

**PROCEEDINGS of the
AMERICAN ASSOCIATION for the ADVANCEMENT OF SCIENCE
PACIFIC DIVISION**

Volume 27, Part I

June 15, 2008

89th ANNUAL MEETING of the AAAS PACIFIC DIVISION

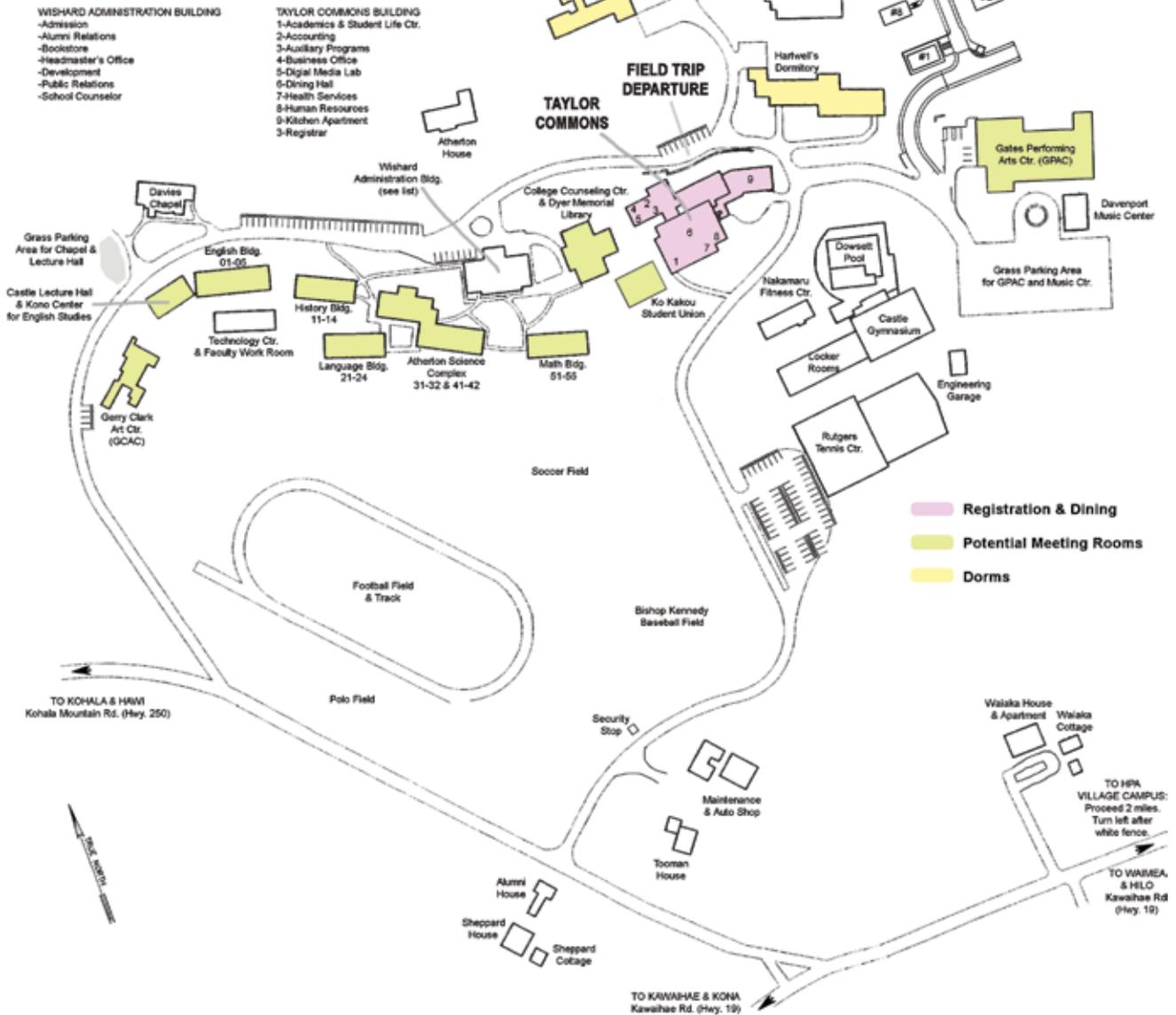
PROGRAM WITH ABSTRACTS



**HAWAII PREPARATORY ACADEMY
on the BIG ISLAND
WAIMEA, HI
June 15 – 20, 2008**



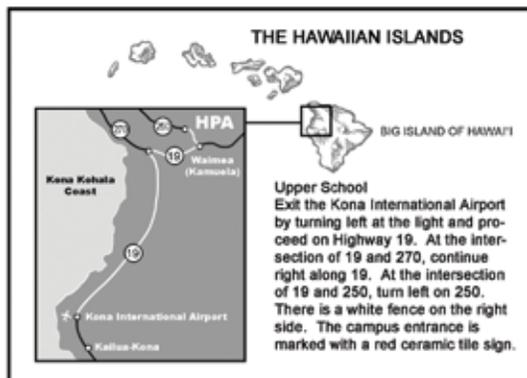
Hawai'i Preparatory Academy Upper Campus



Big Island Map



Directions to HPA Upper Campus (from Kona)



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of the
Annual Meeting
of the
AAAS, PACIFIC DIVISION

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*89th Annual Meeting of the Pacific Division of the
American Association for the Advancement of Science*

**Hawai`i Preparatory Academy
on the Big Island
Waimea, HI
June 15 – 20, 2008**

*Contents accurate as of May 21, 2008.
Times and/or locations of events may change.
Please refer to the Day-At-A-Glance for the most up-to-date information.*





Mark Your Calendar!

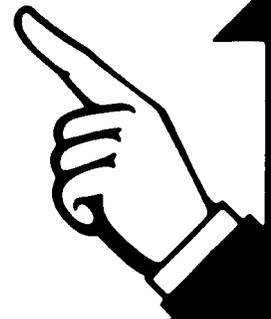
for upcoming Pacific Division meetings

- **14 – 19 August 2009 in San Francisco, CA**

Starts at the California Academy of Sciences in their newly rebuilt facility in Golden Gate Park with a two-day (Friday and Saturday, 14 and 15 August) symposium planned by Michael Ghiselin to commemorate the 150th anniversary of the publication of Charles Darwin's *On the Origin of Species* and the 200th anniversary of Charles Darwin's birth. Moves Sunday to San Francisco State University for a full program, including a large contributed paper session commemorating Darwin. An early indication of interest in offering a contributed paper for this session is encouraged. Please send a tentative title or description to Michele Aldrich (maldrich@smith.edu) or Alan Leviton (alleviton@calacademy.org). Additional programming will occur at the California Academy of Sciences.

- **13 – 16 June 2010 in Ashland, OR**

Meeting again at Southern Oregon University, expect a full program of technical sessions, symposia, workshops, science-related field trips and theatre. More details to follow.



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Publication

Publication of symposia or other technical sessions or talks that have been prepared under the auspices of the AAAS, Pacific Division requires written permission of the AAAS, Pacific Division as well as that of the individual organizers and speakers.

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Standards of Conduct

On April 14, 1978, the AAAS Board of Directors adopted the following position statement regarding standards of conduct at AAAS meetings:

“The Board takes it for granted that all who attend the Annual Meetings of the Association will conduct themselves with consideration for others and with particular consideration for those who generously give their time and thought to the sessions. Differing opinions will continue to be heard and respected. We recognize that there are areas of science that are both controversial and troubling. The Annual Meeting can serve as an effective forum to consider such issues, so long as procedures of orderly debate and fairness are followed. Discourtesy and abusive behavior have no place in the annual Meeting. When excesses occur they do great injury to the Association and to the process of discussion. They cannot be condoned.”

The AAAS, Pacific Division, as part of the larger organization, ascribes to this position and will, if necessary, take appropriate measures to assure adherence to it.

No Smoking Rule

On December 30, 1971, the AAAS Council approved a motion requesting that persons in attendance refrain from smoking at Council meetings and scientific and public sessions. The AAAS, Pacific Division ascribes to this policy and asks that all persons who attend the meeting comply with this ruling.

Meeting Development

The technical programs of AAAS, Pacific Division meetings are developed by proposals submitted by individuals and/or groups of individuals and overseen by the Executive Committee and Executive Director of the Division. Symposium planners are responsible for developing lists of presenters that represent fairly the topic at hand. Papers submitted separately from symposia, referred to as Contributed Papers and Contributed Posters, are reviewed by section chairs prior to their inclusion in the program.

All program review is based on scientific significance, timeliness, balance, and clarity of organization. In the case of symposia and workshops, this review is based on materials provided by planners or submitters and does not include a technical examination of individual presentations.

Student Awards of Excellence

The Council, Executive Committee and officers of the AAAS, Pacific Division are committed to encouraging the scientific development of students by offering them a friendly yet scientifically robust environment in which to present their research results. Part of that environment includes evaluating student presentations and rewarding students' superior efforts. To that end, the Division has developed an extensive program of student Awards of Excellence that are given at both the sectional and divisional levels. More information about this program may be found on page 13 of this Proceedings.

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Program Development:

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J. Thomas Dutro, Jr., U.S. Geological Survey, Washington, D.C.

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Donald J. McGraw, Chula Vista, CA

Michael D. McNeil, USDA Agricultural Research Service, Miles City, MT

Panos Photinos, Physics and Engineering, Southern Oregon University

D. Jeffrey Meldrum, Department of Biological Sciences, Idaho State University, Pocatello

J. Kenneth Nishita, California State University, Monterey Bay

Henry Oman, Seattle, WA

Michael Parker, Department of Biology, Southern Oregon University

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15 June 2008

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Aloha and welcome to the 89th Annual Meeting of the Pacific Division of the AAAS. Our theme, Pacific Science in a Global Society, is especially appropriate for a meeting situated here on the Big Island. Not only is Hawai`i a culturally diverse and vibrant society rich in traditions of Polynesia and the rest of the Pacific rim, but it provides the setting for the study of evolution. Some of the world's newest geological formations with new islands emerging from the Hawai`ian hotspot provide new habitat to be colonized by new migrants and new opportunities for differentiation and adaptation. Hawai`i's rich biota is highly endemic and also highly endangered through the abuses of our own activities. As you enjoy your stay on the island, please take advantage of the opportunities to become acquainted with the beauty and richness of the land, sea and sky that surrounds you and hopefully take away a new appreciation of the importance of preserving this fragile paradise.



Terry Gosliner

President, AAAS Pacific Division

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Hawai'i Preparatory Academy

Courtesy Hawai'i Preparatory Academy

**ANNUAL MEETING of the AAAS, PACIFIC DIVISION
and its AFFILIATED SOCIETIES and SECTIONS at the
HAWAI'I PREPARATORY ACADEMY
on the Big Island of Hawai'i
WAIMEA, HI
June 15 – 20, 2008**

GENERAL INFORMATION

**AFFILIATED SOCIETIES AND SECTIONS
SPONSORING SESSIONS AT THE
HAWAI'I MEETING**

Western Society of Crop Science
Agriculture and Horticultural Sciences
Anthropology and Archaeology
Atmospheric and Oceanographic Sciences
Chemistry and Biochemistry
Cell and Molecular Biology
Computer and Information Sciences
Earth Sciences
Ecology, Organismal Biology and Environmental Sciences
Education
General and Interdisciplinary
Health Sciences
History and Philosophy of Science
Industrial Sciences and Technology
Physics and Materials Science
Psychology
Social, Economic and Political Sciences

HISTORY OF THE HAWAIIAN ISLANDS¹

The first of the volcanic islands that would become the Hawaiian archipelago rose in molten rock and smoke from the ocean some 70 million years ago. It was born at a "hot spot" in the Earth's crust where Hawai'i Island exists today.

But over the millennia, that first island and the following ones that erupted at about the same place, have inched northwest in a curving line on the huge drifting tectonic piece of the Earth's crust called the Pacific



Molten pahoehoe lava. Photo by Bob Abraham, Big Island Visitor Bureau.

Plate. The most ancient islands have long since eroded and returned beneath the sea. Others to the east, surviving only

¹ Text and photos courtesy the Big Island Visitors Bureau, <http://www.big-island.org>.

GENERAL INFORMATION

as coral atolls or rocks jutting from the sea, are known as The Northwestern Hawaiian Islands. Then, farther east, there are the eight youngest islands — what we call the “main” islands — stretching from Kauai to Hawai`i Island, the easternmost island — for now. Because the next Hawaiian island is already forming about 3,000 feet beneath the ocean surface off the southeast coast of our island. This seamount already has a name: Loihi. But don’t bother staring offshore waiting for it to appear. Though Loihi already rises some 18,000 feet from the sea floor (actually on the undersea flank of Mauna Loa), many thousands of years will pass before it breaks the surface.

The human history of the Hawaiian Islands begins with the discovery of this island, the Big Island, sometime between



Ka Lae, South Point. Courtesy Big Island Visitor Bureau.

AD 400 and AD 800. It is believed that the first discoverers, traveling in double-hulled canoes, sailed from the Marquesas Islands in the South Pacific. Using the stars, the currents and the “feel” of the ocean as their guide, the voyagers’ first landfall on these islands was probably near Ka Lae at the southern tip of Hawai`i Island. These first Hawaiians lived in isolation for 500 or 600 years before Polynesians from Tahiti began arriving to this place they referred to as Hawai or “ancient homeland.”

Over the centuries, Polynesians introduced plants and animals: dogs, pigs, chickens, breadfruit, bananas, sugarcane, yams, taro, coconuts, gourds, ti and other “canoe plants.”

Hawaiian life was regulated under laws of kapu, a variation of the Tahitian word tapu, or taboo. Society was feudal and defined by island, often with two or three chiefs vying for control. Beneath the chiefs were other alii (noblemen), and kahuna (priests, healers). Next came the kanaka wale (craftsmen, artists, hula dancers, fishermen). The maka ainana (commoners) worked the land. At the bottom were the social outcasts or slaves called the kauwa-maoli.

In 1778, British explorer Captain James Cook, stumbled upon the Hawaiian Islands after seeking the fabled Northwest Passage across North America. His first landfall was on



Kealakekua Bay, where Capt. Cook met his death. PhotocourtesyBigIslandVisitorBureau.

the island of Kauai. He dubbed these the Sandwich Islands after his friend and patron, the Earl of Sandwich. In January of 1779, Cook returned to Hawai`i to refit and re-provision. His two ships, the Resolution

and the Discovery anchored in Kealakekua Bay on the southwest coast of Hawai`i Island. His arrival happened at the time of the annual makahiki celebration, a time of tribute to the God Lono. The Hawaiians saw Cook’s arrival as Lono’s return, and he received a great welcome. After two weeks, Cook and his ships set sail towards Maui, but came limping back just days later with storm damage to the Resolution. Now, the makahiki festival was over, and the Hawaiians were surprised to see Lono return, having sustained such damage. Their greeting was not as generous now. Thefts of nails and other pieces of iron from the ships increased. When a cutter was found missing, Cook took a chief hostage until the boat was returned. A skirmish broke out between Cook’s men and the Hawaiians, leading to Cook’s death in the shore break of Kealakekua Bay. Today, a monument marks the spot where Cook died. This monument stands officially on British soil.



King Kamehameha Statue, Photo courtesy Big Island Visitor Bureau.

During this time, there was a young warrior, Kamehameha, born in Kohala at the north tip of the Big Island, who had a vision to unite all the islands under one rule. Kamehameha fought a ten year war to dominate Hawai`i Island, then conquered Maui, Molokai, Lanai and finally Oahu. In 1796, his invasion of Kauai was disrupted by a storm and it took another 14 years before Kauai came under his control.

Having united all the islands under his rule, King Kamehameha (“Kamehameha the Great”) gave the name of Hawai`i Island to the name of his kingdom. He ruled from his home in Kailua-Kona until his death at Kamaka Honu, or “Eye of the Turtle,” today found on the grounds of King Kamehameha’s Kona Beach Hotel. He was about 63 years old.

Soon after the death of Kamehameha I in 1819, his son and successor, Liholiho, heavily influenced by Kamehameha’s favorite wife, the powerful Kaahumanu, decided the old “kapu” system should be done away with. This was a ripe moment for American Christian missionaries to arrive. Kaahumanu was one of the first converts, and the numbers steadily grew, though there were strong cultural clashes.

Besides missionaries, Hawai`i was flooded with traders, whalers and other foreigners. They established footholds and gained power and influence. By the early 1840’s the Kingdom of Hawai`i was recognized by the United States, France and Great Britain.

Sugar, which was first grown commercially in Hawai`i in 1835, became the principal industry. Much-needed laborers from China, Japan, Portugal, Korea and the Philippines were soon arriving in droves. Immigration continued into the early



Coffee Picking. Photo by Bob Fewell, Big Island Visitor Bureau.

1900s. From these mixed ethnic groups evolved Hawai'i's identity as a cosmopolitan melting pot.

Adding to the mix were the paniolo, the Mexican cowboys who first arrived on Hawai'i Island during the 1830s to help with the growing cattle industry spreading out from Parker Ranch. The paniolo (the word comes from Español, i.e. Spanish) brought with them a small guitar that has evolved into the instrument that is today synonymous with Hawai'i: the ukulele.

About the same time, another Hawai'i Island agricultural industry was taking root. The lower slopes of Mauna Loa above the Kona Coast proved to be ideal for growing coffee, and now Kona coffee is world famous.

As more and more foreigners came to Hawai'i during the 19th century, the native Hawaiian population declined. They had numbered around 600,000 at the time of Captain Cook's arrival, but by 1850 there were about 85,000, and by 1890 about 40,000. The main reason was the introduction of Western diseases for which the Hawaiians had no immunity. The rapid introduction of Western culture was also a factor.

The Hawaiian monarchy remained until 1893, when a group of American businessmen overthrew Queen Lili'uokalani. It was a sad time for the people as a provisional government headed by Sanford B. Dole took control. In August of 1898, the Hawaiian Islands were annexed as a territory of the United States. The early 1900s were years of relative peace and quiet development. Then on December 7, 1941, Hawai'i was thrust onto the world stage with the Japanese attack on Pearl Harbor on the island of Oahu. Hawai'i played a principal role in World War II in the Pacific as an American military base. The postwar years saw tremendous growth and economic development. In 1959, Hawai'i was admitted to the Union as the fiftieth state.

HAWAI'I'S CLIMATE

Weather on all of the Hawaiian Islands is very consistent, with only minor changes in temperature throughout the year. This is partly due to year-round warm sea surface temperatures. In practical terms, there are only two seasons: the summer months (called Kau in Hawaiian) that extend from May to October and the winter months (Hooilo) that run from November to April. The average daytime summer temperature at sea level is 85° F (29.4° C), while the average daytime winter temperature is 78° F (25.6° C). Temperatures at night are approximately 10° F lower.

The Hawaiian Islands are an incredible collection of many diverse micro-environments, each with its own weather,

plants and animals. Nowhere is this more true than on the Big Island.

As a result of the shielding effect of our massive volcanoes and varying elevations, there are as many different climate zones here as exist along the entire coast stretching from Alaska to Costa Rica. For the full impact of this, you need only explore Hawai'i Island by car or helicopter to see the beauty of tropical rain forests, cool alpine regions, stony deserts and sunny beaches—all within the span of a day's drive.

HAWAI'I PREPARATORY ACADEMY, THE BIG ISLAND (HAWAI'I), AND WAIMEA

The Hawai'i Preparatory Academy is located in Waimea (also called Kamuela, and not to be confused with the Waimeas on the islands of Kauai and Oahu) on the Big Island of Hawai'i. The Big Island, at 4,028 square miles, is the largest of the eight islands that comprise the state of Hawai'i. It was formed by the convergence of lava flows from four volcanoes, Mauna Kea (the tallest at 13,796 feet above sea level), Mauna Loa, Kohala (the oldest) and Kilauea (the active one). Not only is Mauna Kea the tallest, it is absolutely huge, rising over 32,000 feet from the sea floor. If one were to convert it to gravel and spread it over the area of the entire state of California, the gravel would be 600 feet deep! Mauna Kea covers half of the Big Island, and has a surface equal approximately to 85% of the other seven islands of Hawai'i combined.² Mauna Kea is considered by many Hawaiians to be the most sacred spot in all of the islands.

The west, or leeward side of the island, is dry (about 73 inches of rainfall per year in Kailua-Kona Kona) compared to the east, or windward side of the island (150 inches of rainfall per year at Hilo, the second most populous city in the state and also the capitol of the island (county) of Hawai'i).

The geography of Hawai'i varies considerably. There are lush tropical rain forests and arid deserts, white sand beaches and snow-capped mountain peaks. Islanders grow sugar cane, the famous Kona coffee, and cattle. Waimea is the location of the Parker Ranch, once the largest privately owned cattle ranch in the world. The Parker Ranch still encompasses 150,000 acres and runs about 25,000 cattle.

The Hawai'i Preparatory Academy (HPA), founded in 1949, is a coeducational college-preparatory boarding school with grades K-12 situated on two campuses. The Pacific Division meeting will take place on the 200-acre Upper Campus, about two miles south of Waimea. The Upper Campus houses grades 9-12 and sits at the foot of the Kohala Mountains. HPA is about 38 miles north of the Kona airport, a pleasant drive through volcanic lava flows that are peppered with messages written in arrangements of white coral rocks. The Academy sits at about the 2,500 foot level and is close to the boundary between the drier leeward side and wetter windward sides of the island.

GENERAL INFORMATION

ANNUAL MEETING

REGISTRATION

The Registration Center is in the main entry to the James M. Taylor Commons (see map on page 2). Hours for registration are:

Sunday, 12:00 p.m. – 6:00 p.m.

Monday, 7:30 a.m. – 5:00 p.m.

Tuesday, closed for field trips

Wednesday, 7:30 a.m. – 5:00 p.m.

Thursday, 7:30 a.m. – 2:00 p.m.

All persons attending the meeting, except for public sessions, should be registered. On-site registration fees are as follows: professional non-program planner/presenter, \$100; K-12, community college teachers, post-docs and retirees/emeritus, \$60; and students and participating spouses of registrants, \$40. One-day professional registration will be available on-site for \$75. If you attend more than one day, you must pay the full registration fee. Program organizers and presenters registering in the professional category may purchase a full meeting professional registration at the reduced, one-day rate. To be eligible for this discount, the individual must be listed as an organizer/co-organizer of a program or have submitted an abstract that is accepted for presentation at the meeting.

Special stipends of \$75 were given to the first twenty K – 12 and community college instructors that registered in advance for this meeting. The stipend is not available to teachers who register on-site.

Students were given the opportunity to apply for one of ten travel awards to help defray their costs to the meeting. The travel award this year is a four-night room and board package for a double room at HPA.

About field trips: Advance registration was required for all field trips due to limited seating in the vehicles and the need to inform some destinations of the number of people arriving. However, space may be available on some of the excursions. If you didn't preregister for a particular field trip you are interested in participating in, please inquire at the Registration Center to see if space is still available. At least one member of a family group requesting field trip reservations must be a paid meeting registrant. Non-registrants are assessed an additional one-time-only \$10 field trip registration fee, regardless of how many field trips they sign up for during this meeting.

About workshops: All workshops are available to persons already registered for the meeting at no additional charge. Some workshops may have limited space available, so it is suggested persons interested in attending arrive early.

ACCOMMODATIONS and FOOD SERVICE

Rooms and meals packages at HPA were available for advance purchase to meeting attendees. The lodging is in typical dorm rooms, and is priced either as singles (one person per room) or doubles (two persons per room). Bathrooms, including shower rooms, are in common facilities, either down the hall or on an adjacent floor. Bed linens and a washcloth and towel are provided. The rooms have internet access and telephones. Washers and dryers are available for use at no cost (detergent can be purchased at the bookstore) for those staying in the dorms.

The following room/board and meals-only packages were available for advance purchase:

Lodging with Meals (see exception in C. below):

A. Four nights lodging (Sunday, 15 June – Wednesday, 18 June) **and ten meals** (Sunday: reception/dinner; Monday: breakfast, lunch, Hapuna Beach picnic dinner; Tuesday (field trip day): breakfast only; Wednesday: breakfast, lunch, Division Luau-type Banquet; Thursday: breakfast, lunch). Cost: \$410 single; \$300 double (per person); \$140 per child (up to two children age 15 or younger with at least one parent in a room).

B. Five nights lodging (Sunday, 15 June – Thursday, 19 June) **and twelve meals** (as package "A" but with dinner Thursday and breakfast Friday added). Cost: \$501 single; \$363 double (per person); \$166 per child (see A. above)

C. Additional nights lodging (only as additions to packages A or B above) – Friday, 13 June, Saturday and/or 14 June: Cost \$68.50 per night single; \$42.50 per night double (per person); \$10.50 per night per child (see A. above).

NOTE: additional nights lodging do not include any additional meals, which must be purchased on your own.

Meals Only:

D. Ten Meals (same as A above). Cost: \$130 adult; \$97.50 child (15 years and under)

E. Twelve Meals (same as B above). Cost: \$150 adult; \$113 child (15 years and under)

Please note that no refunds will be given for uneaten meals or unused nights of stay.

On-campus dining. The cuisine at HPA is prepared by Sodexo, a food provider for many campuses and other locations. Food is served buffet style in a large dining room. Meal services include a variety of entrees and side dishes, and is "all-you-can-eat." Special foods have been chosen for the Sunday reception/dinner, Monday Hapuna Beach Picnic, and Wednesday Division Banquet, necessitating higher prices for those meals.

Individual meals may be purchased as follows:

Breakfast, \$7.75 (on-site)

Lunch, \$10.00 (on-site)

Dinner, \$12.00 (on-site)

Sunday Reception/Dinner, \$26.00 (advance only)
 Monday Picnic at Hapuna Beach, \$22.00 (advance only)
 Wednesday Division Banquet, \$35.00 (advance only)

The Sunday, Monday and Wednesday special meals must be purchased in advance. Other meals may be purchased on a drop-in basis. If you are interested in attending one of the advance purchase only meals but didn't purchase the meal in advance, please inquire at the Registration Center to see if additional tickets may be available.

GENERAL INFORMATION about the HPA CAMPUS and DORMS

Dormitories: Each dormitory has a large lavatory facility with showers and a common area where guests can read, watch television, or just relax. All rooms are supplied with bed linens, towels, and bath soap. There is no daily housekeeping service. There is a \$25.00 charge for each room key not returned at checkout.

Laundry: There are washers and dryers in each dormitory. Detergent may be purchased from the campus bookstore.

Security: HPA has security guards that patrol the campus after hours.

Fire Alarms: Rooms are equipped with fire/heat sensors. In case of a fire, an alarm will sound. In addition, unannounced fire drills may be conducted. Anytime the fire alarm sounds, everyone must exit the building in a rapid and orderly manner and assemble on the grassy area in front of or near the building until an "all clear" signal is given.

Telephones: Dorm rooms are equipped with telephones that may be used to call out on. Long distance calls may be made from any phone on campus using a calling card or credit card. All calls made within the Island of Hawai'i (the Big Island) are local calls. All others are long distance calls. The switchboard is not open during the summer, so in-coming calls are not possible. Please refer to the section "MESSAGES" for information regarding phone numbers to use in order to receive in-coming messages.

Dining Hall: If you are eating at HPA, most meals will be served cafeteria-style. After you complete your meal, please bus your dishes to the dish washing area and return any condiments used to the condiment area. A tray is required at all times when carrying food in the dining room. Shirts and shoes are also required at all times.

Bookstore: The bookstore, which carries toiletries, supplies, postcards, and gifts, will be open Monday through Friday, 8:00 a.m. to 3:00 p.m.

Mail room: Mail is received at the HPA bookstore each weekday morning. Visitors may post letters and purchase stamps at the bookstore.

Tennis Courts: Use of tennis courts are on a first come, first served basis. Racquet rentals are available for a fee through

the tennis director. Hours are 3:30 to 9:00 p.m. Appropriate tennis attire must be worn (tee-shirts are allowed), including tennis shoes (no black-soled shoes).

Weight/Fitness Center: The fixed weights area of the fitness center is generally open to HPA guests from 6:00 a.m. to 9:00 p.m. daily.

Recommended Clothing: There are a variety of climates on the Big Island. Visitors should consider bringing the following:

- light to medium weight cover up (jacket, sweater, or sweat-shirt) for evenings and days spent in higher altitudes.
- warm sleeping clothes. Waimea is approximately 2,500 feet above sea level and the temperatures at night are generally in the high 50s to low 60s. There is no central heating.
- rain jacket or wind breaker. Misty/windy days and light showers are not uncommon.

Sun Exposure: Do not expose yourself to more than 30 minutes of sun the first few days of your visit. The sun in Hawai'i burns very quickly! Use sunscreen lotion with an SPF of 15 or more for protection and reapply often. Even on overcast days you are at risk for sunburn without protection.

