Marjorie P. Meinel[2]* ([1]Professor Emeritus, Department of Astronomy and the Optical Sciences Center, University of Arizona, Tucson, AZ, and Emeritus Distinguished Scientist, Jet Propulsion Laboratory, Observational Systems Division, California Institute of Technology, Pasadena, CA; [2]Retired, Jet Propulsion Laboratory, Observational Systems Division, California Institute of Technology, Pasadena, CA).

WESTERN SOCIETY of SOIL SCIENCE

Business Meeting
Agricultural Sciences 234
1:30 p.m.

WESTERN SOCIETY of CROP SCIENCE

Business Meeting
Agricultural Sciences 202
3:15 p.m.

RECEPTION and STUDENT AWARDS BANQUET

Bullen Center
43 S. Main Street, Logan
6:00 p.m.

The annual Pacific Division Banquet and Student Awards Banquet will be held at the Bullen Center, 43 S. Main St. in Logan. Starting at 6:00 p.m. will be a no-host reception. Wine, beer and a variety of soft drinks will be available.Dinner will start about 7:00 p.m. The cost is $25 and you must purchase a ticket in advance. Students who are in competitiion for Awards of Excellence are invited to be guests of the Division. Students must have indicated their intention of attending the banquet on their registration form and must have picked up their ticket by noon on Tuesday at the Registration Desk. Following dinner will be the announcement of the winners of the Awards of Excellence for the affiliated societies and sections of the Pacific Division. Winners of Division-wide awards will also be announced. Dr. Jan Sojka, Assistant Director of the Center for Atmospheric and Space Sciences and Professor of Physics at Utah State University will give a brief after-dinner talk on the USU "Get Away Special" space shuttle program.

Wednesday, June 16

COUNCIL of the PACIFIC DIVISION

Business Meeting
Taggart Student Center, Center Colony Room
7:00 a.m.

The Council of the AAAS Pacific Division will holds its annual business meeting and breakfast at 7:00 a.m. on Wednesday, June 16. The Council will elect officers, discuss programs for the 2005 and 2006 annual meetings, and transact such other business as is required by the Division's By-Laws. Visitors are welcome.

NOON PUBLIC LECTURE

Taggart Student Center, Walnut Room
12:15 p.m.

"Command Strategies of the 9-11 Terrorist Attack on the World Trade Towers," *Mr. Henry Oman* (Consulting Engineer, 19221 Normandy Park Drive SW, Seattle, WA 98166).

EVENING PUBLIC LECTURE

Eccles Science Learning Center, Room 053
7:30 p.m.

"An Overview of Yellowstone Park: 1872-2004," *Drs. J. Thomas Dutro[1] and Alan E.Leviton[2]* ([1]US Geological Survey, Room E 308, National Museum of Natural History, MRC-137, Washington D.C. 20560-0137, [2]Department of Herpetology, California Academy of Sciences, 875 Howard St. San Francisco, CA 94103).

TECHNICAL SESSIONS

1100 (time italicized and underlined) indicates a student presentation in competition for Awards of Excellence.
* indicates the speaker from among several authors listed.

I. SYMPOSIA and WORKSHOPS

Monday, June 14

HALF-DAY SYMPOSIA
MONDAY MORNING

ECOSYSTEM, SUSTAINABILITY and HEALTH

Agricultural Sciences 338
Monday
8:30 a.m. – 11:50 a.m.

Sponsored by the Pacific Division Sections on Agriculture and Horticulture and Ecology and Environmental Sciences.

Agriculture has changed dramatically, especially since the end of World War II. These changes allowed fewer farmers to produce the majority of the food in the U.S. Although these changes have had many positive effects, there have also been significant costs. Prominent among these are topsoil depletion, groundwater contamination, the decline of family farms, and the disintegration of economic and social conditions in rural communities. Sustainability rests on the principle that we must meet the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable agriculture integrates environmental health, economic profitability, and social and economic equity. Finally, *reaching toward the goal of sustainable agriculture is the responsibility of all participants in the system.*

Chair: Tilak R. Dhiman (Animal, Dairy and Veterinary Sciences, Utah State University).

0830 *Linking Plant Biochemical Diversity, Herbivore Culture, and Over-Grazing by Livestock: Have We Trained Herbivores to Over-Graze Rangelands?* FREDERICK D. PROVENZA (Dept. of Forest, Range, and Wildlife Sciences, Utah State Univ., Logan, UT).

0915 *Managing Forward by Looking Backward: Building Sustainable Grazing Operations,* BOB BUDD (Director of Land Management, The Nature Conservancy in Wyoming, 350 Red Canyon Road, Lander, WY).

BREAK

1020 *Potential Human Health Benefits of Forage Based Milk and Meat,* TILAK R. DHIMAN (Animal, Dairy and Veterinary Sciences, Utah State University, Logan, UT).

1105 *Geospatial Technology Applications for Agricultural Sustainability,* V. PHILIP RASMUSSEN[1] and DENNIS L. WRIGHT[2] ([1]NASA Geospatial Extension Program, [2]NASA Affiliated Research Center, Plants, Soils, Biometeorology Department, Utah State University, Logan, UT).

ELECTROMAGNETIC TECHNIQUES in SOIL SCIENCE

Agricultural Sciences 234
Monday
8:40 a.m. – 11:30 a.m.

Sponsored by the Western Society of Soil Science

The success of time domain reflectometry (TDR) sparked interest in a variety of other electromagnetic methods of investigating soil water, salinity, geometry and interfacial properties. Methods such as impedance, ground penetrating radar and electromagnetic induction are being used to determine soil properties with a minimum disturbance. Moreover, some of these techniques have potential applications to mapping soil properties on field or larger scales. This seminar will bring together researchers using a variety of electromagnetic methods to report on the state of the science.

Presiding: Lynn M. Dudley (Department of Plants, Soils & Biometeorology, Utah State University).

0840 *Welcome,* Matthew La Force (Geosciences Department, San Francisco State University)

0845 *Electrical Spectra of Soils Determined by Vector Network Analyzer,* SALLY D. LOGSDON (USDA-ARS-National Soil Tilth Laboratory, Ames, IA).

0900 *Low Frequency Impedance Analysis of Soils,* ROBERT N. LOVE*[1], LYNN M. DUDLEY[1], and STEPHEN BIALKOWSKI[2] ([1]Department Plant, Soils & Biometeorology., [2]Department of Chemistry & Biochemistry, Utah State University, Logan, UT).

0915 *Geometrical effects on electromagnetic wave interaction with moist materials,* DAVID A. ROBINSON*[1], S. B. JONES[1], S.P. FRIEDMAN[2], M. BLONQUIST[1], and M.G. SCHAAP[3] ([1]Department of Plants, Soils and Biometeorology, Utah State University, Logan UT; [2]Volcani Center (ARO), Bet Dagan, Israel; [3]GEB Jr. Salinity Lab USDA-ARS, Riverside, CA).

0930 *Toward Standardizing Electromagnetic Sensor Characterization and Calibration,* SCOTT B. JONES*[1], J. MARK BLONQUIST JR[1]., DAVID A. ROBINSON[1], V. PHILIP RASMUSSEN[1] and DANI OR[2] ([1]Dept. Plants, Soils and Biometeorology, Utah State University, Logan UT; [2]Civil & Environmental Engineering Department; University of Connecticut, Storrs, CT).

0945 *A Low Cost Time Domain Transmission Sensor with TDR Performance Characteristics,* J. M. BLONQUIST*, JR., S. B. JONES, and D. A. ROBINSON (Department of Plants, Soils, and Biometeorology, Utah State University, Logan, UT).

BREAK

1030 *Automated Analysis of TDR Waveforms for Water Content Determination in Saline Soils,* SETH HUMPHRIES*[1], SCOTT B. JONES[1], and DANI OR[2] ([1]Department of Plants, Soils, and Biometeorology, Utah State University, Logan, UT; [2]Civil & Environmental Engineering Department, University of Connecticut, Storrs, CT).

1045 *EM-38 Calibration for Salinity Assessment in the Arkansas Valley*, JAMES WITTLER (Soil and Crop Science Department, Colorado State University, Ft. Collins, CO).

1100 *Common and Multi-Offset Ground Penetrating Radar in Assessing Soil Water Content and Dynamics in the Vadose Zone,* ROBERT HEINSE*[1], DANA LAASS[2] and PETER SCHIKOWSKY[2] ([1]Department of Plants, Soils and Biometeorology, Utah State University, Logan, UT; [2]Institute of Geophysics and Geology, Leipzig University, Leipzig, Germany).

1115 *Comparison of Synthetic Aperture Radar (SAR) Data with NOAA AVHRR Derived NDVI in the Gaza-Negev-Sinai Border Regions*, GUY SERBIN*[1], GIL REVIVO[2] and DAN G. BLUMBERG[3] ([1]Department of Plants, Soils and Biometeorology, Utah State University, Logan, UT; [2]Simigon Distributed Training Solutions, Herzliya, Israel; and [3]Department of Geography and Environmental Planning, Ben Gurion University of the Negev, Beer Sheva, Israel).

COLORADO PLATEAUX to GREAT BASIN — A NATURAL LABORATORY from GRADE SCHOOL to GRAD SCHOOL

Agricultural Sciences 302
Monday
10:00 a.m. – 11:20 a.m.

Sponsored by the Pacific Division Section on Education

The Colorado Plateaux and Great Basin are occupied by, or surrounded by, a large number of educational institutions that work with all ages of "students", grade school through grad school and beyond. This is an open symposium to allow everyone interested an opportunity to share the sorts of activities they are carrying out in these spectacular regions of western North America.

Chair: C. Frederick Lohrengel II (Department of Geology, Southern Utah University, Cedar City, UT).

1000 *A Cooperative University – Middle School Ecosystem Field Experience along the Colorado Plateaux – Great Basin Transition of Southern Utah,* HAROLD ORNES (College of Science, Southern Utah University, Cedar City, UT).

1020 *Recruiting Quality Majors: New York High School Students Experience the Geology of Southern Utah,* MARK R. COLBERG, ROBERT L. EVES, and C. FREDERICK LOHRENGEL II (Division of Geosciences, Southern Utah University, Cedar City, UT).

1040 *Natural History of the Colorado Plateaux and Basin and Range: A K-12 - National Park Cooperating Association - University Partnership,* G. POLLOCK[1], D. CANTU[1], R.L. EVES[2], J.E. BOWNS[2], and R.L. MARTIN[2] ([1]Bryce Canyon Natural History Association, Bryce Canyon, UT; [2]Southern Utah University,Cedar City, UT).

1100 *Brian Head Field Ecology: Pros and Cons of Applied Ecology and Education Partnerships on the Colorado Plateaux*, KATE GRANDISON (Biology Department, Southern Utah University,Cedar City, UT).