LOCAL HOTELS and MOTELS

Several large hotels (such as the Hilton Waikoloa Village, Waikoloa Beach Marriott Resort & Spa, the Hapuna Beach Prince Hotel, etc.) on the Kohala Coast of the Big Island are about a 20 minute or so drive from the Hawai'i Preparatory Academy. In addition to the large hotels are a number of condominium complexes (such as the Paniolo Greens at Waikoloa Village, Vista Waikoloa, and Resort Quest Shores of Waikoloa), which are generally less expensive and come equipped with full kitchens and a variety of amenities. The Puako Beach Condominiums (<http://www.Hawaiioceanfront.com/condos.htm>) offer particularly attractive rates for groups of up to eight people, depending on which unit you rent. We suggest you take advantage of hotel search engines such as Hotels.com or Expedia.com in order to find the best deals if it's your desire to stay on the coast during the meeting. There are a limited number of motels in Waimea (also known as Kamuela), about two miles from HPA. A listing of these, as well as places to eat and things to do around Waimea, may be found on the internet at <http://www.kamuela.com/>. Please make your reservations for housing directly with the hotel/motel of your choice. Note that AAAS, Pacific Division mentions the above hotels for information only, not as an endorsement for any specific commercial enterprise.

TRAVEL to the MEETING and PARKING

Flying in: Several major airlines fly into Kailua-Kona (recommended) and Hilo. We recommend travelers check with

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travel web sites such as Expedia.com and Travelocity.com in order to find the best airfares. The airport codes are KOA for Kailua-Kona International Airport and ITO for the Hilo International Airport.

Travel to HPA. Both airports have a variety of rental car agencies and advance reservations are recommended. The best prices are usually obtained quite a bit in advance. Rental cars may be the best way to travel to HPA and back, as they also allow one the opportunity to do a little sightseeing on the side and may not be any more expensive than shuttle service for a single individual. Speedi Shuttle runs service between the Kona International Airport and HPA. As of 13 March 2008, the cost for round trip service was approximately \$144 for one person, \$155 for two people, \$164 for three people and \$167 for four people. Obviously, if you can make arrangements to travel with others, it will significantly reduce the cost of shuttle service to HPA and back. If you are going to use the Speedi Shuttle service, be sure to make your arrangements on-line at <http://www.speedishuttle.com> well in advance of your arrival and choose HPA as your destination.

By automobile from Kona: Exit the Kona International Airport by turning left at the light and proceed on Highway 19. At the intersection of 19 and 270, continue right along 19. At the intersection of 19 and 250, turn left on 250 (Kohala Mountain Road). There is a white fence on the right side. The campus entrance is marked with a red ceramic tile sign.

By automobile from Hilo: From Hilo, follow Highway 19 to Waimea. Turn right onto Lindsey Road (signal with shopping center on left) and then bear left onto Kawaihae Road (still traveling on Highway 19). Bear right onto Highway 250 (Kohala Mountain Road). There is a white fence on the right side. The campus entrance is marked with a red ceramic tile sign.

Parking: Parking is free on the HPA campus. For the location of parking lots, please refer to the map on page 2.

REGISTRATION CENTER

The Registration Center will be set up in the main entry to the James M. Taylor Commons (see map on inside front cover). It will be open the following days and hours:

Sunday, 12:00 – 6:00 p.m.

Monday, 7:30 a.m. – 5:00 p.m.

Tuesday, closed for field trips

Wednesday, 7:30 a.m. – 5:00 p.m.

Thursday, 7:30 a.m. – 2:00 p.m.

MESSAGES

AAAS, Pacific Division contact phone: 541-292-1115. Please note that this telephone is monitored for messages *only* between the dates of 12 – 27 June.

HPA message line for meeting attendees: 808-881-4381

HPA security: 808-881-4006

BREAKS

Mid-morning and mid-afternoon breaks are scheduled, as appropriate, for each session. Refreshments will be served during break times.

MEETING ROOMS

This year's technical sessions will meet in various classrooms and other facilities of the Hawai'i Preparatory Academy. Meeting rooms are expected to be equipped with computers running Windows XP and PowerPoint 2003, and using standard computer projectors. Speakers requiring other specialized equipment such as slide or overhead projectors must have made their requests when they submitted their abstracts. Specialized equipment will be provided if available. If rental costs are incurred, payment will be the responsibility of the requestor.

COMPUTERS and POWERPOINT PRESENTATIONS

Meeting rooms are anticipated to be outfitted with computers running Windows XP, PowerPoint 2003, and data projectors. Some rooms may be outfitted with Macintosh computers running OS X and PowerPoint 2004. If you are planning to use PowerPoint for your presentation, you must make sure that it will run on both platforms. Only CD-ROMs and thumb/USB/flash drives may be used to load presentations onto the computers. If you are preparing your presentation on a Macintosh computer, make sure it will load to a PC running Windows XP, and vice versa.

POSTER SESSIONS

Posters are assigned a display space of 48" tall X 96" wide (1.2 m X 2.4 m). By action of the Council of the Pacific Division in order to assure fairness, all student posters must fit within the assigned display space to be eligible for student Awards of Excellence. Posters are grouped by discipline and subject matter.

There will be two poster sessions at this meeting. Presenters should have their posters in place no later than 10 minutes prior to the beginning of their appointed session and must be available for at least one hour during the session in order to discuss their results with interested persons. All posters must be removed within 30 minutes of the end of the poster session.

Student posters will be judged for Awards of Excellence. Depending on the day of their presentations, students must be present with their posters from 1:30 p.m. – 3:30 p.m. on Monday or 9:00 a.m. – 11:00 a.m. on Wednesday in order to allow judges the opportunity to visit with them. Student posters without the student presenter present will not be judged.

Presenters assume full responsibility for the security of their

poster materials. Unclaimed posters will be discarded at the close of the technical sessions on the meeting on Thursday.

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 \$150 for first place and \$75 for second place. Additionally, each winner also receives a one-year student membership in AAAS, which includes weekly print issues of Science magazine. Societies may supplement these awards with their own cash prizes.

For this meeting, 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 2009 national meeting of AAAS in Chicago, IL, February 13 – 17, 2009, for the purpose of presenting their winning presentation 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 for a sectional or Divisional award, a student must register for the meeting, present the paper or poster, and 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 for both oral and poster presentations are posted on the Division's meeting web page, <http://www.sou.edu/aaaspd/2008Hawaii/index.html#oral>, and <http://www.sou.edu/aaaspd/2008Hawaii/index.html#poster>. Students who are eligible for Awards of Excellence are invited to be the Division's guests at the annual Banquet Wednesday evening, June 18. Festivities that evening start with the presentation of student awards and the Presidential Lecture and then move to the banquet and show. If you are one of these students and are staying the HPA dorms, you have been credited with the free ticket by a reduced rate for your housing package. Those not staying at HPA had the opportunity to purchase a ticket during advance registration. If you do not hold a ticket but would like to attend the banquet, please check at the Registration Center to see if any tickets might be available.

IMPORTANT NOTE: All judging for student awards ends by 3:00 p.m. on Wednesday, at which time the judges go into closed session to determine the winners. If you are a student wishing to compete for an Award of Excellence

and your oral symposium presentation is scheduled later Wednesday afternoon or Thursday, you must, in addition to presenting orally as part of the symposium, prepare a poster for presentation at one of the poster sessions earlier in the week. Your presentation will then be judged as a poster and you will be in the pool of potential prize winners. Dual presentations of this nature may only occur if your presentation is part of a symposium. All oral contributed paper sessions are scheduled to ensure that student presenters are judged prior to the cut-off on Wednesday afternoon.

SPECIAL EVENTS

The following special events are planned for the meeting.

Sunday Afternoon Traditional Hawaiian Blessing and Greetings. Starting about 4:00 p.m. there will be a traditional Hawaiian blessing for the meeting, including traditional Polynesian hula dancers that tell stories of ancient Polynesia through their dancing to percussion instruments.

Sunday Evening Dinner and Reception. A special dinner featuring a selection of pūpū served buffet style will follow the blessing and greetings. The cost of this event is \$26.00 for those not holding an HPA meals ticket (part of the room/board package or purchased separately).

Sunday Evening Public Plenary Lecture. Following dinner will be a public plenary lecture, "Following the Stars to Hawaii's future: From Canoes to Telescopes and Back," presented by Ka'iu Kimura (Associate Director, The 'Imiloa Center, Hilo, HI).

Monday Morning Planning Discussion of the Pacific Science Association and the Tahiti Inter-Congress. Meet at 8:00 a.m. in the Student Union.

Monday Noon Public Lecture. Come and hear Dr. David Hyrenbach (Hawai'i Pacific University) speak on *Wings Without Borders: Tracking Albatross Across the North Pacific*.

Monday Evening Picnic Dinner at Hapuna Beach. Bus transportation will be available to take attendees about 20 minutes to Hapuna Beach, where the Sodexo folks will serve us a picnic dinner. The sun goes down early at Hawaiian latitudes, so don't miss the green flash as the sun sets on the horizon! The cost for this event is \$22.00 for those not holding an HPA meals ticket (part of the room/board package or purchased separately).

Tuesday Evening Public Lecture. Ms. Nancy Redfeather (The Kohala Center) and Dr. William B.N. Berry (University of California, Berkeley, CA) will share the podium and talk about *A Vision for a More Self-reliant and Sustainable Food Future*.

Wednesday Morning Business Meeting of the Western Society of Crop Science. Meet at 11:00 a.m. in the Student Union.

Wednesday Noon Public Lecture. Richard Spiegel (owner, Volcano Island Honey Company) will share his thoughts about *The Worldwide Implications of an Impending Varroa Mite Infestation of Honeybees on the Big Island of Hawai'i*.

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Wednesday Evening Student Awards Presentations.

Wednesday evening will be an especially exciting time for students as Division representatives announce the names of student winners of 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 2009 annual meeting of AAAS in Chicago, IL February 12 - 16, 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 being judged, 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 web site, <http://www.sou.edu/aaaspd/2008Hawaii/index.html#oral>, and <http://www.sou.edu/aaaspd/2008Hawaii/index.html#poster>.

Wednesday Evening AAAS, Pacific Division Presidential Lecture. Following the presentation of student awards, Dr. Terrence Gosliner, President of the AAAS, Pacific Division, will give the 2008 Presidential Lecture.

Wednesday Evening Divisional Banquet. Following the Presidential Lecture, attendees will come together for the Division Banquet. A very special assortment of food items is being assembled for this meal, which will be very much like a luau, with a variety of entrees including Kailua Pig, and vegetarian entrees. Entertainment will be provided as part of the festivities. The cost for this meal is \$35.00 for those not holding an HPA meals ticket (part of the room/board package or purchased separately).

Thursday Morning 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 Thursday, June 19 in the Student Union. The Council will elect officers, discuss programs for the 2009 and 2010 annual meetings, and transact such other business as is required by the Division's By-Laws. This is an open meeting and Pacific Division members with an interest in the governance of the Division are invited to attend.

Thursday Evening Public Lecture. Ronald Baird (National Energy Laboratory of Hawai'i Authority) will talk about *Current Affairs at the National Energy Laboratory of Hawai'i Authority*,

PUBLIC LECTURES

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

Sunday Evening Public Plenary: 7:00 p.m., HPA Gates Performing Arts Center. **Ka'iu Kimura** (Associate Director, The 'Imiloa Center, Hilo, HI) will present the lecture, *Following the Stars to Hawaii's future: From Canoes to Telescopes and Back*. A description of this talk (#1) is on page 51 of these *Proceedings*.



Ka'iu Kimura

Photo courtesy herself.

Monday Noon Public Lecture: 12:15 p.m. – 1:00 p.m., HPA Library. **David Hyrenbach** (Marine Science, Hawai'i Pacific University, Kaneohe, HI) will present *Wings Without Borders: Tracking Albatross Across the North Pacific*, which describes studies of the Black-footed Albatross (*Phoebastria nigripes*) and the Laysan Albatross (*Phoebastria immutabilis*) using satellite tracking to investigate the movements and habitats of these two North Pacific Albatrosses during the breeding season (January – June) and the post-breeding dispersal period (July – September). See full abstract (#2) on page 51 of these *Proceedings*.



David Hyrenbach

Photo courtesy himself.

Tuesday Evening Public Lecture: 7:00 p.m., HPA Gates Performing Arts Center. Join **Nancy Redfeather** (Hawai'i Island Food Summit Coordinator and School Garden Network Coordinator, The Kohala Center, Kamuela, HI) and **William B.N. Berry**



Nancy Redfeather

Photo courtesy herself.

(University of California, Berkeley, Berkeley, CA) for the talk, *A Vision for a More Self-reliant and Sustainable Food Future*. Please refer



William B.N. Berry

to page 51 of these *Proceedings* for the description of the talk (#3).

Wednesday Noon Public Lecture: 12:15 p.m. – 1:00 p.m., HPA Library. *The Worldwide Implications of an Impending Varroa Mite Infestation of Honeybees on the Big Island of Hawai'i*, **Richard Spiegel** (Owner, Volcano Island Honey Company, LLC, Honokaa, HI). The full abstract (#4) is on page 51 of these *Proceedings*.



Richard Spiegel

Photo courtesy his website <http://volcanoislandhoney.com>

Wednesday Evening AAAS, Pacific Division Presidential Lecture: 6:00 p.m. in the HPA Gates Performing Arts Center. **Terrence M. Gosliner**, President of the AAAS,

Pacific Division and Senior Curator, Department of Invertebrate Zoology and Geology, California Academy of Sciences, San Francisco, CA, will present his talk, *Philippine Coral Reefs: An Integrative Approach to Research, Education, Animal Husbandry and Public Outreach*. Read a description of this talk (#5) on page 52 of these *Proceedings*.

Thursday Evening Public Lecture: 6:30 p.m. in the HPA Library. *Current Affairs at the National Energy Laboratory of Hawai'i Authority*, **Ronald Baird** (Director, National Energy Laboratory of Hawai'i Authority). Please turn to page 52 of these *Proceedings* to read the abstract (#6) for this talk.



Terrence M. Gosliner

Photo courtesy himself.

FIELD TRIPS

All field trips are open to meeting registrants and their families. At least one member of a group must be registered for the meeting. Others who are not registered for the meeting will be charged an additional one-time-only \$10 field trip registration fee. This fee is paid only once for this meeting, regardless of whether a person goes on one or two field trips.

Due to limited space, advance registration is required for all field trips. Reservation and payment of field trip fee(s) were included on the Advance Registration Form.

A full refund will be granted if a trip is cancelled by the Division. If a registrant cancels via written notification and received in the Pacific Division office no later than May 17, 2008, the registrant will receive a refund of the fee(s) paid less a \$10 processing fee. If paid by credit card, an additional 3.25% of the original charge will be deducted from the amount being refunded to help pay for fees charged to the Division by credit card companies. With the exception of the Division cancelling a field trip, no refunds will be granted after May 17.

Please be aware that the descriptions of the field trips are our best estimates of what will take place on each. However, unexpected considerations beyond our control may result in last minute changes to the itineraries.

Tuesday, 17 June

(1) Kona Coffee Tour. Departs from the parking area above the Taylor Commons at 8:00 a.m.; returns at about 5:00 p.m. Includes transportation and entrance fees. Lunch is on your own. Cost: \$55.

Led by Anne Sturz, Pacific Division President-elect, this tour starts by traveling south through Kailua-Kona to Captain Cook, where we will tour the Kona Historical Society's

Kona Coffee Living History Farm. From there, we plan to drive a short distance to Buddha's Cup and Kona Lulana Farms to tour a working coffee farm. Next we plan to travel to the Holualoa Kona Coffee Company to take a self-guided tour that includes roasting and bagging facilities. We will then head for the International Marketplace for a late lunch (on your own) and a talk by Bobbi Caputo. Bobbi is a local artist whose art is created in a primitive/folk art style. She paints scenes from her childhood memories of growing up picking coffee on the local plantations. There should be a bit of time for shopping before the return trip to HPA.

(2) Pu'uhonua o Honaunau National Historical Park (Place of Refuge). Departs from the parking area above the Taylor Commons at 8:00 a.m.; returns about 5:00 p.m. *You will be packing your own sack lunch for the day in the dining hall, so plan on arriving 30 minutes prior to departure in order to accomplish this.* Includes transportation, applicable entrance fees, pack your own sack lunch, and water. Limited to 20 participants. Cost: \$70.

Pu'uhonua Honaunau National Historical Park is a wonderfully preserved peek into traditional Hawaiian life. It was the residence of the ali'i (royal chiefs) and the location of the pu'uhonua, a place of refuge for defeated warriors, non-combatants in times of war and those people that violated the kapu (sacred laws). This place of refuge was used for several centuries until 1819 when Kamehameha II abolished traditional religious practices. In 1961 it was made into a national historical park.

This trip is divided into two sections: 1) exploration of the royal grounds and place of refuge and 2) a walking tour to the village of Ki'ila. You will be escorted by Tom De Aguiar, a cultural guide and park ranger who has worked in the park for 30 years.

In the first section of the trip you will see sights such as the Great Wall. Built around 1550, the wall is 17 feet thick and ten feet high, and it separates the royal grounds from the place of refuge. You will explore the grounds where the ali'i (chiefs) used to live. These grounds, along with the royal canoe landing site that was used to enter and leave the area, were banned to commoners. One of the most spectacular sights is the Hale o Keawe, a temple (heiau) that housed the bones of the ali'i and where ki'i (wooden carved statues) still stand watch. Finally you will see the site of this most famous place of refuge, where one could flee to if s/he committed a crime, or kapu. Here, one could be absolved by a priest, thus escaping the death penalty and being allowed to return home.

In the second section of the trip, you will take a walking tour along an 1871 trail for 2 miles each way (a 4 mile round trip). This trail takes you through three different ahupua'a (land divisions), from Honaunau to Keokea and Ki'ila. Keokea ahupua'a features livestock pens from more recent historical times as well as a holua slide, where Hawaiian royalty once sped down the steep slope at great speeds for sport. You

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will then view the dramatic Keanae`e Cliffs, over which lava used to flow, breaking off at the top. The Ahupua`a of Kī`ilae contains the abandoned village of Kī`ilae, where inhabitants lived traditionally from the sea until the 1930s. The structures that endure along the 1871 trail allow you to see first-hand the way people once lived in the area. Along the trail you will encounter platforms that served as heiau (religious structures), rock walls that were constructed to pen livestock, and housing platforms built by the people who once lived along the coast. You will also encounter many plants that native Hawaiians used for food, medicine and making everything from utensils to rope.

After this walk you can jump into the water at the adjacent snorkel spot to see one of the island's best coral reefs or spend time continuing to explore on your own.

What to bring: Walking clothes and shoes, sunscreen, hats and cover up clothing, swimsuit and towel (if taking a dip). It is a very hot area and adjacent to the ocean and you may be outside for 4 hours so make sure you are cool and protected. Bring extra water (there is some with lunch) and snacks if you require more food throughout the day.

(3) Kilauea Volcano. Departs from the parking area above the Taylor Commons at 7:30 a.m.; returns about 9:00 p.m. *You will be packing your own sack lunch for the day in the dining hall, so plan on arriving 30 minutes prior to departure in order to accomplish this.* Includes transportation, pack your own sack lunch, and entry fees. Dinner is on your own, and will probably be in the neighborhood of \$10.00. Cost: \$55.

Due to the recent activity of the Kilauea Volcano, which has, from time to time, caused the evacuation of the park, our plans may change dramatically at the last minute. Below is our best estimate as to how the trip will take place.

Travel with Bob Christiansen (ret., U.S.G.S. and former head of the Hawai`i and Yellowstone Volcano Observatories) east and south on Highway 19 through Hilo to Hawai`i Volcano National Park for a close-up look at Kilauea, the most active volcano on the island. We'll visit the Hawai`i Volcano Observatory (HVO), which sits on the edge of Kilauea's crater, where staff will orient us to the HVO and Kilauea. After eating lunch, we will join with U.S.G.S. and National Park Service folks to drive around and explore the rim of Kilauea. Time permitting, we will drive down Chain of Craters Road, perhaps getting as far as the lava flow that has permanently blocked the road as lava flowed into the ocean. Dinner is planned at the Kilauea Military Camp, after which we'll head home. Should an active area of the volcano be accessible, we'll concentrate our time in that area.

(4) Mauna Kea Observatories and Stargazing. Departs at 8:30 a.m. in 4-wheel drive 15 passenger vans from the parking area above the Taylor Commons; returns about 10:00 p.m. *Be sure to dress appropriately and bring sunglasses and sunscreen. It gets very cold at the summit of Mauna Kea and ultraviolet light levels tend to be quite high!* Includes

transportation via 4-wheel drive vans, lunch and dinner at the Hale Pohaku facility and entry fees. Cost: \$80.

Plans are to depart Waimea and travel to Hilo for a bit of downtown sightseeing, after which we'll depart for Mauna Kea. We'll eat lunch at the Hale Pohaku facility while we acclimate to the elevation. After lunch, we'll begin our ascent to the summit (almost 14,000 foot elevation), where we will tour several facilities. Heading down, we will eat dinner at the Hale Pohaku facility and then return to the Visitor's Center for nighttime stargazing. We should return to HPA no later than 10:00 p.m.

IMPORTANT MEDICAL ALERT: *The summit of Mauna Kea is almost 14,000 feet in elevation. Ascent to this altitude exposes people to a significant reduction in atmospheric pressure, which can result in a variety of medical conditions, including severe illness and even death. Visitors to the summit may experience headaches, tiredness, lack of appetite, insomnia, reduced intellectual capacity, impaired exercise/exertion tolerance, and possible vomiting. It is also possible to develop one or more of the more severe mountain sicknesses, pulmonary or cerebral edema, both of which can be fatal. The altitude may also aggravate pre-existing conditions, particularly cardiovascular, diabetes, and respiratory diseases. Individuals with these conditions are advised to seriously reconsider the advisability of visiting the summit of Mauna Kea. The Pacific Division strongly urges all visitors to bring the above information to the attention of their medical practitioner and to seek medical advice and clearance before visiting the summit. Under no circumstances will visitors under the age of sixteen (16) be allowed on this field trip. Minors between the ages of 16 and 18 require parental permission.*

All participants must have read the "Information and Safety Guidelines for Visitors to the Mauna Kea Summit (<http://www.sou.edu/aaaspd/2008HAWAII/Forms/MaunaKeaMedicalAdvisory.pdf>) and returned pages 2 and 3 initialled at the bottom by each participant and page 4 signed by each participant before being allowed on the trip. A similar document from the Gemini Observatory must have been read, initialled and signed in advance in order to visit the Gemini Observatory atop Mauna Kea.

Again, please note that it gets very cold at the 14,000 foot elevation of Mauna Kea, and it can be quite chilly at the 9,000 foot level. Even though it might be warm in Waimea and even warmer in Hilo, it can be freezing at the summit! Therefore, plan on layering warm clothes so you don't spend your time at the summit just trying to stay warm. Because of the high UV levels at 14,000 feet, it is also wise to bring sunglasses and sunscreen.

(5) Snorkeling. Departs at 8:00 a.m. from the parking area above Taylor Commons; returns about 4:00 p.m. Includes transportation, guide, and rental snorkeling equipment (snorkels, masks, and swim fins). Be sure to bring money for lunch on your own in Kona. Cost: \$60.

Visit two fringing reef spots on the west side of the Big Island. Start in Kāhala Bay, a diverse and easily accessible reef just south of Kona. Get an orientation from a marine scientist in the Pavilion at the Bay to learn about Hawai'i's unique reef life and snorkeling guidelines and then snorkel in the shallow sheltered bay. Learn about different species and their purpose in the bay with the marine scientist. Twenty five percent of all reef fish in Hawai'i are endemic. Therefore, you can see a number of fish that are found nowhere else in the world. Talk about some of the species in the Bay with volunteer ReefTeachers that will be on the beach. Have lunch and see some of the sights in Kailua- Kona. Then head up to Puako Bay, one of the most beautiful reefs on the island. Snorkel in the bay or walk along the beach front, explore the tidepools or visit the nearby Petroglyph fields, one of the largest on the island.

Friday, 20 June

Please note that if you are taking a Friday field trip, are staying at HPA, and are planning to stay on the island Friday night, you need to have made alternate arrangements for housing for Friday night as no rooms are available at HPA beyond Thursday night.

(6) Kilauea Volcano. Departs from the parking area above Taylor Commons at 7:30 a.m.; returns about 9:00 p.m. *You will be packing your own sack lunch for the day in the dining hall, so plan on arriving 30 minutes prior to departure in order to accomplish this.* Includes transportation, pack your own sack lunch, and entry fees. Dinner is on your own, and will probably be in the neighborhood of \$10.00. Cost: \$55.

This trip is a repeat of the Kilauea Volcano field trip on Tuesday. Please refer to its description under field trip (3).

(7) Friday, June 20: 8:00 a.m. – 4:00 p.m. Snorkeling. Departs from the parking area above the Taylor Commons at 8:00 a.m.; returns about 4:00 p.m. Includes transportation, guide, and rental snorkeling equipment (snorkels, masks, and swim fins). Be sure to bring money for lunch on your own in Kona. Cost: \$60.

This is a repeat of the Snorkeling field trip on Tuesday. Please refer to its description under field trip (5).

(8) Kaloko-Honokohau National Park. Departs from the parking area above the Taylor Commons at 8:00 a.m.; returns about 4:00 p.m. Trip includes transportation, interpreters and guide. Be sure to bring money for lunch on your own in Kona. Cost: \$60.

Led by Cindi Punihaole, you will spend the first hour looking at the fishponds in the park with her and another cultural park ranger. Then you will go to the visitors center and from there take a 1.5 mile hike (on an unpaved trail--sturdy tennis shoes or better are required) with Cindi and the head ranger to another point in the park where you will be picked up. Along the way you will learn about the anchialine ponds,

natural resources, petroglyphs, holua slide (the rock slide the ali'i used to slide down) and cultural significance of the area. Cindi's family is from that area so she can tell participants all about her family's kuleana or responsibility with the land. Afterward you'll drive a short distance into Kona for lunch on your own and a bit of time to sightsee/shop.

What to bring: Walking clothes and sturdy tennis shoes or hiking boots, sunscreen, hats and cover up clothing. It can be very warm in this area and adjacent to the ocean. You may be outside for 2.5 to 3 hours so make sure you are cool and protected. Bring extra water and snacks if you require more food throughout the day.

WORKSHOPS

Wednesday, 18 June

8:00 a.m. – 12:15 p.m.

How to Integrate Project Based Learning in the Classroom – Strategies for Teachers. Organized by William B.N. Berry (Department of Earth and Planetary Sciences, University of California, Berkeley, Berkeley, CA; bberry@berkeley.edu) and Samantha Birch (The Kohala Center, Kamuela, HI; sbirch@kohalacenter.org). Open to all meeting registrants. Preregistration is not required but space is limited.

The aim of this workshop is to build the skills and capacity of teachers to implement applied science learning projects in their classroom. The workshop will be facilitated by the American Association for the Advancement of Science (AAAS) and The West Hawai'i Explorations Academy (WHEA).

The workshop will include:

- How to write a project management plan to identify goals, objectives and strategies for the project.
- How to write a project timeline to achieve objectives.
- How to tie the project in with different content areas (multi-disciplinary curriculum).
- How to ensure the project satisfies standards you are required to teach (identifies standards alignment).
- How to secure funds to assist with the development of classroom projects.

Each participant should bring to the workshop a current project or project idea that they would like to implement in their classroom/school.

Session 1: We will go over the above components, using project examples from WHEA.

Session 2: Every teacher will present their idea for a project to the whole group and then, working in smaller groups, discuss how to make their project a reality. Discussions will be guided by a workbook and facilitators. Afterwards, each teacher will present their plans to the entire group for open suggestions and/or comments.

Teachers should expect to take home:

GENERAL INFORMATION

- a working plan for each project,
- a project-planning workbook, and
- details of a contact network to enable them to keep in touch with other teachers (online forum).

Thursday, 19 June
1:00 – 5:00 p.m.

Vernier Software & Technology. Join a Vernier representative for a free, 4-hour, hands-on workshop to learn how to integrate Vernier's computer and handheld data-collection technology into your chemistry, biology, physics, math, middle school science, physical science, and Earth science curriculum. The workshops include lab handouts.

This data-collection workshop is a great opportunity for teachers who:

- want to evaluate Vernier's award-winning data collection technology;
- are new to data collection;
- need a refresher course on their Vernier equipment; or
- want to learn from the experts.

Inquire at the Registration Desk about advance registration for this event. If there is enough interest, a second workshop may be scheduled for Thursday morning.

Advance registration, which may be done on-site at the meeting, is needed for this workshop.

Graduate credit may be available. Ask the Vernier representative!

Thursday, 19 June
8:30 a.m. – 4:30 p.m.

Teaching Science as Inquiry: Aquatic Science. Organized by Erin Baumgartner and Francis M. Pottenger (Curriculum Research & Development Group, University of Hawai'i-Manoa, Honolulu, HI; erinbaum@hawaii.edu). Scheduled for all day Thursday, 19 June. Open to all meeting registrants. Preregistration is not required but space is limited to 20 participants.

The Teaching Science as Inquiry (TSI) model is a professional development model from the Curriculum Research & Development Group (CRDG) that provides educators with a skills-based experience to build scientific inquiry-based instruction into existing professional practice. The goal of TSI instruction is to help teachers and students gain experience with the discipline of science, thus building scientific literacy. TSI immerses participants in inquiry activities to provide experience with a complete inquiry-based instructional sequence that highlights different modes of knowledge generation and dissemination. During each activity, emphasis is placed on the practices used to investigate and acquire new content and the teaching skills needed to facilitate those prac-

tices in a science class. Teachers are provided with facilitated support to apply the TSI instructional model to their current curriculum. This workshop will introduce participants to the TSI model and demonstrate how they can apply it to concepts of aquatic science. Participants will leave with model lessons and a template to produce their own lesson plans for engaging students in the complete discipline of science.