EDUCATION WORKSHOP

ENHANCING ACTIVE LEARNING THROUGH KNOWLEDGE CONSTRUCTION USING the SEMANTIC NETWORKING PROGRAM, *Semantica* Education 3.0.3

Agricultural Sciences 119
Monday
10:00 a.m. – 12:00 p.m.
repeated
Wednesday
1:00 p.m. – 3:00 p.m.

If you haven't preregistered for this workshop, please check at the Registration Desk for availability of space.

Organized by Kathleen Fisher (Center for Research in Mathematics and Science Education, San Diego State University, San Diego, CA 92120).
Sponsored by the Pacific Division Section on Education.

Semantic Research, Inc. is pleased to announce a workshop designed to help registrants become familiar with a unique knowledge structuring tool, *Semantica* Education 3.0.3. *Semantica* is a *groundbreaking,* cross-platform thinking tool for students and teachers. Based on 30 years of research on how humans store information in long-term memory, *Semantica* enables experts and learners alike to easily capture what they know and create interactive, multi-dimensional structures of knowledge that promote retention, recall, and transfer of knowledge.

Research has shown that when students actively construct their knowledge with a scaffolding tool such as *Semantica*, they necessarily shift from habits of rote learning to meaningful understanding, with active engagement being more effective than fact memorization for deep, sustained conceptual understanding. Hake showed in a large trial of over six thousand students that an interactive-engagement curriculum resulted in an average gain of *almost two standard deviations above traditional methods* [1]. A recent publication by Bencher [2] reports that *learning gains have doubled* when using an active learning approach compared with the same course taught in a traditional lecture/recitation method in the introductory physics classes at MIT. Numerous exploratory research studies with semantic networking suggest that students who construct their knowledge with this tool may learn twice as much as those who don't [3].

Workshop participants will work on PCs with a tutorial to familiarize them with its features. Although the workshop will be held in a PC laboratory, the Mac interface is similar, so Mac users are encouraged to attend as well. To attain the greatest benefit from the workshop, it is suggested you bring along an outline from a course you teach in order to have a ready source of material to enter into your semantic network. All participants who complete the workshop will receive a free, fully functional copy of Semantica 3.0.3.

1. Hake, R.R. (1998). *"Interactive-engagement vs traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses,"* Am. J. Phys. 66: 64-74; on-line as ref. 24 at http://www.physics.indiana.edu/~hake
2. Belcher, J.W. (2003), *"Improving Student Understanding with TEAL"* [TEAL = Technology Enhanced Active Learning], Vol. XVI No. 2 October/November 2003 The MIT Faculty Newsletter: http://web.mit.edu/fnl
3. Fisher, K. M. (In Preparation). Summary of research on learning with semantic networks. To be distributed at the workshop.

HALF-DAY SYMPOSIA
MONDAY AFTERNOON

CARBON and NITROGEN in SOIL ECOSYSTEMS

Agricultural Sciences 234
Monday
1:15 p.m. – 5:00 p.m.

Sponsored by the Western Society of Soil Science

Presiding: Paul Grossl (Utah State University)

1315 *Topographic Stratification of Soil Carbon and Nitrogen on a Palouse Hillslope*, ALLYSON YOUNG* and JODI JOHNSON-MAYNARD (Soil and Land Resources, University of Idaho, Moscow, ID).

1330 *Changes in Root Biomass and Intrinsic Permeability of Degraded Meadow Soils,* HILLARY J. TALBOTT* and PAUL A. McDANIEL (Division of Soil Science & Land Resources, University of Idaho, Moscow, ID).

1345 *Relationship of Microbial Biomass to Soil Organic Carbon Accumulations on Semi-arid Mineland Reclamation sites in Wyoming,* JONATHAN D. ANDERSON*, PETER D. STAHL, and LACHLAN J. INGRAM (University of Wyoming, Department of Renewable Resources, Laramie, WY).

1400 *Earthworm Populations During the First Five Years of Direct Seeding: Implications for Productivity*, JODI JOHNSON-MAYNARD, KARL UMIKER, and STEPHEN GUY (Department of Plant, Soil, and Entomological Sciences, University of Idaho, Moscow, ID).

1415 *Earthworm Populations in Different Experimental Coffee Management Systems,* YANIRIA SANCHEZ-DE LEON* and JODI JOHNSON-MAYNARD (Plant, Soil and Entomological Sciences, University of Idaho, Moscow, ID).

1430 *Urease Encoding Genes in Ammonia-Oxidizing Bacteria,* TERESA E. KOPER*[1], AMAL F. EL-SHEIKH[2], JEANETTE M. NORTON[3], MARTIN G. KLOTZ[2], SETH G.THACKER[3], and RITA M. NELSON[3] ([1]Departments of Biology and [3]Plants, Soils, and Biometeorology, Utah State University, Logan UT; [2]Department of Biology and Center for Genetics and Molecular Medicine, University of Louisville, Louisville KY).

BREAK

1500 *Changes in Soil N Transformations after Repeated Application of Dairy Waste,* MUSSIE Y. HABTESELASSIE*[1], JOHN M. STARK[2], BRUCE E. MILLER[3] and JEANETTE M. NORTON[1] ([1]Dept.of Plants, Soils and Biometeorology; [2]Dept. of Biology; [3]Dept. of Agricultural Systems Technology and Education, Utah State University, Logan, UT).

1515 *Comparison of Annual and Multi-Year N-Based and P-Based Manure Applications,* J.G. DAVIS*, C.C. TRUMAN, K.V. IVERSEN, and K.C. DOESKEN (Colorado State University, Fort Collins, CO; USDA-ARS Southeast Watershed Research Laboratory, Tifton, GA; and USDA-ARS, Auburn, AL).

1530 *Balancing Chemical and Biological Nitrogen Management in Irrigated* Phaseolus vulgaris *(L.) Cropping Systems,* KELLI MAXWELL* and W. BART STEVENS (Powell Research and Extension Center, University of Wyoming, Powell WY).

1545 VIEW POSTERS
Lobby, Eccles Science Learning Center.

EMERGING DISEASES of SIGNIFICANCE in the WEST

Eccles Science Learning Center 130
Monday
1:30 p.m. – 3:15 p.m.

Organized by Robert Sidwell (Institute for Antiviral Research, Utah State University, 5600 Old Main Hill, Logan, UT 84322-5600).
Sponsored by the Pacific Division Sections on Biology and Medical Sciences.

This symposium will consider those viral diseases which appear to be increasing as threats to human and animal populations in the west. Epidemiological evidence will be considered, and research directions for the control of these diseases will be reviewed.

Co-chairs: Robert Sidwell and John Morrey (Institute for Antiviral Research, Utah State University, Logan, UT).

1330 Introduction, Robert Sidwell.

1335 *Emerging Diseases of Importance to Western Populations,* ROBERT ROLFS (State Epidemiologist, Utah State Health Department, Salt Lake City, UT).

1355 *Emerging Diseases of Importance to Livestock and other Animals,* CLELL V. BAGLEY, D.V.M. (Professor and Extension Specialist, Extension Services, Utah State University, Logan, UT).

1415 *Hantavirus: A Significant Threat?* RICHARD DOUGLASS (Professor of Biology, Montana Tech of the University of Montana, Butte, MT).

1435 *West Nile Virus and Mad Cow Disease: Current Research Directions,* JOHN D. MORREY (Institute for Antiviral Research, Department of Animal, Dairy and Veterinary Sciences, Utah State University, Logan, UT).

1455 *SARSCoV, The "Super Pathogen": What Is Being Done About It?* DALE L. BARNARD (Institute for Antiviral Research, 5600 Old Main Hill, Utah State University, Logan, UT).

1515 Questions.

MOBILE ELEMENTS: MOLECULAR MECHANISMS and EVOLUTIONARY APPLICATIONS

Eccles Science Learning Center 053
Monday
1:30 p.m. – 5:00 p.m.

Organized by Lynn B. Jorde (Department of Human Genetics, Eccles Institute of Human Genetics, University of Utah, Salt Lake City, UT) and Mark A. Batzer (Department of Biological Sciences, Biological Computation and Visualization Center, Louisiana State University, Baton Rouge, LA).
Sponsored by the Pacific Division Section on Anthropology and Archaeology

Mobile elements, which make up about 30% of the human genome, are DNA segments that are capable of making copies of themselves that are then inserted elsewhere in the genome. These elements can influence many important evolutionary processes, including mutation and rearrangement of chromosomes. This project will ascertain and analyze *Alu* and L1 mobile elements, which make up nearly 30% of the human

genome. These elements can influence many important evolutionary processes, including mutation, recombination, translocation, and exon/gene shuffling. They may also play an important role in the development of new species. Because of their unique properties, these elements are excellent tools for phylogenetic analysis. In this symposium, we will present recent research on the use of mobile elements in primate evolutionary research. In addition, we will discuss molecular mechanisms responsible for mobile element insertion and the potential roles of mobile elements in recombination and genomic instability.

Co-chairs: Lynn B. Jorde and Mark A. Batzer

1330 *Introduction*

1335 *Studies of a Human Retrotransposon,* NICOLAS GILBERT, SHIELA PRIGGE, TAMMY MORRISH, and JOHN V. MORAN* (Departments of Human Genetics and Internal Medicine, University of Michigan Medical School, Ann Arbor, MI).

1405 *Factors Influencing L1 Retrotransposition*, PRESCOTT DEININGER, VICTORIA PEREPELITSA-BELANCIO, MOHAMED EL-SAWY and ASTRID ENGEL (Tulane Cancer Center, Tulane University, New Orleans, LA).

1425 *Mobile Elements and Primate Phylogenetics,* DAVID A. RAY[1]*, JINCHUAN XING[1], DALE J. HEDGES[1], MICHAEL A. HALL[1], MEREDITH E. LABORDE[1], BRIDGET A. ANDERS[1], BRITTANY R. WHITE[1], NADICA STOILOVA[1], JUSTIN D. FOWLKES[1], KATE E. LANDRY[1], LEONA G. CHEMNICK[2], OLIVER A. RYDER[2], and MARK A. BATZER[1] ([1]Department of Biological Sciences, Biological Computation and Visualization Center, Louisiana State University, Baton Rouge, LA; [2]Center for Reproduction of Endangered Species, Zoological Society of San Diego, San Diego, CA).

BREAK

1520 *Mobile Elements and Primate Genomic Evolution,* DAVID A. RAY[1], PAULINE A. CALLINAN[1], ABDEL-HALIM SALEM[1,2], JINCHUAN XING[1], DALE J. HEDGES[1], LYNN B. JORDE[3] and MARK A. BATZER[1]* ([1]Department of Biological Sciences, Biological Computation and Visualization Center, Louisiana State University, Baton Rouge, LA; [2]Department of Anatomy, Faculty of Medicine, Suez Canal University, Ismailia, Egypt; [3]Department of Human Genetics, University of Utah Health Sciences Center, Salt Lake City, UT).

1550 *Mobile Elements and the Evolution of Human Populations,* L.B. JORDE[1]*, W.S. WATKINS[1], A.R. ROGERS[1], M.J. BAMSHAD[1], A.E. BRASSINGTON[1], M.L. CARROLL[2], S.V. NGUYEN[2], J.A. WALKER[2], and M.A. BATZER[2] ([1]Department of Human Genetics, University of Utah School of Medicine, Salt Lake City, UT; [2]Department of Biological Sciences, Louisiana State University, Baton Rouge, LA).

1620 *Estimating the Ages of* Alu *Insertions,* DAVID J. WITHERSPOON*, W. SCOTT WATKINS, MARK A. BATZER and LYNN B. JORDE (Department of Human Genetics, Eccles Institute of Human Genetics, University of Utah, Salt Lake City, UT).

USE of INTERMOUNTAIN NATIVE PLANTS in SUSTAINABLE URBAN LANDSCAPES

Eccles Science Learning Center 046
Monday
1:30 p.m. – 4:40 p.m.

Organized by Roger Kjelgren (Department of Plants, Soils, and Biometeorology, Utah State University, Logan, UT 84322).

Sponsored by the Pacific Division Sections on Agriculture and Horticultural Sciences and Ecology and Environmental Sciences.

Drought and population growth in the Intermountain West are straining municipal water supplies, particularly through the use of water on urban amenity landscapes. This symposium will present an overview of the role that Intermountain native plants can play in creating urban landscapes that are ultra-low water use and that honor the distinctive high-desert character of the region.

Chair: Roger Kjelgren (Department of Plants, Soils, and Biometeriology, Utah State University).

Keynote Presentations

1330 *The Changing Face of the High Desert Urban Landscape,* ROGER KJELGREN (Department of Plants, Soils, and Biometeorology, Utah State University, Logan, UT).

1410 *Utah's Choice: A New Native Plant Selection and Tagging Program*, SUSAN MEYER (Research Ecologist, USDA-Forest Service Shrub Sciences Laboratory, Provo, UT).

BREAK

Research Reports

1510 *Seed Propagation of Native Shrubby Saltbushes (*Atriplex: *Chenopodiaceae),* S.C. GARVIN and S.E. MEYER (USDA-Forest Service Shrub Sciences Laboratory, Provo, UT).

1525 *Irrigation and Growing Media Effects on Pot-In-Pot Production of Intermountain West Native Perennial Wildflowers and Shrubs*, AMY CROFT (Department of Plants, Soils, and Biometeorology, Utah State University, Logan, UT).

1540 *Comparison of Conventional Above-ground Versus Pot-In-Pot Production of Intermountain West Perennial Wildflowers,* GUILLERMO CARDOSO (Department of Plants, Soils, and Biometeorology, Utah State University, Logan, UT).

1555 *Salinity Tolerance of Four Ornamental Herbaceous Perennials*, NICKOLEE ZOLLINGER (Department of Plants, Soils, and Biometeorology, Utah State University, Logan, UT).

1610 *Drought Tolerance of Ornamental Herbaceous Perennials,* NICKOLEE ZOLLINGER (Department of Plants, Soils, and Biometeorology, Utah State University, Logan, UT).

1625 *Drought Tolerance of Western Native Perennial Wildflowers Using Line Source Irrigation,* TERESA CERNY and ROGER KJELGREN (Department of Plants, Soils, and Biometeorology, Utah State University, Logan, UT).

Tuesday, June 15

HALF-DAY SYMPOSIA
TUESDAY MORNING

NUCLEAR TRANSFER: IMPLICATIONS and STATUS

Agricultural Sciences 302
Tuesday
8:00 a.m. – 12:00 p.m.

Organized by Kenneth L. White (Department of Animal, Dairy and Veterinary Sciences, Center for Integrated Biosystems, Utah State University, Logan, UT 84322-4815).

Sponsored by the Pacific Division Section on Biological Sciences.

This symposium will provide an update of the current research developments in the area of somatic cell nuclear transplantation using animal cells to produce live offspring. Presentations will focus on application and efficiencies of the process to various species, developmental implications and gene expression profiles of nuclear transfer embryos and the relation to somatic cell nuclear re-programming efficiencies.

Chair: Kenneth L. White (Utah State University)

0800 Welcome and Introduction

0805 *Current Status of Nuclear Transfer in Animal Agriculture – Successes and Challenges*, KENNETH L. WHITE (Animal, Dairy and Veterinary Sciences Department, Center for Integrated Biosystems, Utah State University, Logan, UT).

0845 *Nuclear Transfer Cytoplasts Derived from Cow Oocytes Support Increased Development* In Vivo *but Not* In Vitro *Compared to Heifer-Oocyte-Derived Cytoplasts,* KENNETH I. ASTON (Animal, Dairy, and Veterinary Sciences Department, Center for Integrated Biosystems, Utah State University, Logan, UT).

0925 *Conditioned Media Effects on Chromosome Composition of Bovine Cloned Embryos*, T. D. BUNCH and G. P. LI (Animal, Dairy and Veterinary Sciences Department, Center for Integrated Biosystems, Utah State University, Logan, UT).

BREAK

1015 *Gene Expression Patterns in Nuclear Transfer Embryos Compared to In Vitro Produced Control Embryos,* LEE F. RICKORDS (Animal, Dairy and Veterinary Sciences Department, Center for Integrated Biosystems, Utah State University, Logan, UT).

1055 *Placental Abnormalities Caused by Somatic Cell Nuclear Transfer,* QUINTON A. WINGER (Animal, Dairy and Veterinary Sciences Department, Center for Integrated Biosystems, Utah State University, Logan, UT).

1135 Panel question/answer.

TRACE ELEMENT BIOGEOCHEMISTRY and SOIL REHABILITATION

Agricultural Sciences 234
Tuesday
9:00 a.m. – 10:00 a.m.

Sponsored by the Western Society of Soil Science.

Presiding: Rich Koenig (Washington State University)

0900 *Selenium in the Environment,* GEORGE F. VANCE (Wyoming Reclamation Ecology Center and Department of Renewable Resources, University of Wyoming, Laramie, WY).

0915 *Can Land Application of Saline-Sodic Coalbed Methane (CBM) Water be a Sustainable Practice: Effects on Soil Properties,* GIRISHA K. GANJEGUNTE*, LYLE A. KING and GEORGE F. VANCE (Department of Renewable Resources, University of Wyoming, Laramie, WY).

0930 *Background Trace Element Concentrations in the Franciscan Complex, San Francisco, California,* MEGAN SIMPSON and MATTHEW La FORCE* (Department of Geosciences, San Francisco State University, CA).

0945 *Iodide Sorption and Volatilization in Soil Environment,* PAUL R. GROSSL*[1], STEPHAN TROLOVE[2], and MARY HUBBARD[1] ([1]Dept. Plants, Soils and Biometeorology, Utah State University, Logan, UT; [2]Crop & Food Research, Hastings, New Zealand).

BREAK

1015 View and judge posters.
Lobby, Eccles Science Learning Center

HALF-DAY SYMPOSIA
TUESDAY AFTERNOON

IMPROVING LEARNING in LARGE LECTURE SCIENCE CLASSES

Eccles Science Learning Center 053
Tuesday
1:30 p.m. – 4:50 p.m.

Organized by Kathleen M. Fisher (Department of Biology and Center for Research in Mathematics and Science Education, San Diego State University, 6475 Alvarado Road, Suite 206, San Diego, CA 92120).
Sponsored by the Pacific Division Section on Education.

Two vignettes will be presented to demonstrate different strategies for engaging students in deep-level processing of complex science ideas, using sophisticated yet simple-to-use personal response software. One product, entitled "AnyQuestions," was developed by one of the presenters, Dr. Sharon Lightner, and her student, Lee Barken. It is a personal response system that utilizes Pocket PCs and accomodates forced response or the input of free text as responses. The other system, currently being used by two presenters, Dr. Minou Spradley and Dr. Jeanne Weidner, is the "eInstruction Classroom Performance System" distributed for higher education by McGraw-Hill publishers. This system utilizes personal response pads for students to respond to multiple choice or true/false questions. The presenters will be the "teachers" and the audience will be the "students". All participants will be assigned code names to maintain confidentiality. Following the vignettes, presenters will reflect on their use of this and other personal response device software in actual classrooms and on their use of engagement strategies with students, highlighting issues and benefits.

Presenters:

Sharon Lightner (College of Business Administration, San Diego State University, San Diego, CA 92120). Dr. Lightner has won many teaching awards, including several for teaching a synchronous course by video simultaneously to students in Europe, Asia and the US. Her newest innovation is an easy-to-use but sophisticated response system that runs on Pocket PCs that she has used with classes of about 40 students.

Minou Spradley (Department of Biology, San Diego City College, San Diego, CA 92101). Dr. Spradley teaches general biology and physiology and has used ConcepTests and other interactive strategies along with the McGraw-Hill student response system in large lectures.

Jeanne Weidner (Department of Biology, San Diego State University, San Diego, CA 92120). Berkeley-trained in neurobiology education, Dr. Weidner has developed an interactive lecture/laboratory course for prospective teachers and frequently uses ConcepTests.

Kathy Williams (Department of Biology, San Diego State University, San Diego, CA 92120). Dr. Williams is a leader in interactive teaching in large classes. She has frequently used evidence-based tests in her ecology course to increase student interest, attendance, and performance.

1330 Presentation of two vignettes with presenters as the "teachers" and participants as the "students." About 1.5 hours.

BREAK

1520 Reflections of presenters. About 1.5 hours.

ALL DAY SYMPOSIA
TUESDAY

FUTURE CLIMATE CHANGE: IMPLICATIONS for WESTERN ENVIRONMENTS

Taggart Student Center, Auditorium
Tuesday
8:30 a.m. – 5:20 p.m.

Organized by Frederic H. Wagner (Ecology Center and College of Natural Resources, Utah State University, Logan, UT 84322-5200).

Sponsored by the Pacific Division Sections on Atmospheric and Oceanographic Sciences, Biological Sciences, Earth Sciences, and Ecology and Environmental Sciences.