PROGRAM AT A GLANCE

**AAAS, Pacific Division 89th Annual Meeting
PROGRAM AT A GLANCE**

SUNDAY	MONDAY	WEDNESDAY	THURSDAY
	Pacific Science Association and Tahiti Inter-Congress Planning Discussion <i>Student Union</i> 8:00 AM - 12:00 PM	Joint Session: Agriculture/Hort; Anthropology/Arch; Ecology, Organismal Bio, Env Sci <i>Room 42</i> 8:00 AM - 11:45 AM	Business Meeting of the Council of the Pacific Division <i>Student Union</i> 7:00 AM - 10:00 AM
	Conservation Status of Hawaiian Native Land Snails <i>Library</i> 8:00 AM - 12:00 PM	Workshop: How to Integrate Project Based Learning... <i>Library</i> 8:00 AM - 12:30 PM	Asian American Women: Health and Welfare <i>Kono Center for English Studies</i> 8:00 AM - 10:00 AM
	Western Society of Crop Science Oral Presentations <i>Gerry Clark Art Center</i> 8:15 AM - 2:35 PM	Progress in Vaccine and Drug Development <i>Castle Lecture Hall</i> 8:25 AM - 4:00 PM	Past and Future of the Fauna of the Pacific Basin <i>Gerry Clark Art Center</i> 8:20 AM - 11:40 AM
	Anthropology in East and Southeast Asia <i>Room 42</i> 8:20 AM - 5:00 PM	Evolution and Conservation of Hawaiian Birds <i>Gerry Clark Art Center</i> 8:30 AM - 12:00 PM	Workshop: Teaching Science as Inquire: Aquatic Science <i>Room 42</i> 8:30 AM - 4:30 PM
	New Humanities....Paradise Lost and.....Recoverable? <i>Room 21</i> 8:30 AM - 11:45 AM	Poster Session II <i>Under the Canopies by Taylor Commons</i> 8:30 AM - 12:00 PM	North Meets South: Special Neuroscience Rsch Programs... <i>Library</i> 9:00 AM - 12:00 PM
	Current Research Perspectives on Palmyra Atoll <i>Gates Performing Arts Center</i> 8:30 AM - 4:45 PM	Joint Session: Atmo/Oceano; Earth Sciences; Indust Sci/Tech; Physics/Materials Sci <i>Room 41</i> 10:40 AM - 12:00 PM	Hawaii Archives: Records and Special Collections <i>Kono Center for English Studies</i> 10:00 AM - 12:30 PM
	Joint Session: Chemistry and Biochemistry; Health Sciences <i>Kono Center for English Studies</i> 9:00 AM - 11:45 AM	WSCS Business Meeting <i>Student Union</i> 11:00 AM	Impacts of Disease on Native Hawaiian Species <i>Castle Lecture Hall</i> 10:00 AM - 3:00 PM
	Joint Session: Education; History and Phil of Science <i>Room 23</i> 10:00 AM - 12:05 PM	Noon Public Lecture <i>Library</i> 12:15 PM	
	Hawaiian Anchialine Pool Ecosystem Conservation/Management <i>Castle Lecture Hall</i> 10:00 AM - 3:35 PM	...Informal Science Education: Pathways to Broader Impacts <i>Library</i> 1:15 PM - 5:00 PM	Workshop: Vernier Software & Technology <i>Room 41</i> 1:00 PM - 5:00 PM
	Materials Science and Nanotechnology <i>Room 41</i> 10:00 AM - 2:55 PM	Celebration and Politics... <i>Room 42</i> 1:15 PM - 5:00 PM	Social, Economic and Political Sciences Section <i>Kono Center for English Studies</i> 1:15 PM - 2:00 PM
	Noon Public Lecture <i>Library</i> 12:15 PM	Pacific Science: U.S.-Asia/Pacific Scientific Collaboration... <i>Gerry Clark Art Center</i> 1:25 PM - 4:10 PM	
	Poster Session I <i>Under the Canopies by Taylor Commons</i> 1:00 PM - 4:30 PM	Student Awards <i>Gates Performing Arts Center</i> 5:30 PM	
Traditional Hawaiian Blessing 4:00 PM		Presidential Lecture <i>Gates Performing Arts Center</i> 6:00 PM	
Welcome Reception/Dinner Cost \$25 in advance 5:00 PM	Hapuna Beach Picnic Cost \$22 in advance 5:00 PM	Division Banquet <i>Taylor Commons</i> Cost \$35 in advance 7:00 PM	
Sunday Evening Plenary Lecture <i>Gates Performing Arts Center</i> 7:00 PM			Thursday Evening Public Lecture <i>Library</i> 6:30 PM
	Tuesday Evening Public Lecture <i>Gates Performing Arts Center</i> 7:00 PM		

GENERAL SESSIONS

Sunday, 15 June 2008

TRADITIONAL HAWAIIAN BLESSING

Hawai'i Preparatory Academy
Sunday
4:00 PM

JOHN K. JENNY will perform an Oli Aloha and welcoming chant and Pule (prayer) for the beginning of the meeting.

SUNDAY DINNER/RECEPTION

Hawai'i Preparatory Academy
James E. Taylor II Dining Commons
Sunday
5:15 PM

Due to the nature of the foods chosen for this meal, tickets must have been purchased in advance, cost \$26.00. Those holding an HPA room/board or meals-only ticket have this meal included in their package.

**SUNDAY EVENING PUBLIC PLENARY
LECTURE**

Hawaii Preparatory Academy
Gates Performing Arts Center
Sunday
7:00 PM

1 *Following the Stars to Hawaii's Future: From Canoes to Telescopes and Back*, **KA'IU KIMURA** (Associate Director, The 'Imiloa Center, Hilo, HI).

Monday, 16 June 2008

**PACIFIC SCIENCE ASSOCIATION and
TAHITI INTER-CONGRESS
PLANNING DISCUSSION**

Hawaii Preparatory Academy
Room 22
Monday
8:00 AM – 12:00 PM

**MONDAY NOON PUBLIC
LECTURE**

Hawaii Preparatory Academy
Library
Monday
12:15 PM - 1:00 PM

2 *Wings Without Borders: Tracking Albatross Across the North Pacific*, **DAVID HYRENBACH¹, MICHELLE HESTER², HANNAH NEVINS^{2,3}, CAROL KEIPER³, JENNIFER STOCK⁴, JOSH ADAMS⁵ and CHERYL BADUINI⁶** (¹Marine Science, Hawaii Pacific University, Kaneohe, HI; ²Oikonos, Bolinas, CA; ³Moss Landing Marine Laboratories, Moss Landing, CA; ⁴Cordell Bank National Marine Sanctuary, Olema, CA; ⁵US Geological Survey, Western Ecological Research Center, Moss Landing, CA; ⁶Claremont Colleges, Keck Science Center, Claremont, CA).

**MONDAY EVENING HAPUNA BEACH
PICNIC**

Hapuna Beach
Monday
5:15 PM

Enjoy a special picnic meal at Hapuna Beach, catered by Sodexho, and watch the horizon for the "green flash" as the sun sets. (Be sure to protect your eyes from looking directly into the sun!!!) A chartered school bus will leave HPA from the Taylor Commons at 5:00 p.m. Or drive the eleven miles to the beach by turning left out of HPA, then right onto Highway 19 (Kawaihe Road). About 8 miles down the road turn left to continue on Highway 19 (Queen Kaahumanu Highway). In about 2 miles, watch for Hapuna Beach Road and follow the signs to the beach. Advance purchase of meal ticket required, cost \$22.00. Those holding an HPA room/board or meals-only ticket have this meal included in their package.

GENERAL SESSIONS

Tuesday, 17 June 2008

**TUESDAY EVENING PUBLIC
LECTURE**

Hawaii Preparatory Academy
Gates Performing Arts Center
Tuesday
7:00 PM

3 *A Vision for a More Self-reliant and Sustainable Food Future*, **NANCY REDFEATHER** (Hawai'i Island Food Summit Coordinator and School Garden Network Coordinator, The Kohala Center, Kamuela, HI) and **WILLIAM B.N. BERRY** (University of California, Berkeley, Berkeley, CA).

Wednesday, 18 June 2008

**BUSINESS MEETING of the
WESTERN SOCIETY of CROP SCIENCE**

Hawaii Preparatory Academy
Student Union
Wednesday
11:00 AM

WEDNESDAY NOON PUBLIC

LECTURE

Hawaii Preparatory Academy
Library
Wednesday
12:15 PM - 1:00 PM

4 *The Worldwide Implications of an Impending Varroa Mite Infestation of Honeybees on the Big Island of Hawaii*, **RICHARD SPIEGEL**, Volcano Island Honey Company.

STUDENT AWARDS PRESENTATIONS

Hawaii Preparatory Academy
Gates Performing Arts Center
Wednesday
5:30 PM

Affiliated society and Division representatives will announce the names of the student winners of sectional Awards of Excellence for their presentations at this meeting. Also announced will be the student winners of the Division-wide Laurence M. Klauber Award (unrestricted), Geraldine K. Lindsay Award in the Natural Sciences, J. Thomas Dutro Award in the Geosciences, Rita M. Peterson Award in Science Education, Presidents' Award (unrestricted), Best Poster Award (unrestricted), and the AAAS–Robert I. Larus Travel Award, which provides travel and other expenses for the awardee to present their winning research as a poster at the AAAS National Meeting in Chicago, IL February 12 – 17, 2009.

**AAAS, PACIFIC DIVISION
PRESIDENTIAL LECTURE**

Hawaii Preparatory Academy
Gates Performing Arts Center
Wednesday
6:00 PM

5 *Philippine Coral Reefs: An Integrative Approach to Research, Education, Animal Husbandry and Public Outreach*, **TERRENCE M. GOSLINER** (President, AAAS, Pacific Division and Senior Curator, Department of Invertebrate Zoology and Geology, California Academy of Sciences, San Francisco, CA)

Wednesday, 18 June 2008, Continued**AAAS, PACIFIC DIVISION BANQUET**

Hawaii Preparatory Academy
James M. Taylor II Dining Commons
Wednesday
7:15 PM

This annual event takes on a Hawaiian flavor with special foods chosen to reflect the many luaus (feasts) which occur in Hawaii. Special entertainment will be presented by **JOHN and HOPE KEAWE**. John is an award winning slack key (kiho`alu) guitarist, composer and recording artist. Hope is an elegant hula dancer and has become an integral part of John's performances by providing beautiful interpretations of his original compositions as well as traditional Hawaiian songs. Tickets must have been purchased in advance, cost \$35.00. Those holding an HPA room/board or meals-only ticket have this meal included in their package.

Thursday, 19 June 2008**MEETING of the COUNCIL
of the PACIFIC DIVISION**

Hawaii Preparatory Academy
Student Union
Thursday
7:00 AM - 10:00 AM

The Council of the AAAS, Pacific Division will hold its annual breakfast and business meeting starting at 7:00 a.m. in the Student Union at the Hawaii Preparatory Academy. The Council will elect officers, discuss programs for the 2009 and 2010 annual meetings, and transact such other business as is required by the Division's By-laws.

**THURSDAY EVENING PUBLIC
LECTURE**

Hawaii Preparatory Academy
Library
Thursday
6:30 PM

6 *Current Affairs at the National Energy Laboratory of Hawaii Authority*, **RONALD BAIRD** (Director, National Energy Laboratory of Hawaii Authority)

TECHNICAL SESSIONS

1100 (time italicized and underlined) indicates a student presentation

* indicates the speaker from among several authors listed

63 (bolded number) indicates the abstract number

I. SYMPOSIA

Monday, 16 June 2008

Conservation Status of Hawaiian Native Land Snails

Library

Monday

8:00 AM – 12:00 PM

Program Organizer: *Michael G. Hadfield* (Professor of Zoology, Kewalo Marine Laboratory, University of Hawaii at Manoa)

Sponsored by the Pacific Division Section on Ecology, Organismal Biology, and Environmental Sciences.

The Hawaiian Islands were once home to one of the greatest radiations of land snails in the world: nearly 800 endemic species in a land area less than that of New Jersey. Due to loss of habitat, introduced predators and massive shell collecting, at least 75% of these unique species are extinct. In this symposium, we will explore the relationships, evolution and conservation status of remaining endemic Hawaiian land snails, and consider impacts upon them of the great numbers of alien gastropod species that have become established in the islands.

Session Chair: Michael G. Hadfield

0800 *Introductory Remarks*

0805 **7** *Conservation Status of Hawaii's Severely Endangered Achatinelline Tree Snails*, ***MICHAEL G. HADFIELD** and **JENNIFER SAUFLER** (Pacific Biosciences Research Center and Department of Zoology, University of Hawaii at Manoa, Honolulu, HI)

0830 **8** *The Application of Microsatellite Data in the Study of Population Differentiation and Inbreeding in Achatinella Species*, ***BJORN ERICKSON**¹ and **MICHAEL HADFIELD**² (¹Department of Animal Science, UC Davis, Davis, CA; ²Kewalo Marine Laboratory, 41 Ahui St., Honolulu, HI)

0855 **9** *Simulating Historical Connectivity among Endangered Tree Snail Populations: A Novel Approach to Translocation*, ***KEVIN T. HALL** and **MICHAEL G. HADFIELD** (Department of Zoology, University of Hawai'i at Manoa, Honolulu, HI)

0920 **10** *What Can Phylogeography Tell Us about Conservation of Hawaiian Land Snails?* ***BRENDEN S. HOLLAND** and **ROBERT H. COWIE** (Pacific Biosciences Research Center, University of Hawaii, Honolulu, HI)

0945 **BREAK**

1010 **11** *Achatinellid Land Snails of the Pacific Islands: Phylogenetics, Phylogeography and Evolution*, **MEAGHAN E. PARKER** (Department of Zoology, University of Hawaii at Manoa, Honolulu, HI)

1035 **12** *Cryptic Succineid Diversity on the Island of Hawaii: Conservation Implications*, **WALLACE M. MEYER III** (University of Hawaii at Manoa, Department of Zoology, Honolulu, HI)

1100 **13** *Hawaiian Land Snail Diversity, Its Decline, and Replacement by Aliens*, **ROBERT H. COWIE** and ***BRENDEN S. HOLLAND** (Pacific Biosciences Research Center, University of Hawaii, Honolulu, HI)

1125 **14** *Introduction Pathways, Spread and Impacts of Alien Snails and Slugs in Hawaii*, ***KENNETH A. HAYES**^{1,2}, **ROBERT H. COWIE**¹, **WALLACE M. MEYER**^{1,2}, **CHUONG T. TRAN**¹ and **JAYNEE R. KIM**³ (¹Center for Conservation Research and Training, University of Hawaii at Manoa, Honolulu, HI; ²Department of Zoology, University of Hawaii at Manoa, Honolulu, HI; ³Department of Biology, University of Hawaii at Manoa, Honolulu, HI)

1150 *Concluding Remarks*, Michael G. Hadfield

Missionaries and Museums, Imperialists and Nationalists, State Needs and Cold-War Politics: Anthropology in East and Southeast Asia

Room 42

Monday

8:20 AM – 5:00 PM

Program Organizer: *Alan L. Bain* (Smithsonian Institution Archives)

Sponsored by the Pacific Division section on Anthropology and Archaeology.

Session Chair: Alan L. Bain

0820 *Introductory Comments*

HAWAII

0830 **15** *Culture Change in Hawai'i Viewed from the Hilo Boarding School Carpentry Shop*, **LYNNE MACKIN**

WOLFORTH (Department of Anthropology, University of Hawai'i-Hilo, Hilo, HI)

The PHILIPPINES

0855 16 *Colonial Exemplaries: Parsing the Birth of Evil in Philippine Colonial Ethnography*, **OONA THOMMES PAREDES** (Department of Anthropology, University of Missouri-Columbia, Columbia, MO)

0915 17 *Towards the Decolonization of Philippine Anthropology: The Role of Ritual in the Formation of Post Colonial Research Agenda*, **MELANIE TAN UY** (Macquarie University, Australia)

1000 BREAK

CHINA

1020 18 *Nation-Building and Anthropology during the Republican Period: David Crockett Graham and the Missionary Anthropological Enterprise in Western Sichuan (1922-1945)*, **ANDREA RODRIGUEZ** (University of Oxford)

KOREA

1055 19 *Korean War anthropology in Japanese, American and Korean Politics*, **ROBERT OPPENHEIM** (Department of Asian Studies, University of Texas at Austin, Austin, TX)

1120 *Commentator's Comments*, Robert Oppenheim

1140 *General Discussion*

1200 LUNCH

JAPAN

1315 20 *Mixed-Blood and Adaptability: Japanese Racial Science, 1930s-1970s*, **TORU SAKANO** (College of Economics, Nihon University, Tokyo, JAPAN)

1345 21 *Reap and Sow: Scientific Investigations of the Ryukyu Islands Under the United States Military Control*, **HIDEKAZU SENSUI** (Department of Business Administration, Kanagawa University, Kanagawa, JAPAN)

VIETNAM

1430 22 *Colonial Surveillance, Postcolonial Controls and the Problematic Place of Anthropologists: Studying Vietnamese Caodaism in a Global Context*, **JANET HOSKINS** (Department of Anthropology, University of Southern California, Los Angeles, CA)

1450 BREAK

1510 23 *Nationalism in Vietnam's Post-Colonial Anthropology*, **CHINH VAN NGUYEN** (Department of Anthropology, Hanoi National University, Hanoi, VIETNAM)

1540 24 *Museums: Anthropology and the Work of Representing Culture in Contemporary Vietnam*, **MARGARET BARNHILL BODEMER** (Department of Anthropology, University of Hawai'i, Manoa, Honolulu, HI)

1620 *Commentator's Comments*, Janet Hoskins

1640 *General Discussion*

**New Humanities and Science Convergences:
Paradise Lost and.....Recoverable?**

Room 21

Monday

8:30 AM – 11:45 AM

Program organizers: *Robert L. Chianese* (Department of English, California State University, Northridge, CA) and *Carl A. Maida* (Schools of Dentistry and Medicine, University of California, Los Angeles, CA)

Sponsored by the Pacific Division General and Interdisciplinary Section.

Tropical Pacific Islands, since their earliest discovery by the West, have been subjects of utopian dreams. Unspoiled natural abundance, balmy weather, Edenic beauty and welcoming, uninhibited natives fulfilled European fantasies of an Earthly Paradise. This paradise was soon lost: imported disease, imposed religious and social structures, exploitation of resources and habitats, and introduced flora and fauna spoiled it.

This symposium will explore the efforts of scientists, social scientists, and humanists to help restore these islands to a more natural, sustainable place that serves native as well as foreign interests. It addresses the topic as a series of questions:

- Have the actual tropical "paradises" been lost beyond recovery?
- Are the efforts of scientists, social scientists, humanists, artists, and writers to recover the place compatible with native peoples' wishes?
- In what ways are these efforts coordinated, interdisciplinary, and evidence of convergence among the disciplines?

The symposium will also consider how the issues confronting contemporary Pacific Island societies can shed light on broader questions of concern to both the sciences and the humanities:

- Has a spoiled Eden become a model for the Earth itself? Is such a model appropriate, helpful? What does it reveal or obscure?
- Do we need a utopian model of an earthly paradise to inspire us any more?
- What does the literature and art of the Islands and of utopia as an idea foretell about their future?
- Do current models of sustainability as applied to the islands hold the best promise for managing their future?

Session Chair: Robert L. Chianese

0830 *Introductory Comments*: Robert L. Chianese

0845 25 *Science and Art: A Happy Symbiosis*, **SHOSHANAH DUBINER** (Studio Viva, LLC, 1330 Evan Lane, Ashland, Oregon, 97520; cybermusing@earthlink.net)

0915 26 *Past and Future Malarial Landscapes in California's Great Central Valley*, **BARBARA YABLON MAIDA** (Department of Geography, 1255 Bunche Hall, University of California, Los Angeles, CA 90095; bymaida@ucla.edu)

0945 27 *City-Building and Regionalism: Contrasting Images of Development in Early Modern Los Angeles and the Ow-*

ens Valley, **CARL A. MAIDA** (University of California, 63-037 Center for the Health Sciences, Los Angeles, CA 90095; cmaida@ucla.edu)

1015 BREAK

1045 28 *The Rural Idyll: Counter-Urbanization and the North American Attempt to Recover Rural Paradise* **SUSAN J. MULLEY** (Department of Landscape Architecture, College of Environmental Design, CSU-Pomona, 3801 West Temple Ave, Pomona CA 91768 sjmulley@csupomona.edu)

1115 29 *Ecological Awareness in American Landscape Art: Depicting and Repairing the American Wasteland*, **ROBERT LOUIS CHIANESE** (Department of English, 18111 Nordhoff Street, California State University, Northridge, CA 91330-8428; robert.chianese@csun.edu)

**Current Research Perspectives on Palmyra Atoll,
A Remote Central Pacific Outpost for Biodiversity**

Gates Performing Arts Center

Monday

8:30 AM – 4:45 PM

Program Organizer: Healy Hamilton (California Academy of Sciences, San Francisco, CA)

Sponsored by the Pacific Division section on Ecology, Organismal Biology and Environmental Sciences

Lying a few degrees north of the equator and east of the dateline, Palmyra atoll consists of almost 700 acres of emergent tropical islets surrounded by the most intact tropical marine wilderness in U.S. jurisdiction. Its location in the deep Central Pacific and singular history of low human occupancy provide conditions that support healthy colonies of nesting seabirds, rare sea turtles, coconut crabs, mangrove and tropical wet forests, and a diverse, healthy coral reef ecosystem with an intact trophic structure. The surrounding oceanic region steers the machinery of global climate and has high predictive value regarding the character of ENSO cycles. For marine biologists, Palmyra provides a window into historic coral reef ecosystems now everywhere altered by human influences. For biogeochemists, the atoll provides a living archive of Holocene climate from a key region with little existing data. For conservation scientists, Palmyra is a laboratory in which to study the process of restoration in a natural system free from confounding human influence. In this symposium, we will explore this fascinating and unique central Pacific atoll. The emphasis will be on the biodiversity of Palmyra, its composition and biogeographic relationships. Results from recent ecological research will demonstrate the value of Palmyra as a laboratory that can advance the conservation of island and coastal systems worldwide.

Session Chair: Healy Hamilton

0830 *Introductory Comments and Movie: “Biodiversity and Conservation Science from the Remote Central Pacific”*

0850 30 *Integrated Ecosystem Observations of Coral Reef Ecosystems of the U.S. Pacific Islands with a Focus on Palmyra and Kingman Atolls*, ***RUSSELL E. BRAINARD¹, JEAN KENYON², RONALD HOEKE², MARC LAMMERS², BENJAMIN RICHARDS², CRISTI RICHARDS², ROB-**

ERT SCHROEDER², BERNARDO VARGAS-ANGEL², SUSAN VOGT² and PETE VROOM² (¹NOAA, Pacific Islands Fisheries Science Center (PIFSC), Coral Reef Ecosystem Division, Honolulu, HI; ²University of Hawaii, Joint Institute for Marine and Atmospheric Research and NOAA PIFSC Coral Reef Ecosystem Division, Honolulu, HI)

0920 31 *Biogeography of Corals at Palmyra and other Central Pacific Atolls and Reef Islets*, **JAMES E. MARAGOS** (Pacific Remote Islands National Wildlife Refuge Complex, U.S. Fish and Wildlife Service, Honolulu, HI)

0950 32 *Biodiversity and Biogeography of the Fishes of Palmyra Atoll*, ***BRUCE C. MUNDT, EDWARD E. DEMARTINI, FRANK A. PARRISH, BRIAN J. ZGLICZYSKI, and ROBERT E. SCHROEDER** (NOAA Pacific Islands Fisheries Science Center, Honolulu, HI)

1020 BREAK

1045 33 *Examination of Algal Diversity and Benthic Community Structure at Palmyra Atoll, U.S. Line Islands*, ***CRISTI L. BRAUN¹, JENNIFER E. SMITH² and PETER S. VROOM¹** (¹Joint Institute for Marine and Atmospheric Research, University of Hawaii'i and Pacific Islands Fisheries Science Center (PIFSC), Coral Reef Ecosystem Division (CRED), Honolulu, HI; ²NCEAS, University of California, Santa Barbara, Santa Barbara, CA)

1105 34 *Ecology And Predator-Prey Dynamics Of Fishes At Palmyra Atoll NWR*, ***ALAN FRIEDLANDER¹, JENNIFER CASELLE², CHRISTOPHER G. LOWE³ and YANNIS PAPANASTATIIOU⁴** (¹NOAA/NOS Biogeography Branch and the Oceanic Institute, Waimanalo, HI; ²Marine Science Institute, University of California Santa Barbara, Santa Barbara CA; ³Dept. Biological Sciences, California State University Long Beach, Long Beach CA; ⁴Department of Zoology, Hawaii Institute of Marine Biology, University of Hawaii at Manoa, Kaneohe, HI)

1125 35 *Palmyra and the Line Islands as a Laboratory for Marine Conservation Research*, **STUART A. SANDIN** (Scripps Institution of Oceanography)

1145 LUNCH

1315 36 *Behavioral Effects of Fishing on Coral Reefs*, ***ELIZABETH M.P. MADIN¹, STEVEN D. GAINES^{1,2}, and ROBERT R. WARNER¹** (¹Department of Ecology, Evolution and Marine Biology, University of California, Santa Barbara, CA; ²Marine Science Institute, University of California, Santa Barbara, CA)

1335 37 *Simulating Overfishing in the Near-pristine Coral Reefs of Palmyra Atoll*, ***DOUGLAS MCCAULEY¹, DAN BRUMBAUGH², KATE HOLMES², HEIKE LOTZE³, ELIZABETH MADIN⁴, LISA MAX⁴, FIORENZA MICHELI¹, JENNIFER SMITH⁵, DEREK TITTENSOR³, BORIS WORM³, and HILLARY YOUNG¹** (¹Department of Biology, Stanford University, Stanford, CA; ²Center

for Biodiversity and Conservation, American Museum of Natural History, New York, NY; ³Department of Biology, Dalhousie University, Halifax, NS, Canada; ⁴Department of Ecology, Evolution and Marine Biology, University of California Santa Barbara, Santa Barbara, CA; ⁵NCEAS, University of California, Santa Barbara, Santa Barbara, CA)

- 1355 38** *Rats and the Reproductive Ecology of Terminalia catappa at Palmyra Atoll: An Example of How Invasive Rodents Influence Forest Structure on Low Tropical Islands*, **ALEXANDER S. WEGMANN** (Botany Department, University of Hawaii, Honolulu, HI)
- 1415 39** *Cocos nucifera Drives Nutrient Depletion via Changes in Seabird Density at Palmyra Atoll*, ***HILLARY YOUNG, DOUGLAS MCCAULEY, and RODOLFO DIRZO** (Department of Biology, Stanford University, Stanford CA)
- 1435 40** *Assessment of the Terrestrial Herpetofauna of Palmyra Atoll, Line Islands*, ***ROBERT N. FISHER and STACIE A. HATHAWAY** (San Diego Field Station, Western Ecological Research Center, United States Geological Survey, San Diego, CA)
- 1455 BREAK**
- 1515 41** *Vox Palmyra*, **BARRY W. STIEGLITZ** (U.S. Fish and Wildlife Service, Hawaiian and Pacific Islands National Wildlife Refuge Complex, Honolulu, HI)
- 1545 42** *Scale Population Dynamics and Control Measures and the Status of Pisonia grandis at Palmyra Atoll NWR in 2007*, **EDITH NONNER** (Formerly: University of Hawaii, Department of Molecular Biosciences and Bioengineering and The U.S. Fish and Wildlife Service, Pacific Remote Islands NWR, Honokaa, HI)
- 1605 43** *Coral Disease at Palmyra Atoll: Patterns of Spatial Distribution*, **GARETH J. WILLIAMS**
- 1625 44** *Conservation Status of Globally Endangered Sea Turtles at the Palmyra Atoll National Wildlife Refuge (2005-2007)*, ***ELEANOR J. STERLING¹, EUGENIA NAROMACIEL¹, KATHERINE MCFADDEN², KATHERINE HOLMES¹, and PETER J. ERSTS¹** (¹Center for Biodiversity and Conservation, AMNH, New York, NY; ²Columbia University, New York, NY)

Hawaiian Anchialine Pool Ecosystem Conservation and Management: The Present Status and Future of Anchialine Pools

Castle Lecture Hall

Monday

10:00 AM – 3:35 PM

Program Organizers: *Sallie Beavers* (Ecologist, National Park Service, Koloko-Honokohau National Historic Park, Kailua Kona, HI) and *David Foote* (USGS Biological Resources Division, Pacific Island Ecosystems Research Center, Hawaii National Park, HI)

Sponsored by the Pacific Division section on Ecology, Organismal Biology, and Environmental Sciences.

Anchialine pools are brackish-water pools that lack surface connection to the ocean, but are hydrologically connected to ground water and the ocean through the permeable aquifer. Anchialine habitats are unique ecosystems worldwide and support rare endemic species, including undescribed species. The Department of Land and Natural Resources estimates that there are between 600 and 700 anchialine pools in the state of Hawaii. Of these, the majority are found on the Kona Coast of Hawaii Island. Anchialine pools are culturally important to Hawaiians, and provided the fresh-water resource necessary to settle the arid Kona coast more than 800 years ago. Today, Hawaii's anchialine pools are increasingly threatened by introductions of alien species, unregulated collection of rare species, infilling by land-use development, alterations to water quality and water quantity from land development and ground-water withdrawals. Effective management tools and regulations need to be developed and implemented. This symposium will summarize the current knowledge of, and threats to, the anchialine pool ecosystem, as well as explore new avenues for research, management, and conservation.

Session Chair: Sallie Beavers

1000 *Introductory comments*

- 1005 45** *Submarine Groundwater Discharge and Its Role in Anchialine Pond Dynamics of Kaloko-Honokohau National Historical Park on the Arid Kona Coast of Hawaii, USA*, ***ERIC GROSSMAN¹, DELWYN OKI², KAREN KNEE³, ADINA PAYTAN⁴, DAVID FOOTE⁵, and SALLIE BEAVERS⁶** (¹US Geological Survey, Pacific Science Center, Santa Cruz, CA; ²US Geological Survey, Pacific Islands Water Science Center, Honolulu, HI; ³Department of Geological and Environmental Sciences, Stanford University, Stanford, CA; ⁴Institute of Marine Sciences, University of California, Santa Cruz, CA; ⁵US Pacific Island Ecosystems Research Center, Hawaii National Park, HI; ⁶ Kaloko-Honokohau National Historical Park, Kailua-Kona, HI)
- 1035 46** *Status of the Hawaiian Anchialine Resource – 36 Years of Observations*, ***RICHARD E. BROCK¹, JULIE H. BAILEY-BROCK² and ALAN K. H. KAM¹** (¹Water Resources Research Center, University of Hawaii, Honolulu, Hawaii; ²Department of Zoology, University of Hawaii, Honolulu, HI)

- 1055 47** *Understanding the Species Richness and Distribution of Anchialine Pools in Hawai'i*, **STEPHANIE LU** (The Nature Conservancy, Honolulu, HI)
- 1115 48** *Reviving a Native Anchialine Community; A Case Study of Rotenone Use in Two Anchialine Pools at Hualalai Resort, Kaupulehu-Kona, Hawaii*, ***DAVID CHAI and AM-BYR MOKIAO-LEE** (Hualalai Resort, Kailua-Kona, HI)
- 1135 49** *Anchialine Pools and Candidate Conservation*, **LORENA WADA** (U.S. Fish and Wildlife Service, Honolulu, HI)
- 1155 LUNCH**
- 1315 50** *Population Genetics of an Anchialine Shrimp, *Metabetaeus lohena*, in the Hawaiian Islands*, ***ATLANTIS D. RUSS and CEDRIC C. MUIR** (Department of Tropical Conservation Biology and Environmental Science, University of Hawaii at Hilo, Hilo, HI)
- 1335 51** *Wildlife Forensics: What DNA Reveals about the Biology and Conservation of Organisms from Hawaiian Anchialine Environments*, **SCOTT R. SANTOS** (Department of Biological Sciences, Auburn University, Auburn, AL)
- 1355 52** *Biological Surveys of Anchialine Pools in Hawaii's National Parks*. ***DAVID FOOTE¹, LORI TANGO², CYNTHIA KING², MEREDITH ACLY² and KARL MAGNACCA²** (¹US Pacific Island Ecosystems Research Center, Hawaii National Park, HI; ²Pacific Cooperative Studies Unit, University of Hawaii, Honolulu, HI)
- 1415 53** *Regional Protection and Management Strategies for Anchialine Pools*, ***SALLIE BEAVERS¹, MARISKA WEJERMAN², ELIZABETH MARRACK², and KELLY KOZAR³** (¹National Park Service, Kaloko-Honokohau National Historical Park, Kailua Kona, HI; ²University of Hawaii, Cooperative Ecosystems Studies Unit, Kaloko-Honokohau National Historical Park, Kailua Kona, HI; ³National Park Service, Inventory & Monitoring Program, Hawaii National Park, HI)
- 1435 Discussion**

**Physics, Materials Science
and Nanotechnology**

Room 41

Monday

10:00 AM – 2:55 PM

Organized by: *Philippe Binder* (Department of Physics and Astronomy, University of Hawaii – Hilo, Hilo, HI), *Shalilni Prasad* (Department of Electrical and Computer Engineering, Portland State University, Portland, OR) *Klaus Sattler* (Department of Physics and Astronomy, University of Hawaii – Manoa, Honolulu, HI) and *Panos Photinos* (Department of Physics and Engineering, Southern Oregon University, Ashland, OR).

Sponsored by the Pacific Division section on Physics and Materials Science

This fourth annual symposium on Materials Science and Technology will cover the synthesis, preparation, characterization and applications of novel smart materials, including:

- Biomaterials
- Ferroelectrics
- Liquid Crystals and Complex Fluids
- Nanomaterials
- Polymers
- Thin Films and Coatings

Session Chair: Panos Photinos

- 1000** Introductory Comments
- 1005 54** *The Evolution of Cluster Early-Type Galaxies Over the Past 8 Gyr*, ***ALEXANDER FRITZ and INGER JØRGENSEN** (Gemini Observatory, Hilo, HI)
- 1035 55** *Undergraduate Special Studies Projects in Support of the Development of the Galbreath Wildlands Preserve Observatory*, **SCOTT A. SEVERSON** (Department of Physics and Astronomy, Sonoma State University, Rohnert Park, CA)
- 1055 56** *Electrical Conductance Anisotropy in a Shear Banding Micellar Solution*, **PANOS PHOTINOS** (Department of Physics and Engineering, Southern Oregon University, Ashland, OR)
- 1125 57** *Towards A General Theory of Complex Systems*, **PHILIPPE BINDER** (Department of Physics and Astronomy, University of Hawaii – Hilo)
- 1155 LUNCH**
- 1315 58** *Structural and Mechanical Characterization of Spider Silk*, **VILUPANUR A. RAVI¹ and *DAVID E. CHAVEZ-TICAS²** (¹Department of Chemical and Materials Engineering, California State Polytechnic University, Pomona, CA; ²Department of Mechanical Engineering, California State Polytechnic University, Pomona, CA)
- 1335 59** *Biosensors Based on Functional Nanoparticle Labels*, ***YUEHE LIN, HONG WU and JUN WANG** (Pacific Northwest National Laboratory, Richland, WA)
- 1405 60** *Spin Acoustic Effect*, **PRASHANT SHARMA** (Department of Physics, Suffolk University, Boston, MA)
- 1425 61** *Undergraduates using a 17 Tesla Superconducting Magnet System*, **JEREMY S. QUALLS** (Department of Physics and Astronomy, Sonoma State University, Rohnert Park, CA)

Wednesday, 18 June 2008

Progress in Vaccine and Drug Development

Castle Lecture Hall
 Wednesday
 8:25 AM – 4:00 PM

Program Organizer: Kenneth A. Cornell (Department of Chemistry and Biochemistry, Boise State University, Boise, ID)

Sponsored by the Pacific Division sections of Cell and Molecular Biology, Chemistry and Biochemistry, and Health Sciences.

Recent years have seen an increasing threat to human, animal and plant health due to the spread of exotic diseases and the emergence of drug resistant microbes and neoplasms. This session will focus on recent developments in vaccines and chemotherapeutics for infectious diseases and cancer. Investigators are invited to present research on identification of targets for antibiotic/chemotherapeutic development, new drug synthesis and screening strategies, and the development of novel adjuvants and vaccines. Also included in this session will be work on elucidating mechanisms of pathogenesis and cellular invasion, and the identification of emergent infectious diseases. Investigators with relevant work from the fields of cell biology, microbiology, chemistry, biochemistry and materials science are encouraged to attend and sponsor cross-disciplinary discussions.

Session Chair: Kenneth A. Cornell

0825 *Introductory Comments*

0830 62 *Intersecting Recycling Pathways: Biochemical Analysis of E. histolytica MTA Nucleosidase as a Target for Antiparasitic Drug Development.* ***DANIEL QUAPP and KEN CORNELL** (Department of Chemistry and Biochemistry, Boise State University, Boise, ID)

0900 63 *Reconstitution of Autoinducer II Effects in E. coli MTN Knockout Strains.* ***J.A. MARTINEZ and K.A. CORNELL** (Department of Chemistry and Biochemistry, Boise State University, Boise, ID)

0930 64 *Adventures in Paradise: Research at the College of Pharmacy, University of Hawaii Hilo.* **ROBERT P. BORRIS** (College of Pharmacy, University of Hawaii - Hilo, Hilo HI)

1000 BREAK

1020 65 *Bioactive Sulfated Sesterterpene Alkaloids from the Marine Sponge Fasciospongia sp.* **GUANG MIN YAO¹, TAMARA P. KONDRATYUK², JOHN M. PEZZUTO² and *LENG CHEE CHANG²** (¹Department of Chemistry and Biochemistry, University of Minnesota Duluth, Duluth, MN; ²Department of Pharmaceutical Sciences, College of Pharmacy, University of Hawaii at Hilo, Hilo, HI)

1050 66 *The Marine Environment as a Resource for Discovery of Chemopreventive Agents.* ***TAMARA P. KONDRATYUK, LAURA E. MARLER, JACKIE GUILFORD, KATHERINE MALONEY, WILLIAM FENICAL and JOHN M. PEZZUTO** (Department of Pharmaceutical Sciences, College of Pharmacy, University of Hawaii at Hilo, Hilo, HI)

1120 67 *Oncostatin M is a Potential Target for Inhibiting Breast Tumor Metastasis.* **CHERYL L. JORCYK** (Department of Biology, Boise State University, Boise, ID)

1150 LUNCH

1315 68 *Marine Sources of New Alzheimer's Drug Leads.* **PHILIP WILLIAMS** (Department of Chemistry, University of Hawaii at Manoa, Honolulu, HI)

1345 69 *From Snail Venom to Therapeutics: How Conotoxins Provide Insight Into Drug Design.* **OWEN M. MCDOUGAL** (Department of Chemistry and Biochemistry, Boise State University, Boise, ID)

1415 70 *In Vivo Regulation of Hepatocyte Proliferation by the Aryl Hydrocarbon Receptor.* ***KRISTEN A. MITCHELL¹ and CORNELIS J. ELFERINK²** (¹Department of Biological Sciences, Boise State University; ²Department of Pharmacology and Toxicology, University of Texas Medical Branch, Galveston, TX)

1510 71 *Immunodominance in Dengue Virus Infection.* ***ALLISON IMRIE¹, JANET MEEKS², MUNKHZUL SUKHAATAR¹ and ALEXANDRA GURARY²** (¹Department of Public Health Sciences; ²Department of Pediatrics, John A. Burns School of Medicine, University of Hawaii at Manoa, Honolulu, HI)

1540 72 *Bacterial Population Signaling: Examining the Effects of Natural and Unnatural Messages.* **KEN CORNELL** (Department of Chemistry and Biochemistry, Boise State University, Boise, ID)

**Evolution and Conservation of Hawaiian Birds:
 Results of a Twenty Year Study**

Gerry Clark Art Center
 Wednesday
 8:30 AM – 12:00 PM

Program Organizer: Leonard Freed (Department of Zoology, University of Hawaii at Manoa, Honolulu, HI)

Sponsored by the Pacific Division section on Ecology, Organismal Biology and Environmental Science

Each paper in this symposium is based on long-term study of Hawaiian forest birds at Hakalau Forest National Wildlife Refuge. These birds are renowned among evolutionary biologists for their spectacular adaptive radiation as reflected in their plumage coloration and bill morphology. They

are equally well known among conservation biologists for extinction and endangerment. The long term study reported here will extend the study of adaptation in these birds to life history and behavior, and extend the study of extinction and endangerment to introduced species ranging from pathogens to ectoparasites to ecological competitors for food. Several papers will be about special adaptation and problems of the endangered Hawaii akepa, one of the Hawaiian honeycreepers. Each paper includes data collected over no fewer than 13 years.

Session Chair: Leonard Freed

0830 *Introductory Comments*

0840 *73 Origin, Radiation, and Current Status of Hawaiian Birds*, ***REBECCA L. CANN¹** and **LEONARD A. FREED²** (¹Department of Cell and Molecular Biology, University of Hawaii at Manoa, Honolulu, HI; ²Department of Zoology, University of Hawaii at Manoa, Honolulu, HI)

0910 *74 Life History Diversification of Hawaiian Honeycreepers*, **LEONARD A. FREED¹** (¹Department of Zoology, University of Hawaii at Manoa, Honolulu, HI)

0940 *75 Adaptation of the Hawaii Akepa to Molt and Breed During a Seasonal Food Decline: The Importance of Offspring Mass*, ***MATTHEW C. MEDEIROS¹**, **LEONARD A. FREED²**, and **J. SCOTT FRETZ²** (¹Department of Biology and the Whitney Harris World Ecology Center, University of Missouri-St. Louis, St. Louis, MO; ²Department of Zoology, University of Hawaii at Manoa, Honolulu, HI)

1010 **BREAK**

1030 *76 Sexual Dimorphism and the Evolution of Seasonal Variation in Sex Allocation in a Hawaiian Bird*, ***REBECCA L. CANN¹** and **LEONARD A. FREED²** (¹Department of Cell and Molecular Biology, University of Hawaii at Manoa, Honolulu, HI; ²Department of Zoology, University of Hawaii at Manoa, Honolulu, HI)

1100 *77 Explosive Increase in Ectoparasites in Hawaiian Forest Birds*, ***GUSTAV R. BODNER¹**, **LEONARD A. FREED¹** and **MATTHEW C. MEDEIROS²** (¹Department of Zoology, University of Hawaii at Manoa, Honolulu, HI; ²Department of Biology and the Whitney Harris World Ecology Center, University of Missouri-St. Louis, St. Louis, MO)

1130 *78 Why Introduced Birds Are the Most Important Threat to Hawaiian Forest Birds*, ***LEONARD A. FREED¹**, **REBECCA L. CANN²** and **GUSTAV R. BODNER¹** (¹Department of Zoology, University of Hawaii at Manoa, Honolulu, HI; ²Department of Cell and Molecular Biology, University of Hawaii at Manoa, Honolulu, HI)

**Putting the Science in Informal Science Education:
Pathways to Broader Impacts**

Library
Wednesday
1:15 PM – 5:00 PM

Program Organizer: *Margaret Gould Burke* (California Academy of Sciences, San Francisco, CA)

Sponsored by the Pacific Division section on Education.

Through case studies and lessons learned, the speakers will address the opportunities and challenges facing informal science education (ISE) institutions in connecting to and effectively translating science research for public audiences, in fostering science literacy and environmental stewardship, in dealing with topics such as evolution that are viewed as controversial by some, and in effectively measuring long-term impacts of their efforts. The intricate interfaces with formal education and the world of federal funding with its mandate for broader impacts will also be explored. The last portion of the symposium is reserved for a free-wheeling exchange among speakers and the audience on these topics.

Session Chair: Margaret Gould Burke

1315 *Introductory Comments*, Margaret Gould Burke

1320 *79 Integrating Research and Education – Opportunities and Mandates*, **MARGARET GOULD BURKE** (California Academy of Sciences, Golden Gate Park, San Francisco, CA)

1400 *80 Engaging the Public in Science – It Matters*, **JUDITH G. SCOTCHMOOR** (University of California Museum of Paleontology, Berkeley, CA)

1440 **BREAK**

1510 *81 Bridging the Gap between Research and Informal Education – A New Model*, **JESSICA I. NEELY** (KQED Public Broadcasting, San Francisco, CA)

1550 *82 The Value of Sharing Our Science*, **DAVID R. LINDBERG** (University of California Museum of Paleontology, Berkeley, CA)

1630 *Discussion, Questions and Answers with Audience*

**Celebration and Politics: Race and Ethnicity in
America Seen Through United States
World's Fairs and Expositions**

Room 42
Wednesday
1:15 PM – 5:00 PM

Program Organizer: *Alan L. Bain* (Smithsonian Institution Archives)

Sponsored by the Pacific Division sections on Anthropology and Archaeology, and Social, Economic and Political Sciences

After the Civil War, the United States showed the world its growing industrial might and engineering prowess in large extravaganzas called world's fairs and invited other nations to join in the fanfare and celebration. The United States also used these exhibition cities to promote cultural identity and national pride. In so doing, the organizers of the fairs and the U. S. government both reflected America's attitude and helped shape the discussion of race and ethnicity. Over time, attitudes changed, reflecting America's changing values in foreign policy and in domestic politics.

This session examines how ideas about race and ethnicity were represented at world's fairs, starting with the 1893 World's Columbian Exposition in Chicago through the 1939 New York world's fair, and looks ahead at what may lie ahead as the United States anticipates participation in the 2010 Shanghai World Expo. In addition, the audience is shown another perspective, as the participants open the discussion from the viewpoint of Asian nations invited to participate at the fairs, the Asian American communities that joined in the fairs, and Asians that were imported to be placed on exhibition as symbols of non-civilized, non-white people and their place in what American depicted as the journey towards civilization.

Session Chair: Robert W. Rydell (Montana State University)

- 1315** *Introductory Comments*, Robert W. Rydell
- 1325** **83** *America's World's Fairs: Negotiating Boundaries of Race and Ethnicity*, **ROBERT W. RYDELL** (Department of History and Philosophy, Montana State University, Bozeman, MT)
- 1355** **84** *Chinese-American Identity in the Making: World Fairs in Chicago and Seattle*, **CHUIMEI HO** (Ph.D., Independent Scholar, Bainbridge Island, WA)
- 1430** **85** *Japanese Participation in the Two Chicago World Fairs: The Road Leading to Manchuria*, **ANDREA L. STAMM** (Librarian, Northwestern University Library, Northwestern University, Evanston, IL)
- 1500** **BREAK**
- 1520** **86** *Modern Displays and the Skeptical 'Savage': Revisiting the Philippine Experience in St Louis, 1904*, **CHERUBIM A. QUIZON** (Department of Sociology and Anthropology, Seton Hall University, South Orange, NJ)
- 1550** **87** *Chinese and Japanese Participation in the Panama-Pacific International Exposition*, **ABIGAIL MARKWYN** (Department of History, Carroll College, Waukesha, WI)
- 1625** *Commentator's Comments*, Robert W. Rydell
- 1640** *General Discussion*

Pacific Science: U.S.–Asia/Pacific Scientific Collaboration in the 21st Century

Gerry Clark Art Center

Wednesday

1:25 PM – 4:10 PM

Organized by: *John Burke Burnett* (Executive Director, Pacific Science Association, Honolulu, HI)

Sponsored by the Pacific Division section on Ecology, Organismal Biology and Environmental Science, and the Pacific Division General and Interdisciplinary Section

This symposium brings together scientists with experience in collaborative international research in Asia and the Pacific to discuss the opportunities and challenges for enhanced collaboration between American scientists and their counterparts in the Asia-Pacific region. There are many examples of very successful U.S. – Asia-Pacific scientific collaborations. Yet collaborative endeavors between U.S. individuals and institutions and those in countries with less sophisticated scientific infrastructure and academic capacity can also present challenges for researchers. While addressing broader issues of collaboration, a focus of this symposium is to present examples of successful efforts of designing and conducting research that has both advanced scientific research, and also advanced goals such as capacity-building and information repatriation that are important to less-developed nation-states. Regional scientific organizations, such as the Pacific Science Association, the ICSU's Regional Office for Asia & Pacific, and the Science Council of Asia, are addressing these issues. Given increasingly critical issues of common concern such as climate change, biodiversity loss, and the demographic, environmental and social implications of globalization, greater emphasis on research that is both multidisciplinary in nature and international in scope is critical to advancing our scientific understanding of these issues and in providing information required to make scientifically sound decisions to societies and policymakers.

Session Chair: John Burke Burnett

1325 *Introductory Comments*

- 1330** **88** *The Pacific Science Association: Advancing International Collaborative Research in the Asia-Pacific Since 1920*, ***NANCY D. LEWIS¹ and JOHN BURKE BURNETT²** (¹Vice-President, Pacific Science Association and Director, Research Program, The East-West Center, Honolulu, Hawaii; ²Executive Director, Pacific Science Association, Honolulu, HI)
- 1350** **89** *Highlights of International Cooperation in the Study of Plant Diversity in Vietnam, 1993-2008*, ***JACINTO C. REGALADO, JR.¹, LE XUAN CANH, TRAN HUY THAI, TRAN MINH HOI, NGUYEN TIEN HIEP, VU XUAN PHUONG, NINH KHAC BAN², PHAN KE LOC, NGUYEN NGHIA THIN³, NGUYEN VAN TAP⁴, VU VAN DUNG, NGUYEN HUY DUNG⁵ and LEONID V. AVERYANOV⁶** (¹Missouri Botanical Garden, St. Louis, MO; ²Institute of Ecology and Biological Resources, Vietnam Academy of Science and Technology, Hanoi, Vietnam; ³Hanoi National University, Hanoi, Vietnam; ⁴National Institute of Medicinal Materials, Ministry of Health, Hanoi, Vietnam; ⁵Forest Inventory and Planning Institute, Ministry of Agriculture and Rural Development, Hanoi, Vietnam; ⁶Komarov Botanical Institute of the Russian Academy of Sciences, St. Petersburg, Russia)

- 1410 90** *Global Forest Observatories: An International Network Monitoring the Health of Tropical Forests*, **STUART J. DAVIES** (Center for Tropical Forest Science, Smithsonian Tropical Research Institute and the Arnold Arboretum of Harvard University, Cambridge MA)
- 1430 91** *DNA Barcoding: International Collaboration for Species Identification in Research, Conservation, and Regulatory Affairs*, **DAVID E. SCHINDEL** (Executive Secretary, Consortium for the Barcode of Life, Smithsonian Institution, Washington DC)
- 1450 BREAK**
- 1510 92** *Global Collaboration to Address Global Problems: Trans-Pacific Collaboration for Research on Global Change and Sustainable Living on Arid Lands*, ***J. SCOTT HAUGER**¹, **QINGWEI SUN**² and **ATSUSHI TSUNEKAWA**³ (¹Desert Research Institute, Reno, NV; ²Cold and Arid Regions Environmental and Engineering Research Institute, Lanzhou, China; ³Arid Land Research Center, Tottori University, Tottori, Japan)
- 1530 93** *Exploring the Unanticipated Consequences of Ocean Acidification by Fossil Fuel CO₂*, **PETER G. BREWER** (Monterey Bay Aquarium Research Institute, Moss Landing, CA)
- 1550 94** *International Scientific Collaboration at the NOAA Pacific Islands Fisheries Science Center*, **SAMUEL G. POOLEY** (NOAA's Pacific Islands Fisheries Science Center, Honolulu, HI)

Thursday, 19 June 2008**Asian American Women: Health and Welfare**

Kono Center for English Studies

Thursday

8:00 AM – 9:45 AM

Program Organizer: *Alan L. Bain* (Smithsonian Institution Archives)

Sponsored by the Pacific Division sections on Anthropology and Archaeology, and Social, Economic and Political Sciences

Most Americans consider Asian Americans model communities. These ideas are reflected in the number of Asian Americans who attend universities and the belief that most Asian American communities are either entrepreneurial, reflected in the companies in Silicon Valley, or small business shop owners, located within communities within high crime areas, reflected in the stories about Los Angeles and the articles on store-front businesses in Washington, DC. The reality is that for Asian American women there are major, hidden problems that Americans are unaware of, poverty, lack of health care and welfare support, and high rates of cancer, and suicide.

This session takes a hard and frank look at the problems that Asian American women face in the United States. This is the only group in America where cancer is the leading cause of death. Cultural and linguistic barriers prevent cancer screening, but health insurance coverage and health care coverage play dominant roles in gaining access to physicians. Low-income Asian immigrant women have little access to prenatal care; and the roles of women and daughters within the Asian American communities, based on race and gender, racism and sexism and the pressures to perform well lead to depression and suicide.

Session Chair: *Alan L. Bain*

0800 *Introductory Comments*

0810 95 *The Role of Health Insurance and the Safety Net in Reducing Cancer Screening Disparities Among Asian American Women*, **NINEZ A. PONCE** (Department of Health Services, UCLA School of Public Health, University of California, Los Angeles CA)

0845 96 *Suicide and Depression Among Asian American Women*, **ELIZA NOH** (Asian American Studies Program, California State University, Fullerton, CA)

0925 *General Discussion***Past and Future of the Fauna of the Pacific Basin**

Gerry Clark Art Center

Thursday

8:20 AM – 11:40 AM

Organized by: *David R. Lindberg* (University of California Museum of Paleontology, Berkeley, CA)

Sponsored by the Pacific Division section on Ecology, Organismal Biology and Environmental Sciences.

The Pacific Basin is one of the oldest ocean basins on Earth and its fauna renowned for its diversity and abundance. This symposium will examine the history and origin of the Pacific Ocean and the marine taxa that inhabit the basin, the islands, and the rim. Special emphasis will be placed in the relationship and interaction between the geological history of the area and the evolution of the fauna (e.g., active vs. passive margins and intertidal faunas, high and low islands and reef diversity, rifting and vent faunas, etc.), and how these interactions have led to current distributions and diversity patterns. With this background, the symposium will then explore the future of these faunas and habitats with respect to global climate change and warming. While changes in latitudinal temperature regimes are obvious consequences of global warming, the symposium will also address consequences of sea level lowering. This latter phenomenon having major effects on island size, habitat availability and even major current direction and intensity (e.g., shallowing of the Arafura Sea between Indonesia and Australia).

Session Chair: David R. Lindberg

0820 *Introductory Comments*

0830 97 *Climate Change in the Pacific Basin: Past and Future*, **DAVID R. LINDBERG** (University of California Museum of Paleontology, Berkeley, CA)

0910 98 *Late Ordovician Climate Change: Related Biodiversity Changes*, **WILLIAM B. N. BERRY** (Department of Earth and Planetary Science, University of California, Berkeley, CA)

0950 BREAK

1010 99 *Documenting Species Diversity Along the Verde Island Passage, Philippines: The Apex of the Coral Triangle*, **TERRENCE M. GOSLINER** (California Academy of Sciences, San Francisco, CA)

1050 100 *Islands, Evolution and Feral Animals*, **MARGARET GOULD BURKE** (California Academy of Sciences, San Francisco, CA)

1130 *Closing Comments*, David R. Lindberg

North Meets South: Special Neuroscience Research Programs in the Pacific

Library
Thursday
9:00 AM – 12:00 PM

Organized by: *Lawrence Duffy* (Associate Dean, College of Natural Science and Mathematics, University of Alaska Fairbanks, Fairbanks, AL), *Linda Chang* and *John Spiess* (Department of Medicine, John A. Burns School of Medicine, University of Hawaii, Honolulu, HI).

Sponsored by the Pacific Division Health Sciences Section.

Although Arctic and Hawaiian Peoples are very diverse and share a variety of health and environmental issues unique to the region, they suffer from common minority health disparities such as stroke, depression, sleep disorders, cancer and developmental deficits related to environmental con-

taminants. Scientific research exploring these health issues and disparities offers significant opportunities and challenges. Success in applying the advanced scientific tools of neuroscience to the challenges of health disparities, in general, depends upon respect for the indigenous people and minority cultures that face these health challenges.

Investigators working within the National Institute of Neurological Disorders and Stroke (NINDS) Specialized Neuroscience Research Programs (SNRP) recognize the value of a state-of-the-art conference.

Our aims are to 1) present ongoing research in Alaskan and Hawaiian neuroscience research priorities and 2) expose graduate students and undergraduate students to neuroscience research with students from other neuroscience programs.

Neuroscience research that might be pursued with minority populations comprises three areas: 1. basic experimental studies; 2. observational studies; and 3. clinical trials/interventions. It would be useful to identify how these particular designs may be utilized to address research hypotheses that are uniquely translatable to Arctic and Hawaiian Peoples. Despite the logistical difficulties and expense, research objectives in the Alaska and Hawaii should be pursued simply because they cannot be replicated in areas more hospitable to research. Among the research questions that can be addressed most appropriately are those that derive from the unique risk profile of the inhabitants, their geographical isolation, limited dietary choices, high exposure to some contaminants and limited health care delivery, in some areas. Research priorities should consider an indigenous perspective.

The dearth of data documenting neuroscience related problems in Alaska and Hawaii is due, in part, to the formidable obstacles facing researchers. Physical obstacles include population density, weather conditions and the difficulties associated with transporting personnel, equipment and samples to the communities where many indigenous people reside. Research is additionally hampered by the shortage of researchers and trained technicians; housing, laboratories and clinic space and associated apparatus such as imaging equipment and freezers. Finally, cultural differences and prior negative experiences, offer a special challenge to investigators who wish to conduct culturally sensitive research that is scientifically meritorious and of true benefit to the participants and the overall community.

The expected outcomes from this symposium include: 1. Identification of current neuroscience research that may be uniquely addressed. 2. Improved communication between research scientists and clinicians around the Pacific and 3. Identification of innovative strategies and opportunities for developing diverse neuroscience research efforts and the recruitment of health professionals who can translate research benefits to medical care for at risk Alaskan and Hawaiian Native Peoples.