Inferences on global climate change in recent years have been based on widely published time series on air temperatures, weather-station measurements for various regions, and for the entire globe over the past ~150 years; trends over the past 1,000 years based on a variety of proxies and modeling efforts; and trends over the past 160,000 years based on ice cores from the Greenland and Antarctic ice sheets. The first three papers in this symposium present evidence from recent research on temperature trends shown by other proxies: bore holes in the earth, air temperatures shown by ice cores from a western U.S. glacier, and tree rings. The next three papers present evidence that the temperature increases are forced by human emissions of greenhouse gases, especially CO_2. The authors discuss other variables affecting temperatures that must be taken into account when inferring anthropogenic forcing from the measured trends. Global circulation models (GCMs) project much larger temperature increases during the 21st century than those of the 20th, based on predicted increases in CO_2 emissions. Environmental effects during the 20th century are thus a limited portent of environmental changes likely to occur in the 21st, and the first six papers in the second half of the symposium report recent research showing the wide range of environmental effect that occurred during the 1900s throughout western U. S. These include especially the effects on hydrologies of the water-short West and on diverse western ecosystems. The final paper discusses factors that must be considered, from a scientist's perspective, in devising policies to address the global warming problem.

Chair: Frederic H. Wagner (Utah State University).

0830 *Introduction,* FREDERIC H. WAGNER (Ecology Center and College of Natural Resources, Utah State University, Logan, UT).

0840 *Surface Warming in the Northern Hemisphere Inferred from Borehole Temperatures,* DAVID S. CHAPMAN* and ROBERT N. HARRIS (Department of Geology and Geophysics, University of Utah, Salt Lake City, UT).

0910 *Ice-core and Stream-flow Evidence of Rapid Climate Change at High-altitude Areas, Wind River Range, Wyoming,* DAVID J. NAFTZ[1]*, KIRK A. MILLER[2], and LIZ OSWALD[3] ([1]U. S. Geological Survey, Salt Lake City, UT; [2]U. S. Geological Survey, Cheyenne, WY; [3]U. S. D. A. Forest Service, Lander, WY).

0940 *Reconciling Natural, Multi-decadal Climate Variability and Predictions of Anthropogenic Climate Change in Western U.S.*, STEPHEN T. GRAY* and LISA J. GRAUMLICH (Big Sky Institute, Montana State University, Bozeman, MT).

BREAK

1030 *Changes in Tropopause Height: A New"Fingerprint" of Human Effects on Climate,* B. D. SANTER[1]*, T. M. L. WIGLEY[2], A. J. SIMMONS[3], P. KÅLLBERG[3], G. A. KELLY[3], S. UPPALA[3], C. AMMANN[2], J. S. BOYLE[1], W. BRÜGGEMANN[4], C. DOUTRIAUX[1], M. FIORINO[1], C. MEARS[5], G. A. MEEHL[2], R. SAUSEN[6], K. E. TAYLOR[1], W. M. WASHINGTON[2], M. F. WEHNER[7], and F. J. WENTZ[5] ([1]Program for Climate Model Diagnosis and Intercomparison, Lawrence Livermore National Laboratory, Livermore, CA; [2]National Center for Atmospheric Research, Boulder, CO; [3]European Centre for Medium-Range Weather Forecasts, Shinfield Park, Reading, U.K.; [4]University of Birmingham, Edgbaston, Birmingham, U.K.; [5]Remote Sensing Systems, Santa Rosa, CA; [6]Deutches Zentrum für Luft- und Raumfahrt, Institut für Physik der Atmosphäre, Oberpfaffenhofen, D-82234 Wessling, Germany; [7]Lawrence Berkeley National Laboratory, Berkeley, CA).

1100 *Climate-change Implications of U. S. U. Lidar Observations of the Mesophere*, VINCENT B. WICKWAR*, JOSHUA P. HERRON, and TROY A. WYNN (Center for Atmospheric and Space Sciences, Utah State University, Logan, UT).

1130 *Natural Climates of the Last Millenium: Where Are We in Modeling the Recent Past?* CASPAR M. AMMANN (National Center for Atmospheric Re-

search, Climate and Global Dynamics Division – Paleoclimatology, Boulder, CO).

LUNCH

1330 *Variability and Trends in Mountain Snowpacks in Western North America,* PHILIP MOTE[1]*, ALAN HAMLET[1], MARTYN CLARK[2], and DENNIS LETTENMAIER[1] ([1]JISAO/SMA Climate Impacts Group, University of Washington, Seattle, WA; [2]Center for Science and Technology Policy Research, University of Colorado, Boulder, CO).

1400 *Variability and Trends in Alpine Glaciers,* DANIEL B. FAGRE (U.S.G.S. Northern Rocky Mountain Science Center, Glacier National Park, MT).

1430 *Variability and Trends in Spring Runoff in the Western United States,* JESSICA LUNDQUIST[1]*, DAN CAYAN[1,2], and MIKE DETTINGER[1,2] ([1]Scripps Institution of Oceanography, [2]U. S. Geological Survey, University of California San Diego, La Jolla, CA).

BREAK

1520 *Observed Impacts of Climate Change on Natural Systems in the United States,* JOHN H. MATTHEWS (Department of Integrative Biology, University of Texas, Austin, TX).

1550 *Ecological Consequences of Forest-insect Disturbance Regimes Altered by Climate Change,* JESSE A. LOGAN[1]* and JAMES A. POWELL[2] ([1]Rocky Mountain Research Station, U. S. D. A. Forest Service, Logan, UT; [2]Department of Mathematics and Statistics, Utah State University, Logan, UT).

1620 *A Synthesis of Recent Climate Warming Effects on Terrestrial Ecosystems of Alaska,* VALERIE A. BARBER[1]*, GLENN PATRICK JUDAY[1], ROSANNE D'ARRIGO[2], EDWARD BERG[3], F. STUART CHAPIN III[4], LARRY HINZMAN[5], HENRY HUNTINGTON[6], TORRE JORGENSEN[7], DAVID McGUIRE[8], TOM OSTERKAMP[6], BRIAN RIORDAN[1], VLADIMIR ROMANOVSKY[9], SCOTT RUPP[1], MATTHEW STURM[10], DAVID VERBYLA[1], JOHN WALSH[11], ALEX WHITING[12], MARTIN WILMKING[1] ([1]Forest Sciences-School of Natural Resources and Agriculture, University of Alaska Fairbanks, Fairbanks, AK; [2]Tree-Ring Laboratory, Lamont-Doherty Earth Observatory, Palisades, NY; [3]Kenai National Wildlife Refuge, Soldotna, AK; [4]Biology and Wildlife Dept., University of Alaska Fairbanks, Fairbanks, AK; [5]Water and Environmental Research Center, University of Alaska Fairbanks, Fairbanks, AK 99775; [6]Huntington Consulting, Anchorage, AK; [7]ABR, Inc. Environmental Research and Services, Fairbanks, AK; [8]Alaska Cooperative Fish and Wildlife Research Unit, University of Alaska Fairbanks, Fairbanks, AK; [9]Geophysical Institute, University of Alaska Fairbanks, Fairbanks, AK; [10]USA-CRREL-Alaska, Ft. Wainwright, AK; [11]International Arctic Research Center, University of Alaska Fairbanks, Fairbanks, AK; [12]Native Village of Kotzebue, Kotzebue, AK).

1650 *Policies to Combat Global Warming,* TOM M. L. WIGLEY (National Center for Atmospheric Research, Boulder, CO).

LORDS of the RINGS: DENDROCHRONOLOGY YESTERDAY, TODAY and TOMORROW

University Inn 507
Tuesday
9:00 a.m. – 3:00 p.m.

Organized by Donald J. McGraw (University of San Diego, San Diego, CA).

Sponsored by the Pacific Division Sections on Biological Sciences, Earth Sciences, Ecology and Environmental Sciences, and History and Philosophy of Science.

Dendrochronology, or tree-ring dating, achieved maturity as a science (or 'group of sciences' comparable, say, to oceanography) during the 20th century. This series of talks includes a mix of both the history of and modern applied aspects of this science. Specific topics will include discussions about the founder of the field, archaeological applications (both North American and Asian), astronomy connections, consideration of early pioneers and their efforts, stable isotopes in tree rings, climatological features, and the future of dendrochronology.

Chair: Donald J. McGraw (University of San Diego, San Diego, CA).

0900 *Introduction*, Donald J. McGraw

0910 *Contributions of A. E. Douglass to Astronomy, the Development of Dendrochronology and the Institutional Growth of Science in the American Southwest*, GEORGE E. WEBB (Department of History, Tennessee Tech University, Cookeville, TN).

0940 *What Can the Stable Oxygen Isotopic Composition in Tree Ring Cellulose Tell Us About the Past?* JOHN S. RODEN (Biology Department, Southern Oregon University, Ashland, OR).

BREAK

1030 *The Growth, Development and Application of North American Tree-Ring Dating,* STEPHEN E. NASH

(Head of Collections, Department of Anthropology, The Field Museum, Chicago IL).

1100 *Tree-Ring Isotope Rhythms: Climate and Dating from the Bands*, STEVEN W. LEAVITT (Laboratory of Tree-Ring Research, University of Arizona, Tucson, AZ).

1130 *The Role of Bristlecone Pine in the Calibration of the Radiocarbon Dating Technique: The Early Work of Edmund Schulman,* DONALD J. McGRAW **(**University of San Diego, San Diego, CA).

LUNCH

1330 *Toward a Dendrochronology to Better Understand Central Asian Archaeology,* IRINA P. PANYUSHKINA (Laboratory of Tree Ring Research, University of Arizona, Tucson, AZ).

1400 *Douglass' "Cycle Problem" and the Scientific Community's Reception of the New Science of Dendrochronology*, GEORGE E. WEBB (Department of History, Tennessee Tech University, Cookeville, TN).

1430 *Recent Contributions to the Tree-Ring Method, Theory and Data, and Suggestions for Future Research*, STEPHEN E. NASH (Head of Collections, Department of Anthropology, The Field Museum, Chicago IL).

Wednesday, June 16

HALF-DAY SYMPOSIA
WEDNESDAY MORNING

NSF ADVANCE: EXAMINING A LEAKY PIPELINE — RESEARCH on the ACADEMIC CAREERS of WOMEN in SCIENCE

Agricultural Sciences 234
Wednesday
9 a.m. – 12:00 p.m.

Organized by Ronda Roberts Callister (Department of Management and Human Resources, Utah State University, Logan, UT 84322-3555).

National Science Foundation (NSF) statistics show women leaving science and engineering careers at much higher rates than men. They also show that the percentage of women at full professor rank has not changed in the last two decades - despite dramatically increasing percentages of women getting Ph.D.s in these fields (new Ph.D.s in Biology are now approximately 50% women, for example).

Questions about why this is happening prompted NSF to develop its Advance program. In the fall of 2001, NSF began awarding grants of up to $3 million. Two rounds of Advance awards have been made. Several of these institutions will be discussing their programs of research to address these questions.

Chair: Ronda Callister (Utah State University)

0900 *Introductions*, Ronda Callister

0910 *Examining the Leaky Pipeline in Puerto Rico,* SARA BENÕTEZ and IDALIA RAMOS (University of Puerto Rico at Humacao, Humacao, PR).