Session Chair: Lawrence Duffy

0900 101 *North Pacific Exposure: Neuroscience, Melatonin and Behavioral Health in the North Pacific*, ***LAWRENCE K. DUFFY¹, KRYIA DUNLAP¹, ARLEIGH REYNOLDS², ABEL BULT-ITO¹, KIMBERLY CLAPP¹ and GIANLUCCA TOSINI³** (¹Specialized Neuroscience Research Program, University of Alaska Fairbanks, Fairbanks, AK; ²Nestle-Purina Research Station, Salcha, AK; ³Specialized Neuroscience Research Program, Morehouse School of Medicine, Atlanta, GA)

0930 102 *Mu-opioid and NK1 Receptor Immunofluorescence and Involvement in the Neuroventilation Bullfrogs*, ***BRITTANY L. DAVIES, CORD M. BRUNDAGE and BARBARA E. TAYLOR** (Institute of Arctic Biology, University of Alaska Fairbanks, Fairbanks, AK)

1000 BREAK

1030 103 *Chronic Ethanol Exposure Causes a Persistent Developmental Deficit in the Neuroventilatory Response to CO₂*,

***CORD M. BRUNDAGE** and **BARBARA E. TAYLOR**
(Institute of Arctic Biology, University of Alaska Fairbanks,
Fairbanks, AK)

1100 104 *Pharmacology of a Novel Positive Allosteric Modulator for Neuronal Nicotinic Receptors*, ***ANSHUL PANDYA**¹, **MAEGAN WELTZIN**¹, **BRIAN EDMONDS**², **MARVIN SCHULTE**¹ and **RICHARD GLENNON**³ (¹Department of Chemistry and Biochemistry, University of Alaska Fairbanks, Fairbanks, AK; ²Department of Biology and Marine Biology, School of Arts and Science, University of Alaska Southeast, Juneau, AK; ³Department of Medicinal Chemistry, School of Pharmacy, Virginia Commonwealth University, Richmond, VA)

1130 105 *Dose Dependent Effects of Arsenic Exposure on Morphology, Caspase-3 Activation, and Metabolic Status of SH-SY5Y Neuroblastoma Cells*, ***MARINA R. CASTILLO**, **EMMA FLORES**, **NJIDEKA CHUWKU** and **CARLA CARTAGENA** (Department of Chemistry and Biochemistry, Biochemistry and Molecular Biology Program, College of Science, Engineering and Mathematics, University of Alaska Fairbanks, Fairbanks AK)

Hawaii Archives: Records and Special Collections

Kono Center for English Studies

Thursday

10:00 AM – 12:50 PM

Program Organizer: *Alan L. Bain* (Smithsonian Institution Archives)

Sponsored by the Pacific Division section on Anthropology and Archaeology

Institutional records, special subject collections and individual personal papers provide public and scholar with access to the celebrations of life and death, important and trivial events, and the struggles of institutions and individuals, without which we would be bereft of our history and knowledge of the past. Archivists and librarians (who are in charge of manuscript collections) collect, preserve and describe this historical material when they become available and are transferred to a repository, where they are maintained for as long as the informational contents are serviceable. This session is devoted to a discussion of some of the rich and varied archives that document the history of Hawaii and the life of Hawaii's people.

Hawaii's plantation records are a vast resource of economic, social, environmental and financial information. They document the living quarters of workers, their medical history, and labor, ethnic and racial tensions. This discussion includes the records of the Hawaiian Sugar Planters' Association (HSPA); lesser known plantation records and other industry records housed at the Mamiya Medical Heritage Center in Honolulu and the Lyman Memorial House Museum in Hilo; the papers of Dr. Nils Larsen, associated with HSPA; and observations why some plantations never sent their records to an archive and/or destroyed their records.

Hawaii's medical records can also be used for anthropological research. The researcher must be cognizant that such records come under privacy, ethical and practical issues regarding use and access to the files. One such group of records is maintained at the Kapi'olani Medical Center for Women and Children. Dr. Charles Wetmore, who arrived in Hawai'i in 1840, was sent from Boston with the Protestant Missions to the Sandwich Islands. His daughter, Frances, became the first woman doctor in Hawai'i. The Wetmore

family papers are located in the archives at the Lyman Museum, Hilo.

Archives are not only available as research material, but may also be used in developing exhibitions. Emma Metcalf Beckley Nakuina, an intellectual who was descended from Hawaiian chiefs on her mother's side, was curator at the Hawaii National Museum from 1883 to 1887. While there, she provided artifacts and other documents for a number of world's fairs. Recently, an exhibition regarding her activities was displayed by the Hawaii State Library.

Session Chair: Alan L. Bain

1000 *Introductory Comments*

MEDICAL ARCHIVES

1010 106 *Adventures in Medical Archives: Access and Use of Medical Archives and Databases at Kapi'olani Medical Center for Women and Children*, **MARCELLA ALOHALANI BOIDA** (Research and Database Associate, Retinopathy of Prematurity Subproject, Research in Minorities in Institutions Project, University of Hawaii at Hilo, Hilo, HI)

1035 107 *The Doctors Wetmore: Hilo's First Family of Medicine*, **LIBBY BURKE** (Archivist, Lyman Museum, Hilo, HI)

1100 *Questions*

PLANTATION AND OTHER INDUSTRY ARCHIVES

1110 108 *Hawaiian Sugar Planters' Association Plantation Archives*, **DORE MINATODANI** (Librarian, Hawaii Specialist, Hawaiian Collection, University of Hawaii at Manoa Library, Honolulu, HI)

1135 109 *Identifying and Accessing the Lesser Known Archival Collections*, **HELEN WONG SMITH** (Librarian and Archivist, Edwin H. Mookini Library, University of Hawai'i at Hilo, Hilo, HI)

1200 *Questions*

WORLD'S FAIRS AND EXHIBITIONS

1210 110 *Contribution of the Hawaiian National Museum to the Hawaii Exhibits at World's Fairs in the 1880's*, **MARTHA HOVERSON** (Hawaii Documents Librarian, Hawaii and Pacific Collection, Hawaii State Library, Honolulu, HI)

1235 *Questions/General Discussion*

Impacts of Disease on Native Hawaiian Species

Castle Lecture Hall

Thursday

10:00 AM – 3:00 PM

Program Organizer: Susan I. Jarvi (Department of Biology, University of Hawaii at Hilo, Hilo, HI)

Sponsored by the Pacific Division section on Ecology, Organismal Biology and Environmental Sciences.

This symposium provides current information and discussion on the consequences of introduced disease on native Hawaiian species. Speakers address

a number of diverse host-parasite relationships involving native Hawaiian species and how they influence populations. Various diseases currently impacting marine life including turtles, shrimp, and corals as well as terrestrial plants of Hawaii will be presented. The impacts of avian malaria, and *Avipoxvirus* and the potential impacts of West Nile Virus will be discussed in a variety of native birds as well as the genetic diversity of these pathogens. Recent studies involving vaccines for West Nile virus and avian malaria will be presented.

Session Chair: Susan I. Jarvi

1000 111 *Don't Use That Shrimp For Bait!* ***T.D. LEWIS, D. MONTGOMERY-BROCK, A.R. EGGERS and J.C. LEONG** (Hawaii Institute of Marine Biology, School of Ocean and Earth Science and Technology, University of Hawaii at Manoa, Kaneohe HI)

1030 112 *Investigations of Coral Disease across the Hawaiian Archipelago*, ***THIERRY WORK¹ and GRETA AEBY²** (¹USGS-National Wildlife Health Center, Honolulu Field Station, Honolulu, HI; ²Hawaii Institute of Marine Biology, Kaneohe, HI)

1100 113 *Pathology and Pathogenesis of Disease in Sea Turtles from Hawaii*, ***THIERRY WORK¹ and GEORGE BALAZS²** (¹USGS-National Wildlife Health Center, Honolulu Field Station, Honolulu, HI; ²Marine Turtle Research Program, NOAA, National Marine Fisheries Service, Pacific Islands Fisheries Science Center, Honolulu, HI)

1130 114 *Climate Change, Avian Malaria, and Endemic Hawaiian Forest Birds: Dynamics of a Changing System*, ***CARTER T. ATKINSON¹, DENNIS A. LAPOINTE¹, BETHANY L. WOODWORTH¹, and MICHAEL D. SAMUEL²** (¹U.S. Geological Survey, Pacific Island Ecosystems Research Center, Hawaii National Park, HI; ²Wisconsin Cooperative Wildlife Research Unit, University of Wisconsin, Madison)

1200 LUNCH

1300 115 *Genetic Diversity of Avian Pathogens in East Hawaii*, ***MARGARET E.M. FARIAS¹, CARTER T. ATKINSON², ALEXIS GIANNOULIS¹ and SUSAN I. JARVI¹** (¹Department of Biology, University of Hawaii at Hilo, Hilo, HI; ²U.S. Geological Survey-Biological Resources Discipline, Pacific Island Ecosystems Research Center, Hawaii National Park, HI)

1330 116 *Efficacy of Irradiated Sporozoites as a Vaccine for Avian Malaria (Plasmodium relictum)*, ***D. ALLAN HALL¹, CARTER T. ATKINSON² and SUSAN I. JARVI¹** (¹University of Hawaii at Hilo, Biology Department, Hilo HI; ²U.S. Geological Survey, Pacific Island Ecosystems Research Center, Hawaii National Park, HI)

1400 117 *Experimental Infections of Hawaii Amakihi and Mortality Due to West Nile Virus*, ***DENNIS A. LAPOINTE¹, ERIK HOFMEISTER², CARTER T. ATKINSON¹, and ROBERT J. DUSEK²** (¹U.S. Geological Survey, Pacific Island Ecosystems Research Center, Hawaii National Park,

HI; ²U.S. Geological Survey, National Wildlife Health Center, Madison, WI)

1430 118 *Protective Efficacy of a Recombinant Subunit West Nile Virus Vaccine in Domestic Geese (Anser anser): A Surrogate Species for Vaccination of the Endangered Nēnē (Branta sandvicensis)*, **SUSAN I. JARVI¹, MICHAEL M. LIEBERMAN², ERIK HOFMEISTER³, VIVEK R. NERURKAR⁴, TERI WONG², and CAROLYN WEEKS-LEVY²** (¹Department of Biology, University of Hawaii at Hilo, Hilo, HI; ²Hawaii Biotech, Inc., Aiea, HI; ³USGS National Wildlife Health Center, Madison, WI; ⁴University of Hawaii at Manoa, Department of Tropical Medicine, Medical Microbiology and Pharmacology, John A. Burns School of Medicine, Honolulu, HI)

II. WORKSHOPS

Wednesday, 18 June 2008

“How to Integrate Project Based Learning in the Classroom: Strategies for Teachers”

Library
Wednesday
8:00 AM – 12:30 PM

Organized by William B.N. Berry (Department of Earth and Planetary Sciences, University of California, Berkeley, Berkeley, CA; bberry@berkeley.edu) and Samantha Birch (The Kohala Center, Kamuela, HI; sbirch@kohalacenter.org). Open to all meeting registrants. Preregistration is not required but space is limited.

The aim of this workshop is to build the skills and capacity of teachers to implement applied science learning projects in their classroom. The workshop will be facilitated by the American Association for the Advancement of Science (AAAS) and The West Hawaii Explorations Academy (WHEA).

The workshop will include:

- How to write a project management plan to identify goals, objectives and strategies for the project.
- How to write a project timeline to achieve objectives.
- How to tie the project in with different content areas (multidisciplinary curriculum).
- How to ensure the project satisfies standards you are required to teach (identifies standards alignment).
- How to secure funds to assist with the development of classroom projects.

Each participant should bring to the workshop a current project or project idea that they would like to implement in their classroom/school.

Session 1: We will go over the above components, using project examples from WHEA.

Session 2: Every teacher will present their idea for a project to the whole group and then, working in smaller groups, discuss how to make their project a reality. Discussions will be guided by a workbook and facilitators. Afterwards, each teacher will present their plans to the entire group for open suggestions and/or comments.

Teachers should expect to take home:

- a working plan for each project,
- a project-planning workbook, and
- details of a contact network to enable them to keep in touch with other teachers (online forum).

Thursday, 19 June 2008

“Teaching Science as Inquiry: Aquatic Science”

Room 42
Thursday
8:30 AM – 4:30 PM

Organized by Erin Baumgartner and Francis M. Pottenger (Curriculum Research & Development Group, University of Hawaii-Manoa, Honolulu, HI; erinbaum@hawaii.edu). Open to all meeting registrants. Preregistration is not required but space is limited to 20 participants.

The Teaching Science as Inquiry (TSI) model is a professional development model from the Curriculum Research & Development Group (CRDG) that provides educators with a skills-based experience to build scientific inquiry-based instruction into existing professional practice. The goal of TSI instruction is to help teachers and students gain experience with the discipline of science, thus building scientific literacy. TSI immerses participants in inquiry activities to provide experience with a complete inquiry-based instructional sequence that highlights different modes of knowledge generation and dissemination. During each activity, emphasis is placed on the practices used to investigate and acquire new content and the teaching skills needed to facilitate those practices in a science class. Teachers are provided with facilitated support to apply the TSI instructional model to their current curriculum. This workshop will introduce participants to the TSI model and demonstrate how they can apply it to concepts of aquatic science. Participants will leave with model lessons and a template to produce their own lesson plans for engaging students in the complete discipline of science.

“Vernier Software & Technology Workshop”

Room 41
Thursday
1:00 PM – 5:00 PM

Join a Vernier representative for a free, 4-hour, hands-on workshop to learn how to integrate Vernier’s computer and handheld data-collection technology into your chemistry, biology, physics, math, middle school science, physical science, and Earth science curriculum. The workshops include lab handouts.

This data-collection workshop is a great opportunity for teachers who:

- Want to evaluate Vernier’s award-winning data collection technology.
- Are new to data collection.
- Need a refresher course on their Vernier equipment.
- Want to learn from the experts.

Advance on-line (<http://www.vernier.com/workshop>) or on-site registration required. Graduate credit may be available. Ask the Vernier representative!

III. CONTRIBUTED PAPERS

1100 (time italicized and underlined) indicates a student presentation

* indicates the speaker from among several authors listed

63 (bolded number) indicates abstract number

Monday, 16 June 2008

Western Society of Crop Science

Gerry Clark Art Center

Monday

8:15 AM – 2:35 PM

Session 1

Cropping Systems and Crop Production

Moderator: Jack Cecil (University of Wyoming)

0815 *Introductory Comments*

0820 **119** *Irrigation and Nitrogen Effects on Teff in the Southern High Plains*, **LEONARD M. LAURIAULT** (Plant and Environmental Sciences Department, New Mexico State University, Tatum, NM)

0840 **120** *Five Years of Research with Skip Row Rainfed Corn to Improve Drought Tolerance in the High Plains*, **ROBERT KLEIN¹**, **DREY LYON²**, **DAVID BALTENSPERGER³**, **ALEXANDER PAVLISTA²**, **CHARLES SHAPIRO⁴**, **STEVEN KNEZEVIC⁴**, **STEPEH MASON⁵**, **ROGER ELMORE⁶**, **ALAN SCHLEGEL**, **MERLE VIGIL** and **JEFFERY GOLUS¹** (¹University of Nebraska, North Platte, NE; ²University of Nebraska-Lincoln, Scottsbluff, NE; ³Texas A&M Univ., College Station, TX; ⁴University of Nebraska-Lincoln, Concord, NE; ⁵University of Nebraska-Lincoln, Lincoln, NE; ⁶Iowa State University, Ames, IA; ⁷Kansas State University, Tribune, KS; ⁸USDA-ARS, Central Great Plains Research Station, Akron, CO)

0900 **121** *Canolage: Increasing the Value of Winter Canola*, **CLARK B. NEELY** (Dept. of Plant, Soil, and Entomological Sciences, University of Idaho, Moscow, ID)

0920 **122** *Comparison of Harvesting Methods of Winter Canola in the Pacific Northwest*, **DON WYSOCKI** and **NICK SIROVATKA** (Crop and Soil Science, Oregon State University, Pendleton, OR 97801)

Session 2

Breeding Field Crops

Moderator: Shree Singh (University of Idaho)

0940 **123** *Development of Breeding Populations for Genomics Research in Cotton*, **JINFA ZHANG¹**, **RICHARD PERCY²** and **SANJAY BAJAJ¹** (¹Department of Plant & Environmental Sciences, New Mexico State University,

Las Cruces, NM; ²Crop Germplasm Research Unit, USDA-ARS, College Station, TX)

1000 **BREAK**

1020 **124** *Response of the Model Legume Medicago truncatula to Aluminum-toxicity*, **SUSAN MIVASAKA** and **CHERYN CLAYTON** (University of Hawaii, University of Hawaii, Hilo, HI)

1040 **125** *Pea and Lentil Response to Environments and the Satellite Breeding Program at Montana State University*, **CHENGCI CHEN¹**, **KARNES NEILL¹** and **KEVIN MCPHEE²** (¹Central Ag Research Center, Montana State University, Moccasin, MT; ²USDA-ARS-NPA-SPNRU, Washington State University, Pullman, WA)

1100 **126** *Efficacy of Screening Methods for Identification of Physiological White Mold Resistance in Dry Bean*, **HENRY TERAN** and **SHREE SINGH** (Plant, Soil and Entomological Sciences Department, University of Idaho, Kimberly, ID)

1120 **127** *Improving Wheat Straw for Use as a Feedstock for Ethanol Production*, ***MACKENZIE T. ELLISON**, **J. L. HANSEN**, **A. KARASEV** and **ROBERT ZEMETRA** (Department of Plant Soil and Entomological Sciences, University of Idaho, Moscow, ID)

1140 **128** *Effects of Phaseolus vulgaris L. on the Development of Experimentally Induced Breast Cancer*, **MARK BRICK¹**, **HENRY J. THOMPSON²** and **MATTHEW THOMPSON²** (¹Dept. of Soil & Crop Sciences, Colorado State University, Fort Collins, CO; ²Department of Horticulture and Landscape Architecture, Cancer Prevention Laboratory, Colorado State University, Ft. Collins, CO)

1200 **LUNCH**

Session 3

Fertility and Crop Physiology

Moderator: Leonard Lauriault (New Mexico State University)

1315 **129** *Physiological Responses of Potato (Solanum tuberosum L.) Genotypes to NaCl Salinity: Effects of Supplementary Calcium and NaCl Salt Pre-treatment*, ***MASOOMEH ETEHADNIA**, **DOUG WATERER** and **KAREN K. TANINO** (Department of Plant Sciences, College of Agriculture-University of Saskatchewan, Saskatoon, Canada)

1335 **130** *Winter Wheat Nitrogen Fertilizer Rate and Application:*

CONTRIBUTED ORAL PAPERS

A Conventional and No Till Comparison, **STEPHEN GUY and MARY LAUVER** (Dept. of Plant, Soil, and Entomological Sciences, University of Idaho, Moscow, ID)

1355 **131** *Impacts of Metsulfuron and Chlorsulfuron on Greasewood and Rabbitbrush communities*, ***JORDGE J. LAFANTASIE¹**, **STEPHEN F. ENLOE²**, **MARK A. FERRELL¹**, **ANDREW R. KNISS¹** and **STEVE D. AAGARD¹** (¹Plant Sciences, University of Wyoming, Laramie, WY; ²Agronomy & Soils, Auburn University, Auburn, AL)

1415 **132** *Genotypic Responses to Biological Nitrogen Fixation on Trigonelline Accumulation and Pod Yield in Peanuts*, **EMMANUEL KODJOE¹**, **NAVEEN PUPPALA²** and **YOUNGKOO CHO¹** (¹Department of Biology, Eastern New Mexico University, Portales, NM; ²New Mexico State University, ASC at Clovis, Clovis, NM)

Joint Session of the Chemistry and Biochemistry, and Health Sciences Sections

Kono Center for English Studies

Monday

9:00 AM – 11:45 AM

Program Organizers: Kenneth Cornell (Department of Chemistry and Biochemistry, Boise State University, Boise, ID) and H. K. Choi (Department of Biology, California State University Dominguez Hills, Carson, CA)

Session Chair: H. K. Choi

0900 *Introductory Comments*

0905 **133** *Novel Approaches to Treat Glioblastoma Multiforme*. ***ALOK BHUSHAN**, **WAJIHA TAHAR ALI**, **SHILPA PULI** and **JAMES C.K. LAI** (Department of Biomedical and Pharmaceutical Sciences, College of Pharmacy and ISU Biomedical Research Institute, Idaho State University, Pocatello, ID)

0925 **134** *Pharmacology of a Novel Positive Allosteric Modulator for Neuronal Nicotinic Receptors*, ***ANSHUL PANDYA¹**, **MEAGAN WELTZIN¹**, **BRIAN EDMONDS²**, **MARVIN SCHULTE¹** and **RICHARD GLENNON³** (¹Department of Chemistry and Biochemistry, University of Alaska Fairbanks, Fairbanks, AK; ²Department of Biology and Marine Biology, School of Arts and Science, University of Alaska Southeast, Juneau, AK; ³Department of Medicinal Chemistry, School of Pharmacy, Virginia Commonwealth University, Richmond, VA)

0945 **135** *Iridium Oxide Nanowire Monitors for Protein Detection*, **VINU L. VENKATRAMAN¹**, **RAVIKIRAN K REDDY¹**, **FENGYAN ZHANG²**, **VICTOR HSU²**, **BRUCE ULRICH²** and **SHALINI PRASAD¹** (¹Portland State University, Portland, OR; ²Sharp Labs of America Inc, Camas WA)

1005 **BREAK**

1025 **136** *Activation Induced Cell Death of Antigen Specific CD4 T Lymphocytes and Its Role in the Immune Evasion of Anaplasmosis*, ***SUSHAN HAN**, **JUNZO NORIMINE** and **WENDY BROWN** (Department of Veterinary Microbiology and Pathology, Washington State University, Pullman, WA)

1045 **137** *Inflammation Decreases Lipid Processing by Macrophages during Egg Yolk Peritonitis in the Chicken* (*Gallus gallus domesticus*), ***INGRID CORNAX EDWARDS** and **KIRK C. KLASING** (Department of Animal Science, University of California, Davis, CA)

1105 **138** *Effect of Mucus Viscoelasticity and Surface Adhesivity on Mucus Displacement during Cough in Sickness and Health*, ***ANPALAKI J RAGAVAN¹**, **CAHIT A EVRENSEL^{1,2}** and **PETER KRUMPE^{1,3}** (¹Dept. of Biomedical Engineering, University of Nevada, Reno, NV; ²Department of Mechanical Engineering, University of Nevada, Reno, NV; ³School of Medicine, University of Nevada, Reno, NV)

1125 **139** *Effects of Volcanic Sulfur Dioxide (SO₂) Emissions on Pulmonary Function in Adults*, ***REID HOSHIDE¹**, **ELIZABETH TAM¹**, **JOHN GROVE²**, **BARBARA BROOKS³**, **EDWARD FERNANDEZ¹**, **JENNIFER ORR¹**, **A. JEFF SUTTON⁴**, **TAMAR ELIAS⁴**, **ANDREW GRANDINETTI²**, and **PETER HOLCK²** (Departments of ¹Medicine and ²Public Health Sciences, John A. Burns School of Medicine, University of Hawaii, Honolulu, HI; ³Hawaii State Department of Health; ⁴US Geological Survey, Hawaii National Park, Volcano, HI; ¹BSB 222C, Honolulu, HI)

Joint Session of the Education and the History and Philosophy of Science Sections

Room 23

Monday

10:00 AM – 12:05 PM

Program Organizers: William B.N. Berry (Department of Earth and Planetary Sciences, University of California, Berkeley, CA) and Donald J. McGraw (Chula Vista, CA).

Session Chair: William B.N. Berry

1000 *Inductory Comments*

1005 **140** *Exploring Undergraduate Student Conceptions of Environmental Processes*, ***BRIANA K MCCARTHY** and **KIMBERLY TANNER** (Department of Biology, Science Education Partnership and Assessment Lab, San Francisco State University, San Francisco, CA)

1025 **141** *When Mythic and Theoretic Experiences Becomes Shareable: A Case Study of Scholarship and Learning in the Realm of Post-theoretic Emergences*, ***BHAVNA HARI-**

HARAN¹, COLLEEN SAXEN² and SYED SHARIQ¹
(¹Kozmetsky Global Collaboratory, Stanford University, Stanford, CA; ²School of Public Health, Wright State University, Dayton, OH)

- 1045 142** *Marine Science Graduate Students as Educators*, **ERIN BLACKWOOD** (Romberg Tiburon Center, San Francisco State University, Tiburon, CA)
- 1105 143** *Introducing the Principles of Electromechanical Energy Conversion with a Low-Cost Experiment for Lower-Division Students*, **THOMAS F. SCHUBERT, JR., FRANK G. JACOBITZ, and ERNEST M. KIM** (Department of Engineering, University of San Diego, San Diego, CA)
- 1125 144** *A New Approach to Understanding Technological Knowledge and Innovation*, **J. SCOTT HAUGER** (Desert Research Institute, Reno, NV)
- 1145 145** *Scourge of the Osage from the Hand that Held the Quill: The Astonishing Nineteenth-Century Survival and Success of the Osage Nation while Plagued by Indian Removal*, **ATHENA STEPHANOPOULOS** (Departments of History and Biology, Wichita State University, Wichita, KS)

Wednesday, 18 June 2008

Joint Session of the Agriculture and Horticulture, Anthropology and Archaeology, and Ecology, Organismal Biology and Environmental Science Sections

Room 42
Wednesday
8:00 AM – 11:45 AM

Program Organizers: Michael D. MacNeil (USDA Agricultural Research Service, Fort Keogh Livestock and Range Research Laboratory, Miles City, MT), Walter Carl Hartwig (Touro University College of Osteopathic Medicine, Mare Island, CA), Stephen Frost (Department of Anthropology, University of Oregon, Eugene, OR), Michael Parker (Department of Biology, Southern Oregon University, Ashland, OR), and Richard Van Buskirk (Department of Environmental Studies, Pacific University, Forest Grove, OR).

Session Chair: Michael D. MacNeil

0800 *Introductory Comments*

0805 146 *Understanding Island Poverty and Mainland Richness: Seasonal Avifaunas in Western Mexico*, **HARTMUT S. WALTER** (Department of Geography, University of California, Los Angeles, CA)

0825 147 *Can Northern Anchovies (*Engraulis mordax*) Serve as Paratenic Hosts for the Parasitic Protozoan, *Toxoplasma gondii*?* ***GLOETA N. MASSIE and MICHAEL W. BLACK** (Department of Biological Sciences, California Polytechnic State University, San Luis Obispo, CA)

0845 148 *Down and Dirty: Examining Mercury Levels in Predatory Pelagic Fish and Their Lower Trophic Level Prey as a Function of Depth in Pelagic Ecosystems Surrounding Hawaii*, **C. ANELA CHOY** (Department of Oceanography, University of Hawaii, Honolulu, HI)

0905 149 *Farmland Impact on Seed Dispersal by Flying Foxes in Tropical Dry Forests*, **MATTHEW SCOTT LUSKIN** (Department of Geography, University of California, Los Angeles, CA)

0925 150 *China's Wildman, the Yeren*. **D. JEFFREY MELDRUM** (Department of Biological Sciences, Idaho State University, Pocatello, ID)

0945 BREAK

Session Chair: D. Jeffrey Meldrum

1005 151 *Mitochondrial Markers: A Valuable Tool for the Molecular Taxonomy of Fruit Flies (*Diptera: Tephritidae*)*, ***SAMIA FKI^{1,2}, DAVID S. HAYMER², MOHAMED RABEH HAJLAOU³ and MOHAMED MAKNI¹** (¹Faculté des Sciences Mathématiques, Physiques et Naturelles

CONTRIBUTED ORAL PAPERS

de Tunis Campus Universitaire - 1060 Tunis; ²University of Hawaii at Manoa, Cell and Molecular Biology, Honolulu HI; ³Institut National Agronomique de Tunisie, Rue Hédi Karray 2049 Ariana, Tunis, Tunisie)

1025 **152** *Variation at the DNA Level Within and Between Populations and Species of the Bactrocera dorsalis Species Complex*, ***CHRISTIE K. M. NAEOLE** and **DAVID S. HAYMER** (Department of Cell and Molecular Biology, University of Hawai'i at Manoa, Honolulu, HI)

1045 **153** *Preliminary Evidence for Epistasis between Map-Based QTL Markers Associated with Powdery Mildew Resistance in Hop (*Humulus lupulus* L.)*, ***JOHN A. HENNING**¹, **M. SHAUN TOWNSEND**² and **DAVID H. GENT**¹ (¹USDA-ARS-FSCU, Corvallis, OR; ²Department of Crop & Soil Sciences, Oregon State University, Corvallis, OR)

1105 **154** *Quantitative Trait Loci Affecting Fatty Acid Composition of Beef*. **N.O.M. TSHIPULISO**¹, **L.J. ALEXANDER**², **T.W. GEARY**², **W.M. SNELLING**³, **D.C. RULE**⁴, **J.E. KOLTES**⁵ and **B.E. MOTE**⁵ and ***M.D. MacNEIL**² (¹Agricultural Research Council, Irene, South Africa; ²USDA Agricultural Research Service, Miles City, Montana; ³USDA Agricultural Research Service, Clay Center, Nebraska; ⁴Department of Animal Science, University of Wyoming, Laramie; ⁵Department of Animal Science, Iowa State University, Ames, IA)

1125 **155** *Seven Habits of Effective Transgenic Product Development*, **PAUL D. OLSON** (Pioneer Hi-Bred International, Waimea, Kauai, HI)

Joint Sessions of the Atmospheric and Oceanographic Sciences, the Earth Sciences, and the Industrial Sciences and Technology Sections

Room 41
Wednesday
10:40 AM – 12:00 PM

Program Organizers: Anne A. Sturz (College of Arts and Sciences, Dean's Office, University of San Diego, San Diego, CA), J. Thomas Dutro, Jr. (U.S. Geological Survey, ret., National Museum of Natural History, Washington, D.C.), Henry Oman (Seattle, WA), and Frank Jacobitz (Department of Engineering, University of San Diego, San Diego, CA).