0945 *Gender Differences in the Quality of Work Life in Science Departments,* RONDA CALLISTER (Management and Human Resources Department, Utah State University, Logan, UT).

BREAK

1035 *Perceptions of Faculty and Administrators at the University of Puerto Rico at Humacao about Gender Bias in Faculty Recruitment Practices,* MARIA DEL C. CRUZ and MYRNA AYALA (ADVANCE Program and Department of Education, University of Puerto Rico at Humacao, CUH Station, Humacao, PR).

1110 *Changing the Culture at the University of Rhode Island: Assessing Readiness for Change,* BARBARA SILVER[1], LISA HARLOW[2] and KATE WEBSTER[2] ([1]University of Rhode Island, Kingston, RI; [2]Psychology Dept. University of Rhode Island, Kingston, RI).

1145 General questions and discussion.

EDUCATION WORKSHOP

ENHANCING ACTIVE LEARNING THROUGH KNOWLEDGE CONSTRUCTION USING the SEMANTIC NETWORKING PROGRAM, *Semantica* Education 3.0.3

Agricultural Sciences 119
Wednesday
1:00 p.m. – 3:00 p.m.

Please refer to page 15 for the description of this workshop.

HALF-DAY SYMPOSIA
WEDNESDAY AFTERNOON

STRATEGIES to ACCOMMODATE DUAL CAREER COUPLES in ACADEMIC SCIENCES and ENGINEERING DEPARTMENTS

Agricultural Sciences 234
Wednesday
1:30 p.m. – 5:00 p.m.

Organized by Kim Sullivan (Department of Biology, Utah State University, Logan, UT 94322-5305; E-mail: yejunco@biology.usu.edu).

Partner accommodation is a significant recruitment and retention issue for colleges and universities. National Science Foundation data indicate that 55% of women scientists and 32% of male scientists are married to another scientist. The challenges of recruiting and retaining dual career couples in the science and engineering fields is particularly difficult for colleges and universities located outside of major metropolitan areas where the college or university is often the only higher education institution in the area and the major employer. Speakers will each take about 15 minutes to discuss the challenges facing dual career couples and efforts being made to recruit and retain dual career couples. Survey results from 19 ADVANCE universities will be presented. A workshop will follow the presentations to discuss best practices and develop a white paper.

1330 Introduction and National Perspective - Chris Hailey (Utah State University)
1345 University of Puerto Rico–Humaco - Idelia Ramos
1400 New Mexico State University - Lisa Frehill
1415 University of Rhode Island - Barb Silver
1420 Utah State University's Dual Career Committee
1435 Potential speakers from Kansas State and Case Western Reserve University
1450 Survey of best practices at ADVANCE Institutions-Kim Sullivan (Utah State University)

BREAK

1520 Discussion and development of white paper.

ALL DAY SYMPOSIA
WEDNESDAY

AGRICULTURAL GENOMICS: WHO, WHAT and WHY?

University Inn 507
Wednesday
9:00 a.m. – 4:00 p.m.

Organized by Kamal A. Rashid (Center for Integrated BioSystems, Utah State Univesity, 4700 Old Main Hill, Logan, UT 84322-4700; E-mail: krashid@cc.usu.edu).
Sponsored by the USU Center for Integrated BioSystems and the Pacific Division Sections on Agriculture and Horticultural Science, and Biological Sciences.

The Utah State University Center for Integrated BioSystems proudly presents a one day symposium in conjunction with the June 13-17, 2004 American Association for the Advancement of Science, Pacific Division annual meeting to be held on the USU campus. The symposium focuses on the recent advances in agricultural genomics for plants, animals and microbes. The symposium addresses the impact and new developments for agricultural sciences. Presentations and discussions will focus on utilization of functional genomics, proteomics and bioinformatics data and how to turn such data into applicable knowledge and industrial products.

Additionally, we invite you to visit our facility during the AAASPD meeting. We have scheduled three tours around this symposium (at 12:00 p.m., 1:00 p.m. and 4:00 p.m. on Wednesday) but also invite you to contact us at the Biotechnology Building if you are interested in touring the facility at other times. The tours meet at the front entrance of the Biotechnology Building and last for about 20 minutes.

Chair: Kamal A. Rashid (Utah State University)

0900 Welcoming remarks.
0915 PLENARY TALK: *Complexity is the Grand Challenge for Biology and Computing*, GEORGE S. MICHAELS (Chief Scientist and Director, Bioinformatics and Computational Biology, Pacific Northwest National Laboratory, Richland, WA).

BREAK

Session I: Microbial Genetics

1030 *Using Genomics in the Food Industry,* BART WEIMER (Center for Integrated BioSystems, Utah State University, Logan, UT).
1100 *Genomics of Plant-associated Bacteria,* MICHAEL L. KAHN (Institute of Biological Chemistry and School of Molecular Biosciences, Washington State University, Pullman, WA).

LUNCH

1200 Tour of the Biotechnology & Genomics Research Center (meet in front of the Biotechnology Center–behind the Agricultural Sciences Building).
1300 Tour of the Biotechnology & Genomics Research Center (see above).

Session II: Animal Genomics

1330 *Advances in Livestock Genomics,* NOELLE E. COCKETT (Department of Animal, Dairy and Veterinary Sciences, Utah State University, Logan, UT).

1400 *Conditional Gene Targeting Strategies to Determine the Role of Transcription Factor AP-2g during Pre- and Peri-Implantation Mouse Development,* QUINTON A. WINGER[1,2] and TREVOR WILLIAMS[2] ([1]Utah State University, Dept of Animal, Dairy and Veterinary Sciences, Logan, UT; [2]University of Colorado Health Sciences Center, Dept of Craniofacial Biology and Cellular & Developmental Biology, Denver, CO).

BREAK

Session III: Plant Genomics

1445 *Development of an Integrated Sorghum Genome Map as a Tool for Gene Discovery and Map-based Cloning,* PATRICIA E. KLEIN[1], ROBERT R. KLEIN[2] and JOHN E. MULLET[1] ([1]Institute for Plant Genomics and Biotechnology, Texas A&M University, College Station, TX; [2]USDA-ARS, Southern Plains Agricultural Research Center, College Station, TX).

1515 *From Models to Crops: Integrated Medicago Genomics for Alfalfa Improvement,* GREGORY D. MAY (Plant Biology Division, The Samuel Roberts Noble Foundation,, Ardmore, OK).

1545 Concluding remarks.

1600 Tour of the Biotechnology & Genomics Research Center (meet in front of the Biotechnology Center–behind the Agricultural Sciences Building).

II. CONTRIBUTED PAPER SESSIONS

1100 (time italicized and underlined) indicates a student presentation in competition for Awards of Excellence.
* indicates the speaker from among several authors listed.

Monday, June 14

ANTHROPOLOGY and ARCHAEOLOGY, EDUCATION, and SOCIAL, ECONOMIC, and POLITICAL SCIENCES
Joint Session

Cosponsored by the Pacific Division Sections on **Anthropology and Archaeology:** Section Chair *Walter Carl Hartwig*, Division of Basic Medical Sciences, Touro University College of Osteopathic Medicine, Mare Island, CA 94592; **Education:** Section Chair *Kathleen M. Fisher*, Center for Mathematics and Science Education, 6475 Alvarado Road, Suite 206, San Diego State University, San Diego, CA 92120; **Social, Economic and Political Sciences:** Section Chair *Mark Aldrich*, Department of Economics, Smith College, Northampton, MA 01063.

ORAL PRESENTATIONS
Agricultural Sciences 317
Monday
1:30 p.m. – 3:50 p.m.

Chair: Walter Carl Hartwig (Touro University College of Osteopathic Medicine, Mare Island, CA).

1330 *The Skookum Imprint: Trace Evidence of Sasquatch?* D.J. MELDRUM[1] and D.R. SWINDLER[2] ([1]Dept. of Biological Sciences, Idaho State University, Pocatello, ID; [2]Dept. of Anthropology, University of Washington, Seattle, WA).

1350 *Supply-Side Fluctuations Viewed as Evolutionary Game Dynamics,* YUYA SASAKI (Department of Economics, Utah State University, Logan, UT).

1410 *Outgrowing Our Roots: Agrarian Restructuring in the New West*, ERIC B. JENSEN (Department of Sociology, Social Work, and Anthropology, Utah State University, Logan, UT).

1430 *Project-based Learning in the Dow Wetlands, Antioch, California,* WILLIAM B. N. BERRY* and RANDY FISCHBACK (Department of Earth and Planetary Science, University of California, Berkeley, CA and Dow Chemical Company, Pittsburgh, CA).

BREAK

1510 *A Study of Learning Organization and Faculty Development—A Northwest University as Example,* HSIENYI LIN* and DALE GENTRY (College of Education, University of Idaho, ID).

1530 *Using Geographic Information System (GIS) Software to Meet State and National Standards in Teaching Science and Geography,* SANDRA SMITH (Sequim Community School, Sequim, WA).

POSTER SESSION
Lobby, Eccles Science Learning Center
Tuesday
9:00 a.m. – 1:00 p.m.
(Please refer to page 31.)

WESTERN SOCIETY of SOIL SCIENCE

President: Matthew J. LaForce, Department of Geosciences, San Francisco State University, 1600 Holloway Ave., San Francisco, CA 94132-4163; laforce@sfsu.edu.

President-Elect and Program Chair: Paul Grossl, Department of Plants, Soils and Biometeorology, Utah State University, Logan, UT 84321-4820; grossl@cc.usu.edu.

Secretary-Treasurer: Jodi Johnson-Maynard, Department of Plant, Soil, & Enthomological Sciences, University of Idaho, P.O Box 442339, Moscow ID 83844-2339; jmaynard@uidaho.edu.

Past President: Jessica Davis, Dept. of Soil & Crop Sciences, Colorado State University, 1170 Campus Delivery, Fort Collins, CO 80523 -1170; jgdavis@lamar.colostate.edu.

ELECTROMAGNETIC TECHNIQUES in SOIL SCIENCE
Agricultural Sciences 234
Monday
8:40 a.m. – 11:30 a.m.
(Please refer to page 13.)

CARBON and NITROGEN in SOIL ECOSYSTEMS
Agricultural Sciences 234
Monday
1:15 p.m. – 3:45 p.m.
(Please refer to page 15.)

POSTER SESSIONS
Lobby, Eccles Science Learning Center
Monday
1:30 p.m. – 5:30 p.m.
Tuesday
9:00 a.m. – 1:00 p.m.
(Please refer to page 31.)

Program continues on page 29.

Tuesday, June 15

BIOLOGICAL SCIENCES and ECOLOGY and ENVIRONMENTAL SCIENCES

Agricultural Sciences 338
Tuesday
8:15 a.m. – 4:15 p.m.