Session Chair: Anne Sturz

1035 *Introductory Comments*

1040 **156** *Enhanced Natural Convection Using Liquid Metals and Alloys during Conjugate Heat Transfer*, ***M. McGARRY**, **C. BONILLA** and **I. METZGER** (University of San Diego, Department of Engineering, San Diego, CA)

1100 **157** *Turbulence in a Velocity Spiral*, **FRANK G. JACOBITZ** (Mechanical Engineering Program, University of San

Diego, San Diego, CA)

1120 **158** *Snow Depth and Lake Ice Thickness Estimations Using GPS*, **MARK JACOBSON** (Montana State University – Billings, Department of Mathematics, Billings, MT)

1140 **159** *Reports on Current Technological Developments for Post-Petroleum Survival*, **HENRY OMAN** (Consulting Engineer, Seattle, WA)

Thursday, 19 June 2008

**Social, Economic and Political
Sciences Section**

Kono Center for English Studies

Thursday

1:15 PM – 2:00 PM

Program Organizer: Carl A. Maida (UCLA Schools of Dentistry and Medicine, University of California, Los Angeles, CA).

Session Chair: Carl A. Maida

1315 *Introductory Comments*

1320 160 *Competent Court Interpreting in Diverse, Low-Case-load Court Systems: Dilemmas and Proposed Solutions*, **MARCELLA ALOHALANI BOIDO**, (Hawaii Certified Court Interpreter and Retinopathy of Prematurity Subproject, Research in Minorities in Institutions Project, University of Hawaii at Hilo, Hilo, HI)

1340 161 *Redefining Security: Nuclear Weapons at the 1986 Constitutional Commission of the Philippines*, **VINCENT K. POLLARD** (Asian Studies Program, University of Hawai'i at Manoa, Honolulu, HI)

IV. CONTRIBUTED POSTERS

193 (number italicized and underlined) indicates a student presentation

*indicates the presenter from among several authors listed

207 poster number is also the abstract number

NOTE TO PRESENTERS: Boards on which to attach poster presentations will be set up under canopies outside of the James M. Taylor II Commons. The poster boards have numbers on them that coincide with the numbers assigned to the posters in this program (see number to the left of the title of each presentation). You are expected to use the appropriately numbered display space for your poster.

Posters should be set up at least 15 minutes prior to the start time of your session. You must be present with your poster for at least one hour during the three and a half hours of the poster session in order to discuss your work. Cards will be available to use in posting the time(s) you will be available. ***If you are a student in competition for an Award of Excellence, you must be present with your poster from 1:30 p.m. to 3:30 p.m. if presenting on Monday or 9:00 a.m. to 11:00 a.m. if presenting on Wednesday in order to give judges the opportunity to review and discuss your work with you.*** Posters should be removed within one-half hour of the end of the session. Presenters assume full responsibility for the security of their poster materials.

*Quick Directory of Sponsoring Societies
and Sections and Their Posters*

<i>society or section</i>	<i>poster numbers</i>
Agriculture and Horticulture	202 – 203
Anthropology and Archaeology	206 – 209
Chemistry and Biochemistry	185 – 190
Earth Science	204 – 205
Ecology, Organismal Biology and Environmental Sciences	174 – 184
Education	162 – 165
General and Interdisciplinary	166 – 167
Health Sciences	168 – 173
Physics and Materials Science	191 – 194
Social, Economic and Political Sciences	210 – 211
Western Society of Crop Science	195 – 201

DONIK² (¹Department of Chemistry & Biochemistry, San Francisco State University, San Francisco, CA; ²California Section, ACS, Walnut Creek, CA)

165 *Involving Students from Pharmacy and Other Professional Schools in Science Education at K-12 Grade Levels*, ***JIM BLANKENSHIP**¹ and **JUDI WILSON**² (¹Department of Physiology and Pharmacology, School of Pharmacy, University of the Pacific, Stockton, CA; ²Office of Science and Special Projects, San Joaquin County Office of Education, Stockton, CA)

GENERAL and INTERDISCIPLINARY

166 *Archeological Residues, Chemical Clues for Deciphering Stone Tool Uses*, **JEFFREY J. ROSENRETER** (Department of Chemistry and Environmental Science, Idaho State University, Pocatello, ID)

167 *Advancing Women Faculty at Utah State: ADVANCE Goals and Outcomes*, **KIM SULLIVAN**¹, **RONDA CALLISTER**², **CHRISTINE HULT**³, ***ROBERT H. SCHMIDT**⁴, **ANN AUSTIN**⁵, **CHRISTINE HAILEY**⁶, and **TRISH KALBAS-SCHMIDT**⁷ (Departments of ¹Biology and ²Management and Human Resources, ³College of Humanities and Social Sciences, Departments of ⁴Environment and Society and ⁵Family, Consumer, and Human Development, ⁶College of Engineering, ⁷ADVANCE Office, Utah State University, Logan, UT)

HEALTH SCIENCES

168 *Looking in All the Wrong Places: HIV Patients Seeking Dental Treatment in the Medical Emergency Care System*, ***CHIOMA KAS-OSOKA**, **KAMI LAURENCE**, **RICHLAND MOSLEY** and **BENJAMIN FREED** (Southern California Regional Dentistry Post-Baccalaureate Program, University of California, Los Angeles, School of Dentistry, Los Angeles, CA)

169 *Complex Dental Treatments For HIV Patients*, ***KARONATUM**, **MARQUITA JACKSON**, **IJEOMA IGWE**, and

Monday, 16 June 2008

POSTER SESSION I

Under the Canopies

Monday

1:00 PM – 4:30 PM

EDUCATION

162 *Wetlands restoration at the University of California field site in Richmond, California*. **WILLIAM B. N. BERRY** (Department of Earth and Planetary Science, University of California, Berkeley, CA)

163 *Using Malama ke `Aina to Teach Science and Math in Hawai`i*, **COLBY KEARNS** [plus K-8 teachers and administrators, and UH Hilo faculty and graduate students] (Tropical Conservation Biology and Environmental Science M.S. Program, University of Hawai`i at Hilo, Hilo, HI)

164 *San Francisco State Chemistry Students Teach at Family Science Nights*, ***MARGARETA SEQUIN**¹ and **ALEX MA-**

BENJAMIN FREED (Southern California Regional Dentistry Post-Baccalaureate Program, University of California, Los Angeles, School of Dentistry, Los Angeles, CA)

170 *Cysteine Protease Inhibitor CSTI is a Candidate Biomarker of Senescent Cells*, **DANIEL KEPPLER¹, ZHANG, JUN³, TEERU BIHANI⁴ and *ATHENA W. LIN²** (¹College of Pharmacy and ²College of Osteopathic Medicine, Touro University, CA; ³UCSF, CA; ⁴Tufts University School of Medicine, MA)

171 *Skin Test Reactivity to Aeroallergens in Patients ≤ 15 yr old Referred to a Hilo Allergy Clinic, 1995-2007: Comparison to Honolulu Patterns in 1966 and 2006*, ***ELIZABETH TAM¹, JOY SAKAI¹, STUART RUSNAK², MARIANNE YOSHIDA¹, B. DYLAN FERN¹ and PHILIP KUO¹** (Departments of ¹Medicine and ²Pediatrics, John A. Burns School of Medicine, University of Hawaii, Honolulu, HI, Office of Student Affairs, JABSOM, Honolulu, HI)

172 *Heart Rate Variability in Adults Exposed to Different Levels of Volcanic Air Pollution*, ***DOMINIC CHOW¹, ANDREW GRANDINETTI², EDWARD FERNANDEZ¹, JENNIFER ORR¹, BARBARA BROOKS³, A. JEFF SUTTON⁴, TAMAR ELIAS⁴, REID HOSHIDE^{1,2} and ELIZABETH TAM¹** (Departments of ¹Medicine and ²Public Health Sciences, John A. Burns School of Medicine, University of Hawaii, Honolulu, HI; ³Hawaii State Department of Health; ⁴US Geological Survey, Hawaii National Park, Volcano, HI; ¹BSB 222C, Honolulu, HI)

173 *New Insights: Leprosy as a New Cure for Atherosclerosis?* **RITA CHUANG** (USC School of Dentistry, Los Angeles, CA)

ECOLOGY, ORGANISMAL BIOLOGY and ENVIRONMENTAL SCIENCES

174 *Polymer Nanocomposite Based Chemiresistive Gas Sensors*, **DIVAKARA MEKA¹, LINDA GEORGE², SHALINI PRASAD¹** (¹Department of Electrical and Computer engineering and ²Department of Environmental Science, Portland State University, Portland, OR)

175 *Quantitative Detection of MTBE-degrading Bacteria with Nanoparticle-DNA Probes*, ***REEF B. HOLLAND, AHJEONG SON and KRASSIMIRA R. HRISTOVA** (Department of Land, Air, and Water Resources, University of California Davis, Davis, CA)

176 *Free-living and Symbiotic Prokaryotes as Inorganic Nitrogen Sources to Chuuk Lagoon (Federated States of Micronesia)*, ***JEANA L. DRAKE and EDWARD J. CARPENTER** (Romberg Tiburon Center for Environmental Studies, San Francisco State University, Tiburon, CA)

177 *Seed Rain and Seed Bank Dynamics after Experimental Removal of Non-Native Species in a Hawaiian Lowland Wet Forest*, **LINDA R. SWEINHART** (Hawaii Community College, Forest TEAM Program, Hilo HI)

178 *Urban Impact on Spider Communities in the San Francisco Presidio*, ***MISHA LEONG, PEDRO MORGADO, THERESA SHELTON, and JOHN HAFERNIK** (Department of Biology, San Francisco State University, San Francisco, CA)

179 *Using Spiders as Bioindicators to Assess Success of Restoration Projects*, ***PEDRO MORGADO, MISHA LEONG, THERESA SHELTON, and JOHN HAFERNIK** (Department of Biology, San Francisco State University, San Francisco, CA)

180 *An assessment of Watershed Health in the Presidio of San Francisco using Aquatic Macroinvertebrate Communities*, **THERESA L. SHELTON** (Department of Biology, San Francisco State University, San Francisco, CA)

181 *Efficacy of Irradiated Sporozoites as a Vaccine for Avian Malaria (Plasmodium relictum)*, ***D. ALLAN HALL¹, CARTER T. ATKINSON² and SUSAN I. JARVI¹** (¹University of Hawaii at Hilo, Biology Department, Hilo HI; ²U.S. Geological Survey, Pacific Island Ecosystems Research Center, Hawaii National Park, HI)

182 *Nitrogen and Carbon Isotopic Assessment of the Discoloration of Laver Cultivated in Ariake Bay, Japan*, **SHINGO UEDA¹, CHUN-SIM U. GO¹, YUN-SEOK KIM¹, YOSHIO KAWAMURA², CHITOSHI MIZOTA³, SHOICHI SHIMOYAMA⁴ and *TAKAO KATASE¹** (¹College of Bioresource Sciences, Nihon University, Kanagawa, Japan; ²Saga Prefectural Ariake Fisheries Research and Development Center, Saga, Japan; ³Faculty of Agriculture, Iwate University, Iwate, Japan; ⁴Faculty of Sciences, Kyushu University, Fukuoka, Japan)

183 *Conservation of the Viola adunca: The Relationship between Native Forbs, Invasive Forbs and Soil Chemistry in the Clatsop Plains*, ***RAYMOND OGLE¹, DYLAN TAYLOR² and RICHARD VAN BUSKIRK¹** (¹Department of Environmental Science, Pacific University, Forest Grove, OR; ²Department of Biology, Pacific University, Forest Grove, OR)

184 *Recreational Use and Impacts Assessment for Richardson's Ocean Park, Hilo, Hawaii*, **COLBY KEARNS** (Keaau, HI)

CHEMISTRY and BIOCHEMISTRY

185 *Three Dimensional Solution Structure for alpha-Conotoxin MII [E11A]: Structure-Function Studies in the Development of Therapeutic Approaches for Parkinson's Disease*. ***MATTHEW TURNER and OWEN McDUGAL** (Department of Chemistry and Biochemistry, Boise State University, Boise, Idaho)

186 *Development of a Passive Diffusive Sampling Device for Assessment of Atrazine in Time-variant Streams of Hawaii*, ***SIMONA VADUVESCU and JON-PIERRE MICHAUD** (Department of Chemistry, University of Hawaii at Hilo, Hilo, HI)

187 *Loss of Antioxidant Gene Function Slows Protein Turnover and Photoinhibition Repair in Cyanobacteria*, ***WENDY K.**

CECIL, BETHANY BORBELY and STEPHEN K. HERBERT (Department of Plant Sciences, University of Wyoming, Laramie WY)

188 *Nle¹AIV Increases Hippocampal Matrix Metalloproteinases in Culture: A Possible Treatment for Alzheimer's Disease*, ***BENJAMIN MORESCO, PAIGE CLAIBORNE, LISA RODIN and MICHAEL SARDINIA** (Department of Biology, Whitworth University, Spokane, WA)

189 *Binding of Serotonergic Ligands to an Acetylcholine-Binding Protein*, ***ANSHUL PANDYA, ABRAHAM HARMS-SMYTH, JESTINA KUSINA, MARVIN SCHULTE** (Department of Chemistry and Biochemistry, University of Alaska Fairbanks, Fairbanks, AK)

190 *Desformylflustrabromine Synthesis and Action on Neuronal Nicotinic Receptors*, ***ANSHUL PANDYA¹, JS KIM², MEAGAN WELTZIN¹, BRIAN EDMONDS², MARVIN SCHULTE¹ and RICHARD GLENNON³** (¹Department of Chemistry and Biochemistry, University of Alaska Fairbanks, Fairbanks, AK; ²Department of Biology and Marine Biology, School of Arts & Science, University of Alaska Southeast, Juneau, AK; ³Department of Medicinal Chemistry, School of Pharmacy, Virginia Commonwealth University, Richmond, VA)

Wednesday, 18 June 2008

POSTER SESSION II

Under the Canopies

Wednesday

8:30 AM – 12:00 PM

PHYSICS and MATERIALS SCIENCE

191 *Morphology Effects on Photocatalytic Water Splitting Activity of Niobate Materials*, ***MICHAEL C. SARAHAN¹, FRANK E. OSTERLOH² and NIGEL D. BROWNING¹** (¹Department of Engineering and Materials Science, University of California, Davis, Davis, CA; ²Department of Chemistry, University of California, Davis, Davis, CA)

192 *Palladium/Polymer Nanocomposite Chemiresistive So₂ Sensor*, ***DIVAKARA MEKA¹, VALMIKANATHAN ONBATTUVELLI², SUNDER ATRE² and SHALINI PRASAD¹** (¹Department of Electrical and Computer Engineering, Portland State University, Portland, OR; ²Department of Industrial and Manufacturing Engineering, Oregon State University, Corvallis, OR)

193 *A Comparative Analysis of Iridium Oxide Nanowires in Electrical Detection of Biochemical Reactions*; ***VINU L. VENKATRAMAN¹, RAVIKIRAN K REDDY¹, FENGYAN ZHANG², VICTOR HSU², DAVID EVANS², BRUCE ULRICH², SHALINI PRASAD¹** (¹Portland State University, Portland, OR; ²Sharp Labs of America Inc, Camas, WA)

194 *Phase Transitions and Ferroelectricity in NaSb₃F₁₀* **R. J. CHRISTIE, *J. MATTHEWS, P. WU, P. PHOTINOS and S. C. ABRAHAMS** (Department of Physics and Engineering, Southern Oregon University, Ashland, OR)

WESTERN SOCIETY of CROP SCIENCE

195 *The Effect of Intercropping Annual Ryegrass with Pinto Beans in Mitigating Iron Deficiency in Calcareous Soils*, ***EMMANUEL OMONDI¹, MIKE RIDENOUR², CINDY RIDENOUR² and RIK SMITH³** (¹Plant Sciences, University of Wyoming, Laramie, WY; ²Meadow Maid Foods, Yoder, WY; ³Department 3354, University of Wyoming, Laramie, WY)

196 *The Legume Integrated Pest Management-Pest Information Platform for Extension and Education (Legume ipm-PIPE) in Idaho*, **HENRY TERAN¹, RAM SAMPANGI², S. KRISHNA MOHAN², HOWARD SCHWARTZ³ and SHREE SINGH⁴** (¹Plant, Soil and Entomological Sciences Department, University of Idaho, Kimberly, ID; ²Plant, Soil and Entomological Sciences Department, University of Idaho, Parma, ID; ³Colorado State University, Fort Collins, CO; ⁴University of Idaho, Kimberly, ID)

197 *Adaptation of Fall Sown Medic, Pea, Vetch, and Lentil to the 2007-08 Climate of the High Plains of Wyoming*, **CHRIS LOEHR, JERRY NACHTMAN, JACK CECIL, STEVE PAISLEY and JAMES KRALL** (Sustainable Agricultural

CONTRIBUTED POSTERS

Research and Extension Center, University of Wyoming, Lingle, WY)

- 198** *Is Fallow Necessary in the Intermediate Precipitation Regions (300-400 mm) of the Pacific Northwest?* **STEPHEN MACHADO** (Oregon State University, Pendleton, OR)

- 199** *Forage Availability Using Agricultural Conservation in North Central Mexico*, **MIGUEL A. MARTINEZ** (CE San Luis, INIFAP, San Luis Potosi, Mexico)

- 200** *Yield and Yield Components Response of Wheat to Zinc Grown in Saline Soil*, ***MOHSEN SEILSEPOUR¹ and ABED FOROUZESH²** (¹Department of Soil and Water, Varamin Agricultural Research Center, Varamin, Iran; ²Department of Agronomy, University of Tehran, Pakdasht, Iran)

- 201** *Comparison of 'Forager' USDA Miscellaneous Class Dry Pea to 'Carnival' Yellow Pea in Terms of Feed Quality and Livestock Feed Performance*, **JACK CECIL, JAMES KRALL, BRET HESS, VENERAND NAYIGHUGU and JERRY NACHTMAN** (Sustainable Agricultural Research and Extension Center, University of Wyoming, Lingle, WY)

AGRICULTURE and HORTICULTURAL SCIENCE

- 202** *The James C. Hageman Sustainable Agriculture Research and Extension Center*, **JACK T. CECIL, JAMES M. KRALL, STEVE PAISLEY, and KELLY T. GREENWALD** (UW SAREC Center, Lingle, WY)

- 203** *Evaluation of Molecular Detection Methods for Ralstonia solanacearum in Hawaiian Soils*. **ANDREW READ¹, THEODORE WILSON² and MICHAEL SHINTAKU¹** (¹College of Agriculture, Forestry and Natural Resources Management, University of Hawaii at Hilo, Hilo, HI; ²University of Colorado Health Sciences Center, Denver, CO)

EARTH SCIENCE

- 204** *A New Species of Cryptantha Found on Pre-Bull Lake Alluvial Fan Deposits from the Big Lost River Valley, Idaho*, **ERIC R. BERGEY¹, RON B. KELLEY², *CARLI M. MORRIS¹, RYAN PANGELINAN², JAY VAN TASSELL¹, and SHELBY WARREN²** (¹Department of Geology, Eastern Oregon University, La Grande, OR; ²Department of Chemistry, Eastern Oregon University, La Grande, OR)

- 205** *The Geology and Geomorphology of the late Miocene Maggie's Vent, a Basaltic Fissure Volcano, Mount Fanny Quadrangle, Northeastern Oregon*, ***ERIC R. BERGEY, CARLI MORRIS, and JAY VAN TASSELL** (Department of Geology, Eastern Oregon University, La Grande, OR)

ANTHROPOLOGY and ARCHAEOLOGY

- 206** *SES Differences Explain Ethnic Disparities in Body Mass, Total Cholesterol and Glucose Levels in Native Hawaiian and Non-Hawaiian School Children in East Hawaii*, ***LENARD ALLEN¹, AKOLEA IOANE², ALEXIA COMSTOCK², DANIEL E. BROWN¹ and LINCOLN GOTSHALK²** (¹Department of Anthropology, University of Hawaii at Hilo, Hilo, HI; ²Department of Kinesiology, University of Hawaii at Hilo, Hilo, HI)

- 207** *Young School Children in East Hawaii Are Heavier Than U.S. Averages: The Effect of Ethnicity*, ***DANIEL E. BROWN¹, MALEA JOEL², LINCOLN GOTSHALK², BRITTANY DOCK² and HAROLD A.T. TEFFT¹** (¹Department of Anthropology, University of Hawaii at Hilo, Hilo, HI; ²Department of Kinesiology and Exercise Science, University of Hawaii at Hilo, Hilo, HI)

- 208** *Ethnic Comparison of Objective and Subjective Hot Flashes in an Ambulatory and Laboratory Setting: The Hilo Women's Health Study*, ***AMBER N. GOODLOE¹, DANIEL E. BROWN¹, PHOEBE S. MILLS¹, LYNN A. MORRISON¹, JENNIFER DUTRA¹ and LYNNETTE L. SIEVERT²** (¹Department of Anthropology, University of Hawaii at Hilo, Hilo, HI; ²Department of Anthropology, University of Massachusetts, Amherst, MA)

- 209** *Plasma Lipid Patterns in Women at Mid-life in a Multiethnic Population: The Hilo Women's Health Study*, ***NICHOLE J. RAHBERG¹, DANIELE BROWN¹, PHOEBE S. MILLS¹, LYNN A. MORRISON¹, KRISTINA McCracken¹ and LYNNETTE L. SIEVERT²**. (¹Department of Anthropology, University of Hawaii at Hilo, Hilo, HI; ²Department of Anthropology, University of Massachusetts, Amherst, MA)

SOCIAL, ECONOMIC and POLITICAL SCIENCES

- 210** *Domestic Violence Offenders' Use of Illicit Drugs and Alcohol as a Risk Factor for Arrest*, **STEPHEN J. MOREWITZ** (Research Division, Stephen J. Morewitz & Associates, IL & CA, Litigation Consultants, San Francisco, CA)

- 211** *Domestic Violence Suspects' Use of Alcohol and Illicit Drug Use and Rape and Sexual Assault in Dating, Intimate Partner, and Acquaintance Relationships*, ***STEPHEN J. MOREWITZ, TIM DUTRA and VIKAS MENGHANI** (California State University, East Bay, Department of Public Affairs & Administration & Student Health Services, & Stephen J. Morewitz, & Associates, IL & CA, San Francisco, CA)

ABSTRACTS

Abstracts are grouped by program.
Not all presenters submitted an abstract.

PUBLIC LECTURES

Sunday Evening Public Lecture

1 *Following the Stars to Hawaii's future: From Canoes to Telescopes and Back*, **KA'IU KIMURA** (Associate Director, The 'Imiloa Center, Hilo, HI)

The mission of the 'Imiloa Center and its vital role in the future of culture and science will be discussed, using examples from the voyaging movement and exploration of the universe.

Monday Noon Public Lecture

2 *Wings Without Borders: Tracking Albatross Across the North Pacific* **DAVID HYRENBACH¹, MICHELLE HESTER², HANNAH NEVINS^{2,3}, CAROL KEIPER², JENNIFER STOCK⁴, JOSH ADAMS⁵ and CHERYL BADUINI⁶** (¹Marine Science, Hawaii Pacific University, Kaneohe, HI 96744; ²Oikonos, P.O. Box 979, Bolinas, CA 92924; ³Moss Landing Marine Laboratories, Moss Landing, CA 95039; ⁴Cordell Bank National Marine Sanctuary, PO Box 159, Olema, CA 94950; ⁵US Geological Survey, Western Ecological Research Center, Moss Landing, CA 95039; ⁶Claremont Colleges, Keck Science Center, Claremont, CA 91711; kyhrenbach@hpu.edu)

The Black-footed Albatross (*Phoebastria nigripes*) and the Laysan Albatross (*Phoebastria immutabilis*) are long-lived seabirds susceptible to bycatch in longline fisheries across the North Pacific Ocean. Although substantial population declines have been projected using fishing effort and bycatch estimates, little is known about the movements and threats faced by individual albatross at-sea, especially during their post-breeding dispersal. We are using satellite tracking to investigate the movements and habitats of these two North Pacific Albatrosses during the breeding season (January – June) and the post-breeding dispersal period (July – September). These species have been tagged at breeding colonies on the NW Hawaiian Islands and at-sea off California. Together, these studies are assembling an improved understanding of the movements, habitats, and threats faced by North Pacific albatrosses. During the breeding season, sympatrically-breeding albatross segregate into different water masses, with vast commuting flights to the Gulf of Alaska / Bering Sea / North Pacific Transition Zone (Laysan) and the California Current shelf / slope regions (Black-footed). Post-breeding albatross range even more widely, venturing into the NW Pacific Ocean and the Bering Sea. These large-scale movements have important implications for the conservation of North Pacific albatrosses, since these species venture across national exclusive economic zones (E.E.Z.s) and regional fishery management organizations (RFMOs), with disregard for jurisdictional boundaries. Additional tagging in 2008 is focusing on the movements of birds breeding from Kure Atoll, the western-most breeding colony in the NW Hawaiian Islands, and their potential overlap with illegal drift-net fisheries operating in the NW Pacific.

Tuesday Evening Public Lecture

3 *A Vision for a More Self-reliant and Sustainable Food Future*, **NANCY REDFEATHER** (Hawaii'i Island Food Summit Coordinator and School Garden Network Coordinator, The Kohala Center, Kamuela, HI) and **WILLIAM B.N. BERRY** (University of California, Berkeley, CA)

In October 2007, over a 2 day period, interested members of the Hawaii'i Island agricultural community and citizens came together in Kona to create a vision for a more self-reliant and sustainable food future. We asked the question, "How Can Hawaii'i Feed Itself?" Self-reliant in food production until the 1940's, today we import around 90% of our food. This talk will explore the challenges and opportunities that are present for agriculture at this time in the areas of environment, economics, education and government policy. Join us for a lively discussion that could occur in any regional area of the U.S. today. Nancy Redfeather will be accompanied by William Berry talking about efforts that the community in Berkeley, California and also the UC Berkeley campus are making towards food self-sufficiency.

Wednesday Noon Public Lecture

4 *The Worldwide Implications of an Impending Varroa Mite Infestation of Honeybees on the Big Island of Hawaii*, **RICHARD SPIEGEL** (Owner, Volcano Island Honey Company, LLC, 46-4013 Puaono Road, Honokaa, HI 96727; richard@volcanoislandhoney.com)

Food shortages and world hunger are growing. Approximately 30 % of food consumed by humans is dependent on honeybees for pollination. It takes approximately 1-3 colonies of honeybees (50,000 worker bees per colony) per acre to adequately pollinate various, honeybee dependent, food mono-crops.

Honeybees worldwide have been decimated by the Varroa mite – one of the most destructive pests of honey bees. The Varroa mite (*Varroa destructor*) is a tiny external parasite which attaches to honey bee larvae and adults and feeds on the bees' hemolymph (blood). Female Varroa mites lay their eggs in honeybee brood cells. Developing mites feed on bee larvae and pupae deforming the wings and bodies of emerging adult bee populations which ultimately reduces pollination needed for fruit and vegetable food production.

The Big Island of Hawaii, one of the most isolated, disease free, queen bee breeding grounds in the world, is currently free of the Varroa mite. Hundreds of thousands of queen bees are bred yearly on the Big Island and shipped worldwide, thus, hundreds of thousands of bee colonies that pollinate food crops worldwide are dependent on the queens raised on the Big Island.

In April 2007 the Varroa mite was discovered on the island of Oahu. The Varroa-free queen breeding environment of the Big Island is now critically endangered. Diminished queen bee production on the Big Island caused by a potential Varroa mite infestation could reduce in the same proportion the number of colonies available to pollinate food crops.

Wednesday Evening AAAS, Pacific Division Presidential Lecture

5 *Philippine Coral Reefs: An Integrative Approach to Research, Education, Animal Husbandry and Public Outreach*, **TERRENCE M. GOSLINER** (California Academy of Sciences, 55 Concourse Drive, San Francisco, CA 94118; tgosliner@calacademy.org)

Beginning with an ongoing program of marine biological research on Philippine coral reefs, the senior leadership of the California Academy of Sciences decided to develop integrated programming around this research focus. The resulting exhibit, programs and interactions can serve as a model for how other institutions can employ scientific research as a foundation for developing educational outreach to large audiences, especially those that do not have a tradition of museum visitation and involvement in conservation activities. Concurrent with the building of new facilities in Golden Gate Park, developing new programs and a desire to reach new and more diverse audiences, the Academy embarked on an ambitious project that united all programmatic divisions of the institution around Philippine coral reefs as one of its major intellectual and programmatic themes. Under the umbrella of explaining evolution, biodiversity and conservation to large and diverse audiences, partnerships were formed and expanded with many organizations and communities including the large Bay Area Filipino community as well as many research, conservation and educational entities in the Philippines. Achieving effective institutional integration and key partnerships are fundamental to making this and other programs successful.

Thursday Evening Public Lecture

6 *Current Affairs at the National Energy Laboratory of Hawaii Authority*, **RONALD BAIRD** (Director, National Energy Laboratory of Hawaii Authority, 73-4460 Queen Kaahumanu Hwy, Kailua-Kona, Hawaii, USA 96740; ronb@nelha.org)

The presentation will review the progress at the National Energy Laboratory of Hawaii Authority (NELHA), made by its aquacultural, water bottling, and energy tenants. Also to be discussed will be NELHA's future vision of itself and its activities in the arena of alternative energy.

SYMPOSIA

Conservation Status of Hawaiian Native Land Snails.

Monday, 8:00 a.m. in the HPA Library

7 *Conservation Status of Hawaii's Severely Endangered Achatinelline Tree Snails*, **MICHAEL G. HADFIELD** and **JENNIFER SAUFLER** (Pacific Biosciences Research Center and Department of Zoology, Rm.152 Edmondson Hall, 2538 McCarthy Mall, University of Hawaii at Manoa, Honolulu, HI 96822; hadfield@hawaii.edu)

In the late 19th century, Hawaiian tree snails (Family Achatinellidae, Subfamily Achatinellinae) were described in terms of incredible abundance on the five major Hawaiian Islands. By the 1950s, their decline had already been noted, a decline so rapid that all species in the O'ahu-endemic genus *Achatinella* were declared "Endangered" in 1982. When the Recovery Plan for the genus was

published (1993), 16 of 42 nominal species were considered likely to be extinct and another 5 "possibly extinct." None of these 21 species has since been found alive, nor have another 10 nominal taxa. We know for certain of the existence of 11 species (perhaps only 9 valid species). Intense field surveys reveal that remaining populations of O'ahu tree snails are rapidly declining. The situation for members of the closely related genus *Partulina* on the other four main Hawaiian Islands is similar, although these islands have been much less intensively surveyed. These declines have led us to major efforts to rear the tree snails in captivity, protected from the predators that are the major cause of decimation in the field. Nine *Achatinella* and 7 *Partulina* species are being propagated at the University of Hawaii. Success with these species varies, indicating that, although their apparent biological needs are identical, the species vary in subtle ways that we have not yet detected. Field efforts include predator enclosures and toxic baiting, again with variable success. Whether or not this spectacular evolutionary radiation of terrestrial gastropods can be sustained remains in question.

8 *The Application of Microsatellite Data in the Study of Population Differentiation and Inbreeding in Achatinella Species*, **BJORN ERICKSON¹** and **MICHAEL HADFIELD²** (¹Department of Animal Science, UC Davis, Davis, CA 95616; ²Kewalo Marine Laboratory, 41 Ahui St., Honolulu, HI 96813; pbe@ucdavis.edu)

Effective conservation management often relies upon accurate knowledge of the population structure and dynamics of the taxon of interest. Such an assessment can be particularly important when determining population priorities or dealing with captive propagation. The native Hawaiian tree snails of the genus *Achatinella*, all of which are endemic to the island of Oahu, are all listed as endangered under the ESA. Extant species live in populations that are often small and isolated, and all but one species are represented in a captive breeding facility at the University of Hawaii at Manoa. Previous genetic work using mitochondrial DNA was able to identify major clades and evolutionarily significant units within one of the species, *A. mustelina*, but could not detect population structure for other species. We isolated eight novel microsatellite markers in order to further clarify genetic structuring within *Achatinella* populations, assess any genetic effects of captive breeding, and assist management efforts. Focusing on *A. sowerbyana*, we measured significant population structure among the three wild populations we sampled, as well as gathering estimates of genetic diversity. These results can be used to direct management decisions for the species, and assist in repopulation efforts involving captive snails.

9 *Simulating Historical Connectivity among Endangered Tree Snail Populations: A Novel Approach to Translocation*, **KEVIN T. HALL** and **MICHAEL G. HADFIELD** (Department of Zoology, University of Hawai'i at Manoa, 2538 McCarthy Mall, EDM 152, Honolulu, Hawai'i, 96822; kthall@hawaii.edu)

Reserves, zoos, and captive breeding programs are becoming increasingly essential to the survival of many native species as the human footprint on planet earth expands. Maintaining an appropriate level of gene flow among such recently fragmented subpopulations, to offset any detriment from unnatural inbreeding, is a crucial component of these conservation strategies. Many recovery plans strictly follow the One-Migrant-Per-Generation Rule, which seeks to achieve a delicate balance between introduced alleles and localized genetic stock. However, the relative risk of outbreeding depression associated with translocation population pairs of vary-

ing genetic divergence has yet to be quantified for any species. With comprehensive demographic data having already been collected on *Achatinella* spp., these endangered snails present both a pressing conservation need and a substantial knowledge base with which to justify a novel attempt at quantifying compatibility. The approach presented here involves using long-term dispersal and reproduction simulations, which are based on empirical data obtained through extensive capture-mark-recapture (CMR) surveys. Simulated estimates of effective migration are then used in a stepping stone model framework to approximate the geographic distance at which gene flow becomes improbable. By correlating this distance with standard metrics of molecular diversity, benchmark levels of genetic variation will be established as a shortcut for determining relatedness (and inferred compatibility) of any population pair. If the 4 populations monitored in this study ultimately provide similar results, efforts to modify these new methods for use with other endangered taxa may be substantiated.

10 What Can Phylogeography Tell Us about Conservation of Hawaiian Land Snails? **BRENDEN S. HOLLAND** and **ROBERT H. COWIE** (Pacific Biosciences Research Center, University of Hawaii, 3050 Maile Way, Gilmore 408, Honolulu, HI 96822; bholland@hawaii.edu)

Because of their high level of endemism, species diversity and conservation status, two of the most important terrestrial snail radiations in the Hawaiian Islands are the tree snails (family Achatinellidae: subfamily Achatinellinae) and the amber snails (family Succineidae). While both families have representatives that are broadly distributed across numerous Pacific archipelagos, each has achieved maximum species diversity in the main Hawaiian Islands, prompting questions regarding the mechanisms and tempos of diversification, and the fundamental differences in range sizes and phylogeographic structure. We have selected two representative species, one from each group, and here present detailed phylogeographic analyses for each, in an effort to evaluate connectivity among populations within a comparative framework using genetic markers. A key characteristic of threatened species with patchy distributions is their propensity to recolonize the patches that are destroyed. Phylogeographic data can assist in the prediction of this ability, as well as provide historical context for the diversification patterns observed in threatened taxa. Using phylogenetic reconstruction and haplotype analyses we can test for population expansions, infer colonization and gene flow history, and assess the relative importance of factors such as dispersal versus vicariance, repeated island colonization, and long-term isolation in driving such unprecedented diversification. Ultimately we hope to understand which factors are most important in generating species diversity on islands, such that management efforts can be focused on maximizing biodiversity.

11 Achatinellid Land Snails of the Pacific Islands: Phylogenetics, Phylogeography and Evolution, **MEAGHAN E. PARKER** (Department of Zoology, University of Hawaii at Manoa, 2538 McCarthy Mall, Edmondson 152, Honolulu, Hawaii 96822; meaghan@hawaii.edu)

The Pacific island orthurethran land-snail family Achatinellidae includes five subfamilies: the endemic Hawaiian subfamilies Achatinellinae and Auriculellinae, and three Pacific-wide subfamilies, Pacificellinae, Tornatellinae and Tornatellidinae. The Achatinellinae, which include the conspicuous and endangered O'ahu tree snails (genus *Achatinella*), exhibit great variability in

shell color and banding pattern and have as a result attracted much scientific interest. The other four subfamilies include smaller, less colorful snails and have consequently attracted less attention. This study addresses the phylogenetic relationships among species in the four non-achatinnelline subfamilies. Partial mitochondrial DNA cytochrome *c* oxidase subunit I (COI) gene sequences have been obtained from 250 individuals from 26 sites on four of the main Hawaiian Islands and from four sites in the Ogasawara Islands of Japan. Using a pupilloid outgroup (also Orthurethra), these preliminary results indicate that: 1) COI is appropriate for resolving species, genera and subfamily relationships (although some of the deeper nodes are not well supported); 2) the four non-achatinnelline subfamilies are supported as monophyletic groups; 3) one species appears to have colonized Ogasawara from Hawaii, either naturally or through human introduction; and 4) many sites in Hawaii harbor more than one species. These data on the four non-achatinnelline subfamilies complement published research on the phylogenetic relationships in the subfamily Achatinellinae, and, with more comprehensive data to be collected in the future, will permit a broad understanding of the evolutionary relationships and biogeography of the entire family.

12 Cryptic Succineid Diversity on the Island of Hawaii: Conservation Implications, **WALLACE M. MEYER III** (University of Hawaii at Maunaloa, Department of Zoology, 2538 Mc Carthy Mall, Edmondson 152, Honolulu, HI, 96822; meyerwal@hawaii.edu)

Correct identification is a primary requirement of biodiversity management. Unfortunately, traditional taxonomies may not summarize true genetic biodiversity, a problem exemplified by the succineid land snails of the island of Hawaii. The species of succineids that occur between the Ola'a portion of Hawaii Volcanoes National Park and the Hilo Forest Reserve were previously thought to belong to two relatively common species, *Succinea cepulla* and *Succinea thaanumi*. However, phylogenetic analysis of partial mitochondrial DNA cytochrome *c* oxidase subunit I sequences, using standard techniques, from 501 individuals from 13 sites suggests that there are at least nine robustly supported monophyletic species-level groups. Distinguishing these taxa in the field is impossible because most shell morphology characters are uninformative, and the taxa are not obligately associated with specific plant types. Of the 501 individuals sampled, 395 (79%) and 75 (15 %) belonged to two widely distributed groups. The other seven are rare (< 3 % each) and have restricted ranges. It is unclear if the rarity of these seven taxa is attributable to their cryptic ecology and behavior, or the timing of sampling. These findings demonstrate that biotic surveys remain critical even in presumed well inventoried areas and well known taxa. Assessment of these snails' conservation status is ongoing, with a goal of providing managers with information to preserve as many distinct lineages as possible.

13 Hawaiian Land Snail Diversity, Its Decline, and Replacement by Aliens, **ROBERT H. COWIE** and **BRENDEN S. HOLLAND** (Pacific Biosciences Research Center, University of Hawaii, 3050 Maile Way, Gilmore 408, Honolulu, HI 96822; bholland@hawaii.edu)

The native Hawaiian land snail fauna is arguably the most diverse in the world for an area the size of the Hawaiian Islands. Not only does it manifest immense diversity, roughly equivalent to that of all of North America, but all except 2-4 of the 752 nomenclaturally valid species are endemic to the archipelago. The na-

tive fauna is disharmonic in the sense that relatively few (10) land snail families are represented compared to continental areas (~30 in North America), though some have diversified far more spectacularly than in most continental faunas. Two families, Achatinellidae and Amastridae, dominate the diversity, with 209 and 325 species, respectively. Four families have 30-60 species, and the remaining four 1-15. There are no native slugs. Extinction has been estimated at 65-90%. The causes include habitat destruction, shell collecting, and predation by and possibly competition with alien species. The major predators are rats and carnivorous snails (primarily *Euglandina rosea*), the latter introduced in ill-conceived biological control efforts intended to control another introduced snail, the giant African snail (*Achatina fulica*). Most native snails are now confined to small fragments of high elevation, relatively unmodified, native habitat. Elsewhere, but increasingly in these native habitats, the fauna is dominated by aliens. The first alien snails (three species) were introduced by early Polynesian settlers, the majority arriving later after Europeans arrived in Hawaii, with the rate increasing over the twentieth century and showing no signs slowing. Currently, there are 38 alien snail/slug species established in Hawaii.

14 Introduction Pathways, Spread and Impacts of Alien Snails and Slugs in Hawaii, KENNETH A. HAYES^{1,2}, ROBERT. H. COWIE¹, WALLACE M. MEYER^{1,2}, CHUONG T. TRAN¹ and JAYNEE R. KIM³ (¹Center for Conservation Research and Training, University of Hawaii at Manoa, Honolulu, HI, 96822; ²Department of Zoology, University of Hawaii at Manoa, Honolulu, HI, 96822; ³Department of Biology, University of Hawaii at Manoa, Honolulu, HI, 96822; khayes@hawaii.edu)

The horticultural trade has been implicated as one of the most important vectors of snails and slugs globally, including in Hawaii. During 2004-2006 we undertook surveys of nurseries, botanical gardens and other similar facilities on the six largest main Hawaiian Islands to document the snail and slug species present. In 2006 we began documenting snail and slug species in non-nursery habitats below 500 m to determine which species are established outside nurseries. In the nurseries we recorded 31 terrestrial species, of which all but two were alien and five had previously not been recorded in Hawaii. There are now 38 established non-native terrestrial snail/slug species recorded in Hawaii. While many have been established for a long time, the non-nursery surveys indicate that some of the newer introductions are spreading quickly and becoming established. In most cases it is not known if these aliens have actively replaced native species or occupied modified habitats from which native snails had already vanished. However, as they spread, especially to higher elevations still occupied by native snails, they may be impacting the native snail fauna, perhaps in some cases via competition for certain components of the litter. Predatory snails, introduced for biocontrol purposes have impacted native snail species via predation. Alien slugs, especially, impact forest regeneration by feeding on native plant seedlings, perhaps thereby modifying native snail habitats. Hawaii has more established alien terrestrial snail and slug species than any other Pacific island or archipelago and the rate of introduction shows no sign of declining.

Missionaries and Museums, Imperialists and Nationalists, State Needs and Cold-War Politics: Anthropology in East and Southeast Asia
Monday, 8:20 a.m. in HPA Room 42

15 Culture Change in Hawai'i Viewed from the Hilo Boarding School Carpentry Shop, LYNNE MACKIN WOLFORTH (Department of Anthropology, University of Hawai'i-Hilo, 200 W. Kawili St., Hilo, HI 96720 USA; Wolforth@hawaii.edu)

The first formal carpentry classes at the Hilo Boarding School (HBS) were not offered until the relatively late date of 1886. The carpentry shop is significant as a thread, drawing together the history of nineteenth and twentieth century Hawai'i. It's programs and student body mirror the events during successive eras at the HBS and mark the changes that occur, first, throughout the lives of Sarah and David Lyman, who dedicated their lives to the Christianization of Hawai'i, second, through the struggles of the late nineteenth century Hawai'i, when Hawai'i teeters between being a sovereign monarchy and an American territory, and finally, to the early twentieth century. It provides a microcosm for looking at the type and extent of culture change during an important segment of history in Hawai'i.

16 Colonial Exemplaries: Parsing the Birth of Evil in Philippine Colonial Ethnography, OONA THOMMES PAREDES (Department of Anthropology, University of Missouri-Columbia, 107 Swallow Hall, Columbia, MO 65211; oonaparedes@yahoo.com)

This paper discusses the role of home-country prejudices in the interaction of Spanish and American colonial agents with different ethnic groups in the Philippines. I explore in turn how this experience has affected the structure of internecine relations in the post-colonial Philippines. For example, the prevalence of a newly concluded *Reconquista* in Spain's national memory at the beginning of Philippine colonization resulted in the almost instantaneous demonization of Muslim groups in the southern Philippines. This was evidenced by the application of a culturally loaded term – *Moro* (Moor) – to all Muslim groups, the accompanying use of incendiary language in colonial correspondence, and a policy of open warfare against such groups. Likewise, the then-recent American experience of the "Indian Wars" seems to have played a role in the romanticizing of tribal minority groups throughout the archipelago, resulting in explicit colonial favoritism towards less obviously Europeanized groups, as well as the cultural devaluation of "majority" Filipinos. To this day, both these experiences colour internal politics, dialogues on Philippine national identity, and the writing of ethnography itself.

17 Towards the Decolonization of Philippine Anthropology: The Role of Ritual in the Formation of Post Colonial Research Agenda, MELANIE TAN UY (Macquarie University, NSW 2109 Australia)

The notion of the 'individual' in ethnographic records of Philippine indigenous groups is rare. This difficulty is even more acute in colonial and missionary records. The significance in examining the notion of the individual among indigenous groups situates tension and conflict as key features of culture rather than stability. Unlike the common theme that the cultural system shapes the individual, this study examines the role of individuals and their use of power to create tradition, prestige, and their cultural representation.

Anthropology now has come to restore the limitations of look-

ing at culture as an intact whole. (Barth 1969, Fischer 1999) Personhood and the category of the person has regained credence and examined in the social context. (Carrithers, Collins, Lukes 1985) Extensive Melanesian studies have helped inform this current theoretical construction. (Strathern 1990, 1987, 1981, 1972; Foster 1999, 1990) In the Philippines, notable ethnographic examples that focus on the individual (Rosaldo 1980) and the prominent space for autonomy Gibson (1986) strongly points to the tension between individual pursuits and community identity.

Among the Ifugao in the Cordillera region in the contemporary period, the lack of record on individuality and the tensions of power within the community may be attributed to the perception and representation of ‘environmental harmony’ that presupposes strong notions of community. The focus on rice culture and the rice terraces have shaped the literature and their self representation as a strongly knit community of Ifugaos since the 1960s. Research such as that of Kwiatkowski (1998) become almost taboo and elicits community disappointment because of the revelation of hunger and the assumption of breakdown of ‘community’.

In spite of the reification of the notion of a singular community, there were attempts by several Cordillera colonial missionaries and administrators to account for the pervasive occurrence of the indifferent and calculating native. (Barton [1938] 1963, Jenista 1987, Scott 1982) These individuals were cited for a range of qualities. On the one end, they were cited for their attitudes of nonchalance, playfulness, indifference that is a source of frustration for the administrators. On the other hand, some figures were commended for their talent and skill that were indicators of their capacity for assimilation. The framework in which the indigenous people were understood was through the historical construction of the lowland-highland context.

The duality of contrasts such as individuality - community was highlighted with the categories of the ‘lowland and highland’ that was constructed in the colonial period. Individuality then is linked as one salient contrasts and feature assumed with lowland Christian groups.

Although the notion of the admirable Ifugao individual was a significant phenomenon historically, there seems to be a lack in understanding in the role of the individual within the cultural context. Rather than solely examine this from the context of lowland and highland politics of representation, this research investigates the notion of individuality within the context of Ifugao social life on two levels: the present and the past.

One of the key findings of my investigation of contemporary mortuary ritual practice was its reproduction of the individual. The success of ritual performance, that is, the conferment of social prestige, rests heavily on the social interpretation and construction of the idealized Ifugao individual. The current tensions of power and prestige building can also be used to recover an autonomy lost in the colonial historical accounts of the Ifugao. The characterization of the calculating native, the indifferent or the playful can then be reversed to recapture an alternate construction of Ifugao ethnicity in which the colonial administrators and missionaries play merely a secondary role.

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18 Nation-Building and Anthropology during the Republican Period: David Crockett Graham and the Missionary Anthropological Enterprise in Western Sichuan (1922-1945), ANDRES RODRIGUEZ (University of Oxford, c/o Carmen Luz Fernandois, 10912 SW 72nd Street, Unit 311Miami , FL 33173 USA; andres.rodriguez@wolfson.ox.ac.uk)

Missionaries working with ethnic minorities in China’s south-western borderlands have usually been depicted as agents of a Christian ‘civilizing project’ at odds with that of the Chinese nation-state. Accused of fostering ethnic identities that challenged the hegemony of the Han Chinese the role played by missionary anthropologists has usually been simplified within narratives of imperialist aggression in Chinese historiography. This paper will re-examine this relationship by analyzing the anthropological works of missionaries in western Sichuan carried out under the auspices of the Chengdu based West China Border Research Society. Fuelled by both a scientific and religious interest these missionaries played an important role in the development of ethnography in Western Sichuan at a time when Chinese boundaries and its ethnic population were being contested by the Chinese and foreign states.

Foremost among these missionaries was David Crockett Graham, an American Baptist missionary who played a pioneering role in the development of Sichuanese ethnography through his personal relationship with ethnic minorities and the foundation of South-western China’s first ethnographic museum. This paper will examine the ways in which Graham’s work reflected not only the strong influence of global paradigms of anthropology but also the ways in which it sought to accommodate and interact with the discourses of Chinese nationalism during this period.

19 Korean War anthropology in Japanese, American and Korean Politics, ROBERT OPPENHEIM (Department of Asian Studies, University of Texas at Austin, University Station G9300, Austin, TX 78712 USA; rmo@mail.utexas.edu)

This paper considers the projects of Korean War anthropology – surveys of the effects of the occupation of South Korea – in terms of its varied connections with Japanese, American, and Korean politics. I find the form and personnel of Korean War research to have been mediated by the American occupation of Japan and research questions posed in the context of its governance. Korean War research, however, was simultaneously a turning point for questions of the relation of “long-term” research to military purpose within the American academic-military complex of the time. Finally, assumptions and research questions behind Korean War research was

also connected with the specific character that anti-communism took as a project of the early Republic of Korea state. This paper contributes to an understanding of the complexity of the fields within international social science research has been located.

20 *Mixed-Blood and Adaptability: Japanese Racial Science, 1930s-1970s*, **TORU SAKANO** (College of Economics, Nihon University, 1-3-2 Misakicho, Chiyoda-ku, Tokyo 101-8360 JAPAN; tsakano@titan.ocn.ne.jp)

Recent trends in historical study have been vigorously pursuing the investigation of racism in relation to the modern political system in Western countries. Compared with it, many Japanese think that their society has never been concerned with racism. Needless to say, this idea is not correct. However, the examination of racism in modern Japan has just begun. So, I want to take notice of race studies in Japanese anthropology and medicine during the period, 1930's -1970's and think about the issues of "race" (in Japanese "Jinsyu") in modern Japanese society.

I will discuss the following topics in the symposium: (1) the studies about mixed blood between Japanese and other "races," and (2) the studies about the "racial" differences of adaptability to environment. The aim of this paper is to examine the continuity/discontinuity of racial studies between wartime and post-war Japan.

21 *Reap and Sow: Scientific Investigations of the Ryukyu Islands Under the United States Military Control*, **HIDEKAZU SENSUI** (Department of Business Administration, Kanagawa University, 2946 Tsuchiya, Hiratsuka, Kanagawa 239-1293 JAPAN; email: sensui-hidekazu@kanagawa-u.ac.jp)

Scientific Investigations of the Ryukyu Islands was a series of research projects supported by Department of the Army funds under Pacific Science Board administration. More than thirty projects were in operation during the early 1950s, when the Islands became decisively separated from mainland Japan and came under the lasting American control. Anthropologists and biologists were sent not only to fill a gap in scientific knowledge of this formerly closed Japanese territory, but also to supply practical and useful information for which the occupation forces were in pressing need.

The National Archives' (United States National Archives and Records Administration) recent disclosure of materials concerning the U. S. Civil Administration of the Ryukyu Islands (USCAR) has enabled historians to shed light on this long-neglected aspect of the occupation. A preliminary examination reveals that correspondence, memoranda and budget reports vividly convey discord between the academics and the military, which eventually made the projects short-lived. Though there were different interests, the two parties did share some similar concerns on the condition of the Islands and their joint mission to counter its deterioration, find a way to placate social unease and the continued enforcement of the quarantine. However, the Islanders were frustrated over the prioritization of flexible American governance, and the pest infestation of their sweet potato crops was a result of American goods that had been brought into the Islands. Ironically, the scientists and the military were tackling some of the very problems that had been created by the American presence on the Islands.

22 *Colonial Surveillance, Postcolonial Controls and the Problematic Place of Anthropologists: Studying Vietnamese Cao daism in a Global Context*, **JANET HOSKINS** (Department of Anthropology, University of Southern California, GFS 131 University Park Cam-

pus, Los Angeles, CA 90089-1692 USA; jhoskins@usc.edu)

This paper explores the ethical, methodological and epistemological challenges of doing fieldwork on a politically sensitive topic, which draws on a painful history of American military intervention, the ways in which the process of decolonization was disrupted by Cold War conflicts and the spiritual commitments of displaced refugees and "new immigrants" in California.

Cao daism is a syncretist religion that was also the largest mass movement in French Indochina, gathering 2-3 million followers in the early 20th century. During the colonial period, it was the subject of intense surveillance because of its ties to the nationalist struggle for independence. After the French defeat in 1954, Cao daist leaders struggled to remain independent of Cold War divisions and opposed the partition of Vietnam. But neutrality became virtually impossible and religious leaders who argued they supported peace and unification were arrested or exiled. After 1975, many religious centers were closed down in Vietnam and it took a couple of decades for Cao daist congregations to gather and build new temples in the diaspora. In the last 10 years this religion was to a certain extent re-born both in Vietnam and overseas, and contacts between the homeland and overseas congregations were renewed.

I examine the writings and ritual practices of Cao daists in Vietnam and in California, France and Australia to explore how this effort to unite the "gods of Asia" and the "gods of Europe" became a global religion, and has re-emerged in the 21st century. The place of the anthropologist among historians, religious writers and political scientists is assessed, the value of archival research is related to that of ethnography, and the idea of a "multi-sited research project" is critically evaluated.

23 *Nationalism in Vietnam's Post-Colonial Anthropology*, **CHINH VAN NGUYEN** (Department of Anthropology, Hanoi National University, 336 Nguyen Trai Road, Thanh Xuan District, Hanoi VIETNAM; vanchinh1026@vnn.vn)

Vietnam's post-colonial anthropology has been developed on the basis of the colonial anthropological legacy, the foundation of Confucian thoughts and the receipt of Soviet school of ethnology. Like every discipline of social sciences and humanities in modern Vietnam, the post-colonial anthropology is placed under the close control of the State. Its mission is to serve political tasks. Anthropologists have little space for their own anthropological imagination and personal creation. My main concerns in this paper is about the question of how anthropological knowledge was produced in post-colonial Vietnam and what factors influenced its way of interpreting the culture. In seeking answers to this question, I would suggest that in the context of post-colonial Vietnam, the nationalist approach is likely encouraged by the country's political culture, and in fact, this approach dominated Vietnamese post-colonial anthropology.

During the American war in Vietnam, the focus of Vietnamese anthropology was aimed at finding the evidences of a long historical culture with its distinguished identity. When the border conflict between China and Vietnam happened during the 1970s and early 1980s, Vietnamese anthropologists concentrated their efforts on the Southeast Asian model of the Vietnamese culture which was believed to be different from the (northern) Chinese one. Now, with the country entering into the era of world integration, such questions as "who we are," "what is our own cultural identity," and "how our culture can be preserved in facing globalization," are often raised in the state media discourse. Once again, cultural anthropologists found their chance. Instead of searching for Vietnamese cultural

roots in relation with the ancient thoughts of Confucianism, Buddhism and Taoism, which are deemed the “imported thoughts,” the Vietnamese researchers have been searching for “indigenous foundations” which can represent the Vietnamese cultural identity.

24 Museums: Anthropology and the Work of Representing Culture in Contemporary Vietnam, MARGARET BARNHILL BODEMER (Department of Anthropology, University of Hawai’i, Manoa, 2424 Maile Way, Saunders 345, Honolulu, HI 96822 USA; Bodemer@hawaii.edu)

There are currently at least 120 museums in Vietnam, a nation of over 88 million people, and, according to current plans, the number of museums will double in the next 15 years. Nearly every one of these museums includes a room or section devoted to people and culture (dan toc), the content of which is the domain of anthropologists (dan toc hoc) in Vietnam. In this paper I explore the role of museums and anthropology in contemporary Vietnamese society, based on research at the Vietnam Museum of Ethnology in Hanoi, the Vietnam Museum of Ethnic Cultures in Thai Nguyen, as well as several other key museums in Vietnam. I consider how these museums balance and negotiate the complex demands of tourism, education, research and government policy. Through participant observation and interviews at these museums, I illustrate how personal experiences and Vietnam’s historical and political contexts affect museum practices and the very idea of what a museum should be. In fact, museums in Vietnam do not exist as isolated institutions but rather, should be seen as operating within the larger social and political contexts of national discourse on the nation, the people, and the culture of modern Vietnam.

**New Humanities and Science Convergences:
Paradise Lost and...Recoverable?
Monday, 8:30 a.m. in HPA Room 21**

25 Science and Art: A Happy Symbiosis, SHOSHANAH DUBINER (Studio Viva, LLC, 1330 Evan Lane, Ashland, Oregon, 97520; cybermusing@earthlink.net)

What can science and art do together to restore Paradise? Human beings, as species *Homo aestheticus* (ethologist Ellen Dissanayake’s term), have evolved to require beauty and meaning in their lives. This paper argues that creating a meaningful response in art to the beauty of nature metaphorically re-creates Paradise.

Countless scientists describe the “enchantment” of nature. Training in drawing and painting not only allowed scientists like zoologist Ernst Haeckel and histologist Santiago Ramón y Cajal to communicate their observations and aesthetic responses both to scientists and the general public, but were essential to their own creative thinking. Others, like Einstein and Tesla, had heightened powers of visualization and mental play upon which their great insights depended.