Cosponsored by the Pacific Division Sections on **Biological Sciences**, Chair: *A. Michelle Wood*, Department of Biology, University of Oregon, Eugene, OR 97403; **Ecology and Environmental Sciences**, Chair: *Michael S. Parker*, Department of Biology, Southern Oregon University, Ashland, OR 97520.

Chair:Michael S. Parker (Southern Oregon University).

0815 Opening comments.

0820 *Additive Response to Combined Cancer Therapies in Six Lymphoid Cell Lines,* BRACKEN M. WEBB*, MICHAEL R. PHILLIPS, BYRON K. MURRAY, and KIM L. O'NEILL (Department of Microbiology, Brigham Young University, Provo, UT).

0840 *Expression of NADPH Oxidase Homologs in Human Tumor Cells,* AGNES JUHASZ*, SUSAN MARKEL, MARIANNE METZ, LINDA MATSUMOTO, JOSEPHUS VAN BALGOOY and JAMES H. DOROSHOW (Medical Oncology Department, City of Hope Comprehensive Cancer Center, Duarte, CA).

0900 *Effects of Electromagnetic Fields (EMF) on Angiogenesis of Breast Cancer and Macrophages Measured using the Chorioallantoic Membrane (CAM) Assay,* RUSSELL L. HAMBLIN*, DEVIN D. TWITCHELL, BYRON K. MURRAY, and KIM L. O'NEILL (Department of Microbiology and Molecular Biology, Brigham Young University, Provo, UT).

0920 *Detecting Apoptosis: A Comparison of the Comet Assay and the Annexin-V Method Using Six Lymphoid Cell Lines,* MICHAEL R. PHILLIPS*, BRACKEN M. WEBB, BYRON K. MURRAY, and KIM L. O'NEILL (Department of Microbiology, Brigham Young University, Provo, UT).

0940 *Inhibition of Benzo[a]Pyrene Induced DNA Damage in HepG2 Cells by the Organosulfur Compound N-acetyl Cysteine (NAC) as Measured by the Comet Assay,* MICHAEL O'NEIL, LONI O'NEIL, AMANDA STEVENS*, COREY SPEERS, BYRON MURRAY, and KIM O'NEILL (Department of Microbiology and Molecular Biology, Brigham Young University, Provo, UT).

BREAK

1020 *Measurement of MDA Levels as a Marker of Lipid Peroxidation in Serum,* CHRIS TRIMBLE, LEE D. MCLEMAN, SEIGA OHMINE, S. BRIANT STRINGHAM, DAVID P. TOMER, KIM L. O'NEILL and BYRON K. MURRAY (Department of Microbiology and Molecular Biology, Brigham Young University, Provo, UT).

1040 *Lipid Peroxides Generated by the Ozonation of Biological Fluids are Effectively Neutralized by Phytochemicals with Antioxidant Capacity*, DAVID P. TOMER*, LEE D. MCLEMAN, SEIGA OHMINE, S. BRIANT STRINGHAM, CHRIS TRIMBLE, NICHOLAS J. BUCHKOVICH, KIM L. O'NEILL, and BYRON K. MURRAY (Department of Microbiology and Molecular Biology, Brigham Young University, 775 WIDB, Provo, UT).

1100 *Effects of Prolactin (PRL) on the Expression of PRL and PRL Receptor Long Form (PRL-L-R) mRNA in the Skin of Mink (*Mustela vison*),* JASON HUNT*, MALCOLM SHIELDS and JACK ROSE (Department of Biological Sciences, Idaho State University, Pocatello, ID).

1120 *Prolactin (PRL) and PRL-Receptor-Long Form (PRL-L-R) mRNA Expression in the Testis and Epididymis of Sexually-immature and –mature Mink (*Mustela vison*),* JONATHON LORDS*, JASON HUNT, MALCOLM SHIELDS and JACK ROSE (Department of Biological Sciences, Idaho State University, Pocatello, ID).

1140 *Pygmy Rabbits (*Brachylagus idahoensis*): Methods of Detection, Habitat Preferences, and Distribution in*

Nevada, EVELINE S. SÉQUIN* and PETER F. BRUSSARD (Department of Biology, Program in Ecology, Evolution, and Conservation Biology, University of Nevada at Reno, Reno, NV).

LUNCH

Chair: A. Michelle Wood (University of Oregon).

1315 *Raster-Based Spatial Evolutionary Game Dynamics,* YUYA SASAKI (Department of Environment and Society, Utah state University, Logan, UT).

1335 *A Kinetic Analysis of Bluetongue Virus mRNA Using Quantitative Real-Time PCR,* GARRY MILLER*, MAGGIE BUCCAMBUSO, YI-CHEN LEE, and JOSEPH LI (Biology Department, Utah State University, 5305 Old Main Hill, Logan, UT).

1355 *Effect of 3-dimensional and Color Contrast Patterns on Nest Location Performance of Two Solitary Bees (Hymenoptera: Megachilidae)*, CHRISTELLE GUÉDOT (Biology Department, Utah State University, Logan, UT).

1415 *Screening Candidate Fungicides for Control of Chalkbrood Disease in Alfalfa Leafcutting Bees,* (Megachile rotundata*),* CRAIG HUNTZINGER*, ROSALIND JAMES, JORDI BOSCH, and WILLIAM P. KEMP (USDA-ARS Bee Biology and Systematics Laboratory, North Logan, UT).

1435 *The Mechanism of the Cat Twist,* J. RONALD GALLI (Department of Physics, Weber State University, Ogden, UT).

BREAK

1515 *Cytotaxonomy, Karyomorphology and Genome Analysis of Six Species of* Allium *(Alliaceae)***,** TASNEEM F. KHALEEL (Department of Biological and Physical Sciences, Montana State University, Billings, MT).

1535 *A Search for Congruence between Ontogeny and Phylogeny: Within-Group Variation in Morphological Integration in Clover (*Trifolium repens *L.) in Different Aged Pastures,* JACK MAZE* and ROY TURKINGTON (Department of Botany, University of British Columbia, Vancouver, B. C.).

1555 *SeasonalFluxes of Water Vapor and CO_2: Their Decoupling from the Atmosphere Above a Grassland Steppe of Northern Kazakhstan,* NICANOR SALIENDRA*[1], KANAT AKSHALOV[2], DOUGLAS JOHNSON[3], TAGIR GILMANOV[4] and EMILIO LACA[5] ([1]Dept. of Forest, Range and Wildlife Sciences, Utah State University, Logan, UT; [2]Baraev Research and Production Center for Grain Farming, Akmolinskaya Oblast , Kazakhstan; [3]USDA-ARS Forage and Range Research Laboratory, Utah State University, Logan, UT; [4]Dept. of Biology and Microbiology, South Dakota State University, Brookings, SD; [5]Dept. of Agronomy and Range Science, University of California, Davis, CA).

POSTER SESSION

Lobby, Eccles Science Learning Center
Monday
9:00 a.m. – 1:00 p.m.
(Please refer to page 31.)

COMPUTER and INFORMATION SCIENCES, EARTH SCIENCES, and ENGINEERING and INDUSTRIAL SCIENCES

Agricultural Sciences 317
Tuesday
1:30 p.m. – 3:00 p.m.

Cosponsored by the Pacific Divison Sections on **Computer and Information Sciences**, Chair: *Alan E. Leviton*, California Academy of Sciences, 875 Howard St., San Francisco, CA 94103; **Earth Sciences**, Chair: *J. Thomas Dutro, Jr.***,** U.S. Geological Survey (E-308), National Museum of Natural History, Washington, D.C., 20560-0137; **Engineering and Industrial Sciences**, Chair: *Henry Oman*, 19221 Normandy Park Drive S.W., Seattle, WA 98116.

Chair: Henry Oman

1330 Opening Remarks

1340 *Study of Spider Silk with a Particular Emphasis on Surface Behavior,* AUTUMN GARZA-GOSSETT* and V.A. RAVI (Chemical and Materials Engineering Department, California State Polytechnic University, Pomona, CA).

1400 *Peering into the Earth's Most Critical Layer Using Geophysics: Environmental and Engineering Case Studies–Faults, Sinkholes, Cavities, Groundwater, Groundwater Contamination*, ALVIN K. BENSON (Department of Physics, Utah Valley State College, Orem, UT).

1420 *Two-Stage Algorithm for Global Optimization,* ZSOLT UGRAY*[1] and LEON LASDON[2] ([1]Business Information Systems Department, Utah State University, Logan, UT ; [2]MSIS Department, University of Texas, Austin, TX).

1440 *Plant Layout Design with Heuristics,* ZSOLT UGRAY* and KARINA HAUSER (Business Information Systems Department, Utah State University, Logan, UT).

POSTER SESSION
Lobby, Eccles Science Learning Center
Tuesday
9:00 a.m. – 1:00 p.m.
(Please refer to page 31.)

WESTERN SOCIETY of CROP SCIENCE
of the AMERICAN SOCIETY of AGRONOMY

President: Shree Singh, University of Idaho, 3793 N 3600 E, Kimberly, ID, USA 83341-5076; singh@kimberly.uidaho.edu.
President-Elect: Leonard Panella, USDA-ARS, Crop Res. Lab., 1701 Center Ave., Fort Collins, CO, USA 80526-2083; lpanella@lamar.colostate.edu.
Past President: Robert Zemetra, Department of Plant, Soil & Ent. Sci., University of Idaho, Moscow, ID, USA 83844-2339; rzemetra@uidaho.edu.
Secretary-Treasurer: David Hole, Utah State University-PSB Dept., 4820 Old Main Hill, Logan, UT, USA 84322-4820; dhole@mendel.usu.edu.

CONTRIBUTED PAPERS
Agricultural Sciences 202
Tuesday
8:45 a.m. – 2:45 p.m.

Chair: Shree Singh, Kimberly (Research & Extension Center, University of Idaho)

0845 *Response of Dry Bean Cultivars and Landraces to Seven Cropping Systems in Southern Idaho,* H. TERAN[1]*, D. WESTERMANN[2], R. ALLEN[1], R. PARROTT[3], K. MULBERRY[3], J. SMITH[4], M. DENNIS[1], R. HAYES[1], C. G. MUNOZ[1], and S. P. SINGH[1] ([1]Univ. of Idaho, [2]USDA-ARS, Kimberly, ID, [3]Organic bean grower, [4]Bean grower).

0900 *Quantitative Resistance to White Mold in Common Bean,* J. MAXWELL*, M. A. BRICK, P. BYRNE, X. SHAN, and H. F. SCHWARTZ (Colorado State University).

0915 *Response of Common Bean Cultivars and Landraces to Drought Stress,* C. MUNOZ[1]*, R. ALLEN[1], D. WESTERMANN[2], M. DENNIS[1], R. HAYES[1], H. TERAN[1], and S. P. SINGH[1] ([1]Univ. of Idaho and [2]USDA-ARS).

0930 *Cold Germination and Emergence of Different Canola Genotypes,* C. CHEN*, and K. NEILL (Montana State University, Bozeman, MT).

0945 *Development of a High Omega 3 Oilseed: Camelina,* D. L. JOHNSON (Montana State University, Bozeman, MT).

BREAK

Chair: Dennis Cash (Department of Animal & Range Sciences, Montana State University)

1030 *PINB is the Limiting Factor in the Reduction of Grain Softness in Wheat!* C. G. SWAN*, F. MEYER, A. HOGG, J. M. MARTIN, and M. J. GIROUX (Montana State University, Bozeman, MT).

1045 *Gene Expression Analysis of M955 a Low Phytic Acid Barley Mutant,* D. E. BOWEN[1]*, M. J. GUTTIERI[1], V. RABOY[2], and E. SOUZA[1] ([1]University of Idaho; [2]USDA-ARS Aberdeen ID).

1100 *Modification of Wheat Straw for Use as a Biofuel,* M. KUMAR*, J. L. HANSEN, and R. S. ZEMETRA (University of Idaho).

1115 *Interspecific* Leucaena *Hybrids for Fodder and High-value Hardwood,* J. BREWBAKER (University of Hawaii).

1130 *Precision Agriculture Technology to Plan and Manage a New Research and Extension Center,* D. A. CLAYPOOL[1]*, H. J. FARAHANI[2], R. P. BELDEN[1], and L. C. MUNN[1] ([1]University of Wyoming, [2]USDA-ARS).

LUNCH

Chair: David Claypool (Department of Plant Sciences, University of Wyoming)

1315 *Development of an Imazamox Resistant Wheat Cultivar Suitable for the Pacific Northwest,* A. CARTER*, J. HANSEN, T. KOEHLER, and R. ZEMETRA (University of Idaho).

1330 *Developing a Method for Transferring Genes from the C Genome of Jointed Goatgrass into the Genomes of Wheat,* J. L. HANSEN*, and R. S. ZEMETRA (University of Idaho).

1345 *Effects of Late Summer Harvest on Alfalfa Productivity and Stand Life in the Northern U.S.,* S. D. CASH*, R. L. DITTERLINE, K. D. KEPHART, and S. L. BLODGETT (Montana State University, Bozeman, MT).

1400 *Integrating Daily Patterns of Pasture Soluble Carbohydrate Level and Grazing Behavior,* T. C. GRIGGS[1]*, J. W. MACADAM[1], H. F. MAYLAND[2] and J. C. BURNS[3] ([1]Utah State University, Logan, UT; [2]USDA-ARS, Kimberly, ID).

1415 *Forage Quality of Spring Cereal Forage Varieties in Montana,* D. M. WICHMAN[1]*, S. D. CASH[2], P. F. HENSLEIGH[2], K. D. KEPHART[3], M. P. WESTCOTT[4], D. L. JOHNSON[5], P. F. LAMB[6], and M. KNOX[4] ([1]Central Agricultural Research Center,

MAES, Montana State University, Bozeman, MT; [2]Montana State University, Bozeman, MT; [3]SARC, Montana State University, Bozeman, MT; [4]WARC, Montana State Univeristy, Bozeman, MT; [5]NWARC, Montana St. University, Bozeman, MT; [6]NARC, Montana State University, Bozeman, MT).

1430 *Field-pea and Oats Cropping in Mixture in Alaska: As an Alternative Approach to Quality Forage Production and Weed Control,* S. BEGNA* and D. FIELDING (USDA-ARS, Fairbanks, AK).

BREAK

1515 Business Meeting (Agricultural Sciences 202).

POSTER SESSION
Lobby, Eccles Science Learning Center
Monday
1:30 p.m. – 5:30 p.m.
(Please refer to page 31.)

WESTERN SOCIETY of SOIL SCIENCE

(Program continued from Monday, page 25.)

TRACE ELEMENT BIOGEOCHEMISTRY and SOIL REHABILITATION
Agricultural Sciences 234
Tuesday
9:00 a.m. – 10:00 a.m.
(Please refer to program on page 26.)

1000 View and judge student posters.

LUNCH

1330 Business Meeting (Agricultural Sciences 234).
Presiding: Matthew La Force (San Francisco State University)

POSTER SESSIONS
Lobby, Eccles Science Learning Center
Monday
1:30 p.m. – 5:30 p.m.
Tuesday
9:00 a.m. – 1:00 p.m.
(Please refer to page 31.)

notes

III. CONTRIBUTED POSTER SESSIONS

(16) (number italicized and underlined) indicates a student presentation in competition for Awards of Excellence.
* indicates the presenter from among several authors listed.

NOTE TO PRESENTERS: Tack board stands for poster presentations will be set up in the lobby of the Eccles Science Learning Center. Two presentations will be assigned to each side of the stands. Presenters are expected to be available to discuss their poster presentations at posted times. Presenters must cooperate fully with the time frames for which their presentations are scheduled. The poster stands have numbers on them which coincide with the numbers assigned to the posters in this program (see number in parentheses by the title of each presentation). Presenters are expected to use the appropriately numbered display space for their poster. Posters may be set up in the half-hour preceding the starting time of each session. Posters should remain up until the ending time of the session, and then must be removed immediately. Presenters assume full responsibility for the security of their poster materials.

Those presenting posters must be present at least one hour during the display period and must post the time when they will be on hand to discuss their work.

Students presenting posters must be present until judging is completed. Ordinarily, two or three judges will visit each student poster.

Monday, June 14

MORNING SESSION

Lobby, Eccles Science Learning Center
Monday
9:00 a.m. – 1:00 p.m.

BIOLOGY

(*6*) *Stress Inducing Cross Protection to UV-B Radiation and Heat of* Metarhizium anisopliae *Conidia*, DRAUZIO E.N. RANGEL*, ANNE J. ANDERSON and DONALD W. ROBERTS (Department of Biology, Utah State University, Logan, UT).

(*7*) *Atomic Force Microscopy Adhesion Mapping of Bacterial Biofilms,* GOPINATH NARASIMHAN*[1], JESSE JOHNSON[1], BRANDT ESPLIN[2], ANNE ANDERSON[2], DAVID BRITT[1] (Departments of Biological Engineering[1] and Biology[2], Utah State University Logan, UT).

(*8*) *Influence of Pluronics™ on Planktonic and Biofilm Growth of a Soil Bacterium,* HEATH HALL*[1], SPENCER MANN[1], DAVID W. BRITT[1], BRANDT ESPLIN[2], and ANNE J. ANDERSON[2] (Departments of Biological Engineering[1] and Biology[2], Utah State University, Logan, UT).

(*9*) *Production of a Monoclonal Antibody against 9L Gliosarcoma,* JANELL L. KNAUFF* and JOAN M. REDD (Department of Biological Science, Walla Walla College, College Place, WA).

(*10*) *1,25-Dihydroxyvitamin D3 Stimulates Vesicular Transport within 10 sec in Polarized Intestinal Epithelial Cells,* TREMAINE M. STERLING* and ILKA NEMERE (Department of Nutrition and Food Sciences and the Center for Integrated BioSystems, Utah State University, Logan UT).

(*11*) *Differential Effects of SDZ 211-939 on Human and Bovine Voltage-gated Sodium Channel Inactivation May Be Due To Differences in the DII-DIII Linkers,* TYCE J. KEARL*[1], PETER C. RUBEN[1], and MEIKE MEVISSEN[2] ([1]Department of Biology, Utah State University, Logan, UT ; [2]Institute of Veterinary Pharmacology, University of Bern, Bern, Switzerland).

(*12*) *Inhibition of CXCR4/SDF-1α Mediated Angiogenesis by Tannic and Ellagic Acid in Breast Cancer Cells,* D.D. TWITCHELL, K.T. MEIER, B.K. MURRAY, and K.L. O'NEILL (Department of Microbiology and Molecular Biology, Brigham Young University, Provo, UT).

(*13*) *The Effects of Prolactin (PRL) on Mink* (Mustela vison*) Guard and Under-hair Fiber Length,Under-hair Follicle Depth and Skin Epidermal Thickness*, MARCUS HARRIS*, ERIC SWENSON, JASON HUNT, MALCOLM SHIELDS and JACK ROSE (Department of Biological Sciences, Idaho State University, Pocatello, ID).

(*14*) *Reproductive Inhibition by Methyl Farnesoate in the Tadpole Shrimp* Triops longicaudatus*, a Possible Endocrine Alternative for Population Control,* WILLIAM K. NELSON* and BRIAN TSUKIMURA (California State University Fresno, Fresno, CA).

(15) *Molecular Biogeographic Analysis of the Relationships between* Papilio indra *Sub-Species,* JAMES PRICE*, DEVONE BURTON, AMANDA BUTLER, KRISTI GOODWIN, BRAD GRAHAM, MELISA GRIFFITH MICHELLE HOGG, REBEKAH MARTINEAU, BENJAMIN MCCUMBER, HARLEY MULLEN, PETER

RAVEN, BRIAN STURGILL, DERREL WALKER, KIM WAGSTAFF, JOSEPH WRIGHT, and WAYNE WHALEY (Department of Biology, Utah Valley State College, Orem, UT).

(16) *Problem Solving Dynamics of Stomatal Networks*, JEVIN WEST*, SUSANNA MESSINGER, DAVID PEAK, and KEITH MOTT (Biology Department and Physics Department, Utah State University, Logan UT).

(17) *Confirmation of* Poa *hybrids and Transgene Movement from* Poa pratensis *L.,* AMY ANDERTON (Utah State University, Logan, UT).

CHEMISTRY

(1) *The Genetic Algorithm Based Elucidation of the Structure of the Multiply Aromatic Clusters of Main Group Elements,* ANASTASSIA N. ALEXANDROVA* and ALEXANDER I. BOLDYREV (Department of Chemistry and Biochemistry, Utah State University, Logan, UT).

(2) *Digitally Enhanced Thin-Layer Chromatography*, AMBER I. HESS (Stevenson School, Pebble Beach, CA).

(3) *Ozonic Acid and Ionic Salts of the* O_4^{2-} *Dianion,* BEN ELLIOTT* and ALEXANDER I. BOLDYREV (Department of Chemistry and Biochemistry, Utah State University, Logan, UT).

(4) *Aggregation of 1,1′-diethyl-2,2′-cyanine Dye on Polyvinyl Sulfate: A Quantitative Study of the Kinetics of the Electron Transfer in the "J-Aggregates",* HUSSEIN SAMHA (Department of Physical Science, Southern Utah University, Cedar City, UT).

(5) *Novel Homocysteine Bridged SOD-SAM Electrode,* QINSHU SUN (Department of Pharmacology and Pharmaceutical Chemistry, Jining Medical College, Jining, Shandong 272013, P. R. China).

ECOLOGY and ENVIRONMENTAL SCIENCES

(18) *Soil Nitrogen Dynamics Beneath Yellow Starthistle (*Centaurea Solstitialis*) and Smooth Brome (*Bromus Inermis*) Canopies: A Mechanism for Arrested Succession?* JULIE P. RIEDER (Utah State University, Logan, UT).

(19) *Alkaloids and Old Lace: Pollen Toxins Exclude Generalist Pollinators from Death Camas (*Toxicoscordion [=Zigadenus] paniculatum*) (*Melanthiaceae*),* MELISSA WEBER*[1], MORGAN G. YOST[1], JAMES H. CANE[1,2], and DALE R. GARDNER[3] ([1]Biology Department, Utah State University, Logan, UT; [2]USDA – ARS, Bee Biology & Systematics Laboratory, Logan, UT ; [3]USDA – ARS, Poisonous Plant Research Lab, Logan, UT).

AFTERNOON SESSION

Lobby, Eccles Science Learning Center
Monday
1:30 p.m. – 5:30 p.m.

Presenters—please read note to presenters at the beginning of this poster section, page 31.

AGRICULTURE and HORTICULTURAL SCIENCE

(4) *Perenniality Traits in* Poa annua *L. Populations Throughout Utah's Diverse Environments,* ALEX N. STOY* and PAUL G. JOHNSON (Dept. of Plants, Soils, and Biometeorology, Utah State University, Logan, UT).

(5) *Effects of Saline Irrigation and Rooting Media Organic Matter on Growth and Development of Two Western Native Perennials,* RACHEL N. JEPPSON* and JENNIFER W. MACADAM (Department of Plants, Soils, and Biometeorology, Utah State University, Logan, UT).

(6) *Characteristics of Root Growth in a Management Intensive Grazing System,* JEFF O. LARSEN*, RHONDA L. MILLER, LUKE A. PETERSEN, and VAUGHN J. THACKER (Agricultural Systems Technology and Education Department, Utah State University, Logan, UT).

WESTERN SOCIETY of CROP SCIENCE

(7) *Production and Forage Quality of Irrigated Cereals in Montana,* S. D. CASH*, L. M. M. SURBER, A. L. TODD, D. M. WICHMAN, and R. L. DITTERLINE (Montana State University, Bozeman, MT).

(8) *Stage of Maturity, Time of Sampling, and Method of Drying Effects on Forage Quality of Haybet Barley,* L., M. M. SURBER*, S. D. CASH, J. G. P. BOWMAN, and L. BARNEY (Montana State University, Bozeman, MT).

(9) *Nitrate Concentration of Cereal Forage Species at Three Stages of Maturity,* L. M. M. SURBER*, S. D. CASH, J. G. P. BOWMAN, and A. L. TODD (Montana State University, Bozeman, MT).

(10) *Complementation of the Pina (Null) Allele with the Wild Type Pina Sequence Restores a Soft Phenotype in Transgenic Wheat,* H. WANJUGI[1]*, M. J. GIROUX[1], J. M. MARTIN[1], and A. BLECHL[2] ([1]Montana State University, Bozeman, MT and [2]ARS Crop Improvement and Utilization Research Unit).

(11) *Nutrient Management for Winter Wheat Quality in Varying Moisture Regimes,* J. CLAWSON*[1], D. HOLE[1], R. KOENIG[2], B. MILLER[1], E. SOUZA[3], and S. CLAWSON[1]* ([1]Utah State University; [2]Washington State University; [3]University of Idaho).

(12) *Irrigated Winter and Spring Wheat Response to P in Calcareous High Lime Soil,* B. BROWN*, R. GIBSON, and K. HUBER (University of Idaho).
(13) *Trigonelline in Soybean Seeds and Seedlings under Stress Conditions,* Y. D. CHO[1]*, A. B. TURNIPSEED[2], D. A. LIGHTFOOT[3], and A. J. WOOD[3] ([1]Eastern New Mexico Uni. Portlales, NM, [2]South Dakota State U. Brookings, SD , [3]Southern Illinois U. Carbondale, IL).
(14) *Resistance Genes to Multiple Races of Fusarium Wilt in Common Bean,* M. BRICK[1]*, J. B. OGG[1], P. BYRNE[1], H. F. SCHWARTZ[1], and J. D. KELLY[2] ([1]Colorado State University, [2]Michigan State University).
(15) *Change in XTH Activities, Cell Wall Extensibility and Hypocotyl Elongation of Soybean Seedlings at Low Water Potential,* Y. WU[1]*, B. R. JEONG[2], S. C. FRY[3], and J. S. BOYER[2] ([1]Utah State University, [2]University of Delaware, [3]University of Edinburgh).
(16) *Laccase Gene Expression in Maize and Arabidopsi,* V. HAROLDSEN*, E. DAVIS, M. X. LIANG, X. N. CAI, E. BUSHMAN and Y. WU (Utah State University, Logan, UT).
(17) *Proteomic Analyses of Mature Barley Seeds among Recombinant Chromosome Substitution Lines Generated from a Cross between Barley spontaneum and Harrington barley,* D. ROCHE (Utah State University, Logan, UT).
(18) *Differences in Carbon Isotope Discrimination between Two Rowed and Six Rowed Barley Lines,* Q. JIANG*, D. ROCHE, and D. HOLE (Utah State University, Logan, UT).

WESTERN SOCIETY of SOIL SCIENCE

(1) *Iron Nutrition and Suppression of Cotton Root Rot on Calcareous Soil,* JOHN E. MATOCHA (Texas A&M University, TAES).
(2) *Pasja Yield Responses to Fertilizers under Different Cultivation Methods in New Zealand*, LEANNA REYNOLDS* and ANDREA PEARSON (Crop & Food Research, Hastings, New Zealand).
(3) *Use of Plants and Fish Wastes for Ameliorating Hazards Associated with Coal Bed Methane Waters,* GEORGE F. VANCE*, JOHN G. WOIWODE, ROGER M. HYBNER, KEVIN FITZSIMMONS and GIRISHA K. GANJEGUNTE (Department of Renewable Resources, University of Wyoming, Laramie, WY).

Tuesday, June 15

MORNING SESSION

Lobby, Eccles Science Learning Center
Tuesday
9:00 A.m. – 1:00 p.m.

Presenters—please read note to presenters at the beginning of this poster section, page 31.

ANTHROPOLOGY

(14) *A Rotary Dental Mill in* Paranthropus*?* GORDON STRASENBURGH (Society for Scientific Exploration, North Bend, OR).

COMPUTER and INFORMATION SCIENCES

(*1*) *PLSC Specifications of ARM AMBI-AXI Hardware Protocol,* UDIT M. DAVE* and ANNETTE BUNKER (Verification Research Group, Utah State University, Logan, UT).
(*2*) *Automated Hardware Protocol Verification Using Symbolic Trajectory Evaluation*, ROHIT SARASWAT* and ANNETTE BUNKER (Department of Electrical and Computer Engineering, Utah State University, Logan, UT).

EDUCATION

(10) *Long-term Mudpot Monitoring: An Ideal Project for Undergraduate Research,* ANNE STURZ*, CHARLES KOEHLER, THERESA COMPTON and JENNIFER PRICHARD (Department of Marine Science, University of San Diego, San Diego, CA).

HEALTH SCIENCES

(11) *Duration of Heart Problems among Non-Insulin-Dependent Diabetics: Socioeconomic Status Differences,* STEPHEN J. MOREWITZ (Stephen J. Morewitz, Ph.D., & Associates, San Francisco, CA).
(12) *Hypertension Impairment and Socioeconomic Differences among Persons with Insulin-Dependent Diabetes,*

STEPHEN J. MOREWITZ (Stephen J. Morewitz, Ph.D., & Associates, San Francisco, CA).

(13) *Non-enzymatic Glycation in Diabetes – Is it Really Non-Enzymatic? Is it Really Only a Disease Process?* LARRY M. BRAND (San Diego, CA).

PSYCHOLOGY

(*15*) *Stability of the Mismatch Negativity Response to Frequency, Location, and Duration,* MARIE IMWINKELRIED*, KATE LAMVIK*, EVANTHIA ROUSSOS*, and STANLEY E. LUNDE (University of California-Los Angeles, Los Angeles, CA).

(*16*) *3D Localization of the Mismatch Negativity Response to Auditory Stimuli,* YING LUU*, PHIVAN PHAM, SUSAN SABAL, MICHELLE WATSON and STANLEY E. LUNDE (University of California-Los Angeles, Los Angeles, CA).

(*17*) *Adolescent Development and Environments,* DENISE E. TAYLOR* and RANDALL M. JONES (Family, Consumer, and Human Development Department, Utah State University, Logan, UT).

SOCIAL, ECONOMIC and POLITICAL SCIENCES

(*3*) *Are Stock Options Congruent with Maximizing Share Holder Value? A Mathematical Derivation,* AMANDA GAIL BERRY (Stevenson School, Pebble Beach, CA).

WESTERN SOCIETY of SOIL SCIENCE

(*4*) *Metal(loid) Solubility as Affected by Redox Changes in Mining-Impacted Sediments*, DOUGLAS C. FINKELNBURG*, GORDON R. TOEVS, and MATTHEW J. MORRA (Environmental Sciences Program, University of Idaho, Moscow, ID).

(*5*) *Influence of Reclamation Management Practices on Soil Bulk Density and Infiltration Rates,* GYAMI SHRESTHA* and PETER D. STAHL (Department of Renewable Resources, University of Wyoming, Laramie, WY).

(*6*) *Using Soil Texture to Guide Variable-Rate Nitrogen Fertilization,* JARED E HOBSON*, JASON W. ELLSWORTH and APRIL B. LEYTEM (Twin Falls Research and Education Center, University of Idaho, Twin Falls, ID).

(*7*) *Nitrogen Leaching in Management Intensive Grazing,* LUKE PETERSEN*, VAUGHN THACKER, and RHONDA MILLER (Agricultural Systems Technology and Education Department, Utah State University, Logan, UT).

(*8*) *Soil and Vegetation Impacts From Land Application of Saline-Sodic Coalbed Methane Waters,* LYLE A. KING*, GEORGE F. VANCE, and GIRISHA K. GANJEGUNTE (Department of Renewable Resources, University of Wyoming, Laramie, WY).

(*9*) *Evaluation of Geospatial Technologies for Variable Rate Nitrogen Management in Potatoes,*TOM R. BOWEN*, BRYAN G. HOPKINS, and JASON ELLSWORTH (University of Idaho, Idaho Falls, ID).