Science, in turn, continues to influence and inspire artists. The paper will show how selected contemporary artists consciously use thoughts, artifacts, and tools of cosmology, evolutionary biology, microbiology, geology, cybernetics, ecology, etc., in their art. In my own art, D’Arcy Thompson’s *On Growth and Form* led to my artistic exploration of morphology and patterns in nature; a cell biology class inspired paintings that depict life as what microbiologist Lynn Margulis calls “planetary exuberance.”

Through illustrative examples, this paper suggests that practic-

ing seemingly opposing skill sets – observation/logic and image-making/intuition – increases creativity in both art and science and thereby brings us all closer to Paradise.

26 Past and Future Malarial Landscapes in California’s Great Central Valley, BARBARA YABLON MAIDA (Department of Geography, 1255 Bunche Hall, University of California, Los Angeles, CA 90095; bymaida@ucla.edu)

Whenever Europeans have moved into new environments, they have perceived the land as potentially threatening; this sense of physical vulnerability was part of the process of adjusting, both psychologically and materially, to new landscapes. California’s Central Valley was a place with neither a landscape nor a climate conducive to permanent settlement. Health is one way of linking California’s regional history with the larger narrative of European settlement. The most fertile and well-watered lands were also those with the greatest potential threat to health.

Settlers anxious about health issues were part of the environmental history of the western United States. Anglo-Americans did not see the landscape as a separate entity so much as something that impinged on their own wellbeing. Central Valley immigrants were aware of an environment in transformation; one that prompted concerns over health and illness. Mid-19th century topographers of the Sacramento region described the tulelands as a continual source of pestilence, nurseries of disease — the complete opposite of the “perfectly salubrious” region advertised in the East. As settlement and irrigation expanded, new sources of miasma formed; the soil was poorly drained and mud puddles having an acidic pH attracted anopheline mosquitoes.

The case of malaria in the Central Valley exposes the disjuncture between cultural and physical scientific perspectives, as medical data is inconclusive. Though malaria is most ubiquitous in Asia and Africa, the Americas are at risk of future malarial prevalence, through environmental pressures of growth and changes in land use, exacerbated by changing climate.

27 City-Building and Regionalism: Contrasting Images of Development in Early Modern Los Angeles and the Owens Valley, CARL A. MAIDA (University of California, 63-037 Center for the Health Sciences, Los Angeles, CA 90095; cmaida@ucla.edu)

Since the 1890s, Americans had steadily migrated to Los Angeles with diverse sets of expectations. Those seeking land, wealth, and mental and bodily cure encountered a city establishment that consciously upheld a Victorian ideal of civic life, as most city dwellings were single-family houses, a feature essential to a late Victorian family-centered existence. An “extended city” developed as an escape from the industrial metropolis that had defined urban form at the turn of the twentieth century. Unlike Eastern and Midwestern cities modeled on European urbanism, Los Angeles was designed as a “new American city” of suburban villages linked by a network of trolleys. The early modern city relied extensively upon mass motorization for its pattern of settlement, its privatized commuting patterns and its low-density “automobile suburbs.” In Los Angeles, one encounters “natural” realms – beaches, mountains, and deserts that promote private experience. These contrast with the “civic” or public realms of plazas, town squares, and boulevards that organize public life in older European and American cities. Because of the city’s explosive growth with the concomitant need for water, a new form of regional politics and a concern for local autonomy emerged in the Owens Valley, much of which belongs to Los Angeles that for decades has transported valley water 240 miles southward to supply

metropolitan residents. The regionalist spirit inspired many citizens to organize on behalf of local control of water resources. The Owens Valley struggle is exemplary of the ongoing conflict between an expansionist urban region and local society.

28 *The Rural Idyll: Counter-Urbanization and the North American Attempt to Recover Rural Paradise* **SUSAN J. MULLEY** (Department of Landscape Architecture, College of Environmental Design, CSU-Pomona, 3801 West Temple Ave, Pomona CA 91768 sjmulley@csupomona.edu)

Rural landscapes in vernacular culture encompass a pastoral iconography evoked by perceptions of the rural idyll. This study illustrates that pastoral iconography has affective or emotive dimensions evoked by both personal nostalgia related to specific landscape types and by cultural nostalgia for the pastoral icon. This paper develops the frameworks necessary to explain vernacular understanding of rural landscapes as the most desirable landscape typology. In the political and social environment of creeping urbanization and exploitive threats to the integrity of the rural environment, non-exploitive natural capital increases in value and becomes an important consideration in the creation of social capital for rural residents. The pastoral ideal offers stability, a sense of belonging and an escape from the evils and dangers of the city. However, in areas of significant ex-urban migration, the movement of population into rural areas destroys the very character of the rural environment that exurbanites seek. Open space, privacy, lack of traffic, safety and low human to land ratio are all threatened by exodus to the countryside. However, exurban residents are relocating in search of a common ideal of paradise. Deeply held cultural views associated with rural iconographic identity, and emotional attachments which span both locale and individual identity are powerful factors in the North American construction of rural ‘paradise found’.

29 *Ecological Awareness in American Landscape Art: Depicting and Repairing the American Wasteland*, **ROBERT LOUIS CHIANESE** (Department of English, 18111 Nordhoff Street, California State University, Northridge, CA 91330-8428; robert.chianese@csun.edu)

Some nineteenth-century American landscape artists developed “pre-ecological consciousness” and depicted the destruction of American wilderness. They rejected the “New Eden” and “Manifest Destiny” ideologies of their times and evolved a countervailing ideology of the American Wasteland. For them, leveling the forest for settlement and even for a commercially productive Garden produced eco-catastrophe.

These contrary energies in the beginnings of the American landscape tradition—for development or for preservation—fuel a contemporary movement in landscape art today of revising or “reconstructing” many older, classic landscape works of art that extol development. Such modern reconstructions deliberately reconfigure the imagery and values implicit in earlier works, both deconstructing and reconstructing earlier American painting, shifting attention from mythic assumptions to environmental actualities.

At the same time, postmodern landscape artists make their reconstructions of earlier landscape art a way of problematizing landscape art itself. They call into question the very construction of “nature” by human culture and let this serve as a form of environmental consciousness-raising.

Finally, other contemporary artists actually work to reclaim degraded land and make art that literally restores wilderness and creates

eco-preserves out of wastelands. These “eco-artists” frame a new kind of environmental beauty in art and once again revamp the tradition of American landscape art as they draw inspiration from it.

This paper includes a slide presentation of illustrative examples of each of the periods, movements, and artists in American Landscape art that depict and repair the American Wasteland.

Current Research Perspectives on Palmyra Atoll, A Remote Central Pacific Outpost for Biodiversity Monday, 8:30 a.m. in HPA Gates Performing Arts Center

30 *Integrated Ecosystem Observations of Coral Reef Ecosystems of the U.S. Pacific Islands with a Focus on Palmyra and Kingman Atolls*, **RUSSELL E. BRAINARD¹**, **JEAN KENYON²**, **RONALD HOEKE²**, **MARC LAMMERS²**, **BENJAMIN RICHARDS²**, **CRISTI RICHARDS²**, **ROBERT SCHROEDER²**, **BERNARDO VARGAS-ANGEL²**, **SUSAN VOGT²** and **PETE VROOM²** (¹NOAA, Pacific Islands Fisheries Science Center (PIFSC), Coral Reef Ecosystem Division, 1601 Kapiolani Boulevard, Suite 1110, Honolulu, HI, U.S.A. 96814; Rusty.Brainard@noaa.gov; ²University of Hawaii, Joint Institute for Marine and Atmospheric Research and NOAA PIFSC Coral Reef Ecosystem Division, 1601 Kapiolani Boulevard, Suite 1110, Honolulu, HI, 96814)

In an effort to provide scientific information needed to support ecosystem approaches to conservation and management, NOAA has been implementing the Pacific Reef Assessment and Monitoring Program (RAMP): an integrated ecosystem observing system to map, assess, and monitor the coral reef ecosystems across the Pacific Islands region. Pacific RAMP has conducted baseline assessments and long-term monitoring around 50 reef ecosystems in the Hawaiian and Marianas Archipelagos, American Samoa, and the remote U.S. Line and Phoenix Islands. Monitoring efforts include: rapid ecological assessments of corals, other invertebrates, fish, and algae; spatial towed-diver surveys of benthic composition and the abundance of ecologically and economically important macroinvertebrates and large fish; benthic habitat mapping; passive acoustic monitoring of biotic and anthropogenic sounds; and oceanographic and water quality monitoring using shipboard surveys and moored instrument arrays. Multidisciplinary ecosystem observations were initiated around Palmyra and Kingman Atolls in 2000, with follow-on surveys completed in 2001, 2002, 2004, 2006, and 2008. Integrated ecosystem assessments of these two atolls are being compiled as part of a comprehensive *Coral Reef Ecosystem Monitoring Report for the Pacific Remote Island Areas: 2000–2008*, which will describe the spatial and temporal patterns of the reef ecosystems around these two remote atolls. Use of consistent multidisciplinary methods allows an unprecedented opportunity to perform biogeographic and ecological comparative analyses across diverse ecological, environmental, and socioeconomic gradients. Patterns of variability of reef fish biomass, coral cover and disease prevalence, algal diversity, acoustic energy, oceanographic conditions, and other reef metrics will be presented.

31 *Biogeography of Corals at Palmyra and other Central Pacific Atolls and Reef Islets*, **JAMES E. MARAGOS** (Pacific Remote Islands National Wildlife Refuge Complex, U.S. Fish and Wildlife Service, 300 Ala Moana Blvd., Box 50167, Honolulu, HI 96850; jim_maragos@fws.gov)

Shallow water corals and other cnidarians have been inven-

toried at 12 central Pacific atolls and reef islands: Kingman Reef, Baker, Howland, Jarvis, Swains and Teraina Islands; and Johnston, Kanton, Kiritimati, Palmyra, Rose, and Tabuaeran Atolls. Large human settlements are established at Kiritimati, Tabuaeran, and Teraina while the rest remain uninhabited or sparsely inhabited. The corals within this cluster are part of a Central Pacific biogeographic province that includes atolls and reef islands in the Tokelau, Tuvalu, Phoenix, Line, Northern Cook and Eastern Tuamotu. On the basis of coral distributions, the neighboring biogeographic coral provinces in the tropical Pacific are the Hawaiian Islands to the north, the northwest Pacific (Micronesia), the Southwest Pacific (Melanesia and western Polynesia), and the southeastern Pacific (eastern Polynesia).

Generally the larger Central Pacific atolls support greater variety of corals and anemones while more geographically isolated and smaller islands and atolls support lower variety of corals. Coral diversity is higher on atolls and islands within the path of the eastward moving Equatorial Countercurrent. Endemism is low and faunal homogeneity higher within the group except for the three atolls closest to the Hawaiian Islands. Historically the 12 are also important for the dispersal of coral species from the biologically rich northwestern and southwestern Pacific towards the southeastern Pacific.

32 Biodiversity and Biogeography of the Fishes of Palmyra Atoll, BRUCE C. MUNDY, EDWARD E. DEMARTINI, FRANK A. PARRISH, BRIAN J. ZGLICZYNSKI, and ROBERT E. SCHROEDER (NOAA Pacific Islands Fisheries Science Center, 2570 Dole St., Honolulu, HI 66822; Bruce.Mundy@noaa.gov)

The 594 fish taxa recorded from Palmyra Atoll include 383 shorefishes, 22 epipelagic taxa, 162 meso- or bathypelagic taxa, and 27 deepwater demersal taxa. The shorefish species number is congruent with expectations for an island of Palmyra's size, isolation, and distance from the Indo-Pacific center of marine biodiversity. The shorefish fauna is dominated by Indo-Pacific species (ca. 72%). A smaller Pacific Ocean endemic component (22%) includes 6% that are Pacific tectonic plate endemics. Among the plate endemics, two range from Samoa to French Polynesia, six are known only from Line Islands and French Polynesia, and one is known only from the Line, Phoenix, and northern Cook Islands. Only one of the six Line and Phoenix Islands endemic species was recorded at Palmyra. There is low similarity to the fish fauna of the Hawaiian Islands. One introduced species (*Omobranchus obliquus*) was recorded. Among the epipelagic species, 55% were circumglobal species and the remaining 45% were Indo-Pacific. Mesopelagic taxa were predominately circumglobal (59%) or Indo-Pacific (19%), but seven (4%) were eastern tropical Pacific endemics that have the atoll at their western range limits. The vertically migrating fauna at the atoll's slopes consists largely of stomiiform species. Of the deepwater demersal fish taxa, only 37% were identifiable to species. Half of those were Pacific endemic species, 40% were circumglobal, and 10% were Indo-Pacific. Knowledge of the deepwater fauna of central Pacific islands, including Palmyra, is extremely poor, having improved little since the first circumglobal oceanographic expedition in the 1870s.

33 Examination of Algal Diversity and Benthic Community Structure at Palmyra Atoll, U.S. Line Islands, CRISTI L. BRAUN¹, JENNIFER E. SMITH² and PETER S. VROOM¹ (¹Joint Institute for Marine and Atmospheric Research, University of Hawai'i

and Pacific Islands Fisheries Science Center (PIFSC), Coral Reef Ecosystem Division (CRED), 1125B Ala Moana Blvd., Honolulu, HI 96814; ²NCEAS, University of California, Santa Barbara, 725 State St. Suite 300, Santa Barbara CA 93101; cristi.richards@noaa.gov)

Palmyra Atoll National Wildlife Refuge is the second largest atoll under U.S. jurisdiction in the Pacific Ocean. Until recently little was known about algal diversity and benthic community structure on Palmyra reefs aside from algal species lists generated during 1955 and 1966 expeditions. Since 2001 the NOAA, PIFSC, Coral Reef Ecosystem Division has conducted rapid ecological assessment surveys biennially to monitor and gather baseline data for all U.S. jurisdiction Pacific reefs. Additionally academics with Scripps Institution of Oceanography have been documenting benthic community structure on reefs across Palmyra since 2005. This study reports on the current state of knowledge for algal species richness, diversity and benthic community composition across the atoll. Spatial and temporal trends of benthic community structure from 2004-2008 will be discussed. *Chondria*, *Microdictyon*, *Heterosiphonia*, *Halimeda*, and *Dasya* are among the 5 most common algal genera recorded from over 75% of sampled sites. A preliminary genus-level Cheney ratio of 15, above the 6.0 "tropical threshold" indicates a tropical flora with diversity of Rhodophytes exceeding other algal groups. Benthic community composition on the reef slope (10 m depth) is dominated by reef builders (coral and crustose coralline algae) that cover >50% of the benthos, with turf algae, macroalgae (including *Halimeda*), soft corals, and other invertebrates covering the rest. Reefs of Palmyra appear healthy, being devoid of direct human impacts. Building comprehensive algal species lists and continuing benthic monitoring will allow reef managers to detect ecosystem change and identify introduced species.

34 Ecology And Predator-Prey Dynamics Of Fishes At Palmyra Atoll NWR, ALAN FRIEDLANDER¹, JENNIFER CASELLE², CHRISTOPHER G. LOWE³ and YANNIS PAPASTAMATIIOU⁴ (¹NOAA/NOS Biogeography Branch and the Oceanic Institute, Makapu'u Point/41-202 Kalaniana'ole Hwy Waimanalo, HI 96795; ²Marine Science Institute, University of California Santa Barbara, Santa Barbara CA 93106; ³Dept. Biological Sciences, California State University Long Beach, 1250 Bellflower Blvd., Long Beach CA 90840; ⁴Department of Zoology, Hawaii Institute of Marine Biology, University of Hawaii at Manoa, 46-007 Lilipuna Rd, Kaneohe, HI 96744; afriedlander@oceanicinstitute.org)

We have been conducting research into the population dynamics of bonefish and associated species at Palmyra Atoll National Wildlife Refuge since 2002. Results show that the population of bonefish at Palmyra is likely comprised of a single species (*Albula vulpes*) and the population size is much larger than previously estimated (10,000s-100,000s). Comprehensive logbook and tagging programs for recreational anglers between 2002 and 2004 showed large variations in catch rates by location, angler expertise, and time of year but no consistent trends over time. Basic information on age, growth, feeding habitats, reproduction, recruitment, genetics, and blood chemistry patterns of bonefish will be presented along with more detailed information on movement patterns of bonefish and blacktip reef sharks (*Carcharhinus melanopterus*), both important components of the lagoon community at Palmyra. Using acoustic telemetry, we found that blacktip reef sharks had relatively small home ranges over a time-scale of days to weeks, and showed strong site fidelity to sand-flat ledges within the west lagoon over

a 3 year period. Fractal analysis of these movements indicate that blacktips may be patrolling the ledges to intercept prey species that may move to and from the lagoons and sand flats with the flooding and receding tide. Sharks also showed evidence of diel and tidal movements, and utilized certain regions of the west lagoon disproportionately. Bonefish, on the other hand, appear to be using the entire lagoon over a small number of tidal cycles. These findings have provided us with a better understanding of the ecology and species interactions that are occurring in the lagoons at Palmyra, which may ultimately lead to better management of resources both within the Refuge and at other coral reef ecosystems.

35 *Palmyra and the Line Islands as a Laboratory for Marine Conservation Research*, **STUART A. SANDIN** (Scripps Institution of Oceanography)

Most insights into the ecology of coral reef communities are derived from studies of anthropogenically-impacted systems. As such, we lack both a fundamental understanding of reef functioning without human disturbance and an ecological baseline for marine conservation and restoration efforts. To address this lacking, we quantified the biodiversity and trophic structure of the coral reef communities, from microbes to sharks, around Palmyra and three of the neighboring Line Islands in the central Pacific. Within one biogeographic region, these islands span a broad range of anthropogenic disturbance, from intense fishing pressure and nutrient input to essentially pristine with no historic human influence.

Anthropogenic disturbance affected the reef ecosystems in two principal ways. (i) Local human impacts, in particular fishing, directly reduced the total biomass and changed the trophic structure of the fish community, and indirectly increased algal biomass and incidence of coral disease. (ii) Global human impacts, in particular climate change, appear to have reached even these remote reefs causing coral mortality. However, we found that the ability of reefs to recover from global warming events is increased through the reduction of local impacts. The information synthesized in this multidisciplinary study will guide the management of both healthy and degraded coral reef systems.

36 *Behavioral Effects of Fishing on Coral Reefs*, **ELIZABETH M.P. MADIN¹, STEVEN D. GAINES^{1,2}, and ROBERT R. WARNER¹** (¹Department of Ecology, Evolution and Marine Biology, University of California, Santa Barbara, CA 93106; ²Marine Science Institute, University of California, Santa Barbara, CA 93106; madin@lifesci.ucsb.edu)

The community-level consequences of predator removal and the mechanisms behind them are poorly understood in coral reef systems. However, the majority of coral reefs globally experience some degree of fishing pressure, much of which is focused on predatory fishes. To date, most research has been focused on changes in the density of prey species as the principal mechanism causing the effects of fishing to cascade through coral reef communities. However, an entirely different pathway exists by which fishing, and therefore predator removal, could fundamentally alter marine ecosystems: changes in the behavior of prey species. The Line Islands represent a gradient in human influence that ranges from nearly pristine reefs to ones with key upper trophic levels functionally removed. We used this system to ask whether prey fishes behave differently over a gradient of fishing intensity and thus predator biomass. We quantified behaviors of a suite of prey fishes spanning different functional groups, focusing on behaviors that are subject to a

risk-reward trade-off and play a potentially important role in mediating benthic community structure. We found that these prey fishes exhibit demonstrable shifts in behavior over the gradient of predator biomass. In particular, patterns of movement over feeding areas appear to be constrained by the level of predation risk imposed by predators. Our findings demonstrate that fishing on coral reefs may strongly affect prey species' behavior, and further suggest that these behavioral responses may have important implications for benthic community structure in ways not predicted from traditional density-mediated trophic cascade models.

37 *Simulating Overfishing in the Near-pristine Coral Reefs of Palmyra Atoll*, **DOUGLAS MCCAULEY¹, DAN BRUMBAUGH², KATE HOLMES², HEIKE LOTZE³, ELIZABETH MADIN⁴, LISA MAX⁴, FIORENZA MICHELI¹, JENNIFER SMITH⁵, DEREK TITTENSOR³, BORIS WORM³, and HILLARY YOUNG¹** (¹Department of Biology, Stanford University, Stanford, CA 94305; ²Center for Biodiversity and Conservation, American Museum of Natural History, Central Park West at 79th Street New York, NY 10024; ³Department of Biology, Dalhousie University, 1355 Oxford St. Halifax, NS, Canada B3H 4J1; ⁴Department of Ecology, Evolution and Marine Biology, University of California Santa Barbara, Santa Barbara, CA 93106; ⁵NCEAS, University of California, Santa Barbara 725 State St. Suite 300 Santa Barbara, CA 93101; dougm@stanford.edu)

Overfishing is one of the most serious threats to coral reef health. Most studies of overfishing in coral reefs are generated in moderate to heavily fished systems. This body of work has vastly improved our understanding of the ecology of fishing in coral reefs, but tells us little about the effects that fishing has when first initiated in pristine reefs. Because fishers preferentially remove the largest reef fish first, and these large fish may have disproportionately strong influences on reef ecology, we hypothesized that the initial years of fishing may have a disproportionately strong impact on reefs. With a relatively intact guild of large reef fish, Palmyra Atoll offers an extremely rare opportunity to experimentally test this hypothesis. To quantify the magnitude of the possible direct and indirect first effects of fishing and to better understand the ecological implications of removing a reef's largest fish, we experimentally simulated overfishing on Palmyra's near pristine reefs. Large fish (e.g. snappers, sharks, large parrotfish) were excluded on portions of the forereef at Palmyra using enclosure cages. Removing large fish altered fish behavior and had cascading effects on ecological processes that shape coral communities, including rates of herbivory and coral recruitment. Data from this experiment helps historicize the impacts of fishing on coral reefs and demonstrate the ecological importance of large reef fish.

38 *Rats and the Reproductive Ecology of Terminalia catappa at Palmyra Atoll: An Example of How Invasive Rodents Influence Forest Structure on Low Tropical Islands*, **ALEXANDER S. WEGMANN** (Botany Department, University of Hawaii, Honolulu, HI 96822)

The negative effects of introduced rodents on native biota are amplified on island systems that evolved in the absence of mammals, such as Palmyra Atoll (Palmyra), a small cluster of islands (2.2 km² of emergent land) dominated by only a few lowland rainforest tree species. The native herbivores and dispersers of canopy tree diaspores at Palmyra are 5 land crab species in 3 genera. Based on observations of rat (*Rattus rattus*) interactions with diaspores (mass = 30 g) and seedlings of the common tree, (*Terminalia cata-*

ppa), we hypothesize that introduced rats significantly alter plant recruitment by changing existing patterns of pre- and post-dispersal seed predation, seed dispersal, and seedling establishment. We found that rats remove the mesocarp from half of all *T. catappa* diaspores prior to abscission from parent plants. Predispersal mesocarp removal decreased mean secondary dispersal distance by 90% as land crab and rats do not target de-pulped diaspores. Although both rats and land crabs interact with diaspores, three-fourths of *T. catappa* secondary dispersal events, and all recorded seed predation events, were attributed to rats. Rats engaged in directed dispersal by moving diaspores to husking stations where most seeds were killed and few germinated and established, while land crab foraging fit the colonization model of seed dispersal. Rats were responsible for 50% of documented *T. catappa* seedling mortality, despite being outnumbered 3:1 by land crabs. When rats disrupt coevolved crab-plant mutualisms, shifted patterns of seed dispersal, seed predation, and seedling predation can impact forest community structure.

39 *Cocos nucifera* Drives Nutrient Depletion via Changes in Seabird Density at Palmyra Atoll, **HILLARY YOUNG, DOUGLAS MCCAULEY, and RODOLFO DIRZO** (Department of Biology, Stanford University, Gilbert Hall 108, Stanford CA 94305, hsy-oung@stanford.edu)

This research investigates the hypothesis that the historical introduction of the coconut palm (*Cocos nucifera*) at Palmyra and throughout many areas of the Pacific is a large-scale, slow occurring, invasion driven by (1) a nutrient depletion feedback caused by the indirect effects of this non native species on other species that operate as nutrient vehicles (birds) and (2) more direct invasion feedbacks due both to increased physical damage by falling palm debris and to the fostering of invasive seed predators (rats) and native herbivores (crabs) in *C. nucifera* dominated forests. These two complementary feedback loops could have significant cascading effects throughout the ecosystem. Within this larger framework, we focus on the numerous nutrient related effects of the *C. nucifera* invasion. Specifically we will document (1) that *C. nucifera* is a non preferred nesting and roosting habitat for seabirds in this system causing lower total seabird numbers in heavily invaded islands; 2) that areas with high dominance of *C. nucifera* have reduced levels of nutrients and elevated C:N ratios; and (3) that $\delta^{15}\text{N}$ is reduced in *C. nucifera* invaded sites, suggesting that the lower number of birds are at least a partial cause of the reduced nutrient levels. This work has larger consequences for study of biological invasion mechanisms, and the ecosystem importance of seabirds as nutrient vehicles.

40 *Assessment of the Terrestrial Herpetofauna of Palmyra Atoll, Line Islands*, **ROBERT N. FISHER and STACIE A. HATHAWAY** (San Diego Field Station, Western Ecological Research Center, United States Geological Survey, 4165 Spruance Road, San Diego, CA 92101; rfisher@usgs.gov)

The Line Islands are poorly studied herpetologically. Palmyra Atoll is the northernmost island with emergent terrestrial habitat in this island chain; additionally it is the smallest vegetated landmass. We reviewed the literature and museum records for the Line Islands for reptiles and amphibians and have examined the majority of the specimens collected from Palmyra Atoll. Field work was conducted in 2006 and 2007 to systematically conduct diurnal and nocturnal surveys around the atoll for reptiles and amphibians to serve as a current baseline for understanding the diversity and distribution pri-

or to a proposed rat removal project that might change the dynamics of any species present.

We detected three species of geckos. We did not detect *Bufo marinus*, a non-native species which was historically recorded as 1960's USNM museum records from the atoll. The three geckos were also recorded in museum records and include one native species (*Lepidodactylus* n.sp.), one early introduction probably associated with World War II developments on the atoll (*Lepidodactylus lugubris*), and one recent introduction (*Hemidactylus frenatus*; earliest record 2002). Of the three, the native species was detected in the eastern and southern islets of the atoll but not on the larger northern or western islands. The mourning gecko (*L. lugubris*), is a parthenogenic species and is represented on the atoll by many different clone types. This species is widespread everywhere we surveyed on the atoll but it appears that different clones have different islet distributions. The recent invader the house gecko (*H. frenatus*), only occurs on the Cooper Island complex, with highest densities around the main buildings.

41 *Vox Palmyra*, **BARRY W. STIEGLITZ** (U.S. Fish and Wildlife Service, Hawaiian and Pacific Islands National Wildlife Refuge Complex, 300 Ala Moana Blvd., Honolulu, HI 96850)

Palmyra Atoll National Wildlife Refuge is 1 of 19 national wildlife refuges in the Pacific, which in turn are in the 548-unit National Wildlife Refuge System. These 19 interconnected refuges have served as stepping stones for the colonization and dispersal of species between the quadrants of the Pacific Ocean. Though far flung across the Pacific, these tiny circles in the ocean represent far less than 1 percent of the U.S. Exclusive Economic Zone. However, these waters are extremely significant coral reef and deep water ecosystems that exist nowhere else within the United States and are the last refugia for fish and wildlife rapidly vanishing elsewhere. Palmyra is unique in the Refuge System, the mission of which, in part, is to “administer a national network of lands and waters for the conservation, management, and ... restoration of the fish, wildlife, and plant resources...” The Refuge System actively manages its lands and waters as primary use lands – set aside first and foremost for wildlife and wildlife conservation. These remote Pacific refuges are some of the most logistically difficult and costly to administer, often especially in the eyes of the average American taxpayer who cannot afford to visit them. Because of its relatively pristine state, Palmyra is an important benchmark and laboratory. The challenge at Palmyra is careful balance of an active management regime with important research intended to illuminate not only our management direction, but also how to address the planet's changing climate and its impact on other island systems and nations.

42 *Scale Population Dynamics and Control Measures and the Status of Pisonia grandis at Palmyra Atoll NWR in 2007*, **EDITH NONNER** (Formerly: University of Hawaii, Department of Molecular Biosciences and Bioengineering and The U.S. Fish and Wildlife Service, Pacific Remote Islands NWR, 48-5263 Kukuihaele Rd., Honokaa, HI 96727; enonner@gmail.com)

Palmyra Atoll National Wildlife Refuge (NWR) harbors some of the last remaining *Pisonia grandis* (*Pisonia*) forest throughout its range. The invasion of *Pulvinaria urbicola*, an introduced polyphagous scale insect has been linked to the decline of *Pisonia* forests across the Pacific. The presence of scale was first noted on *Pisonia* at Palmyra in spring of 2002; shortly thereafter an outbreak occurred across the atoll causing a widespread forest die-off. Annual census

data for the *Pisonia* population was collected in 2004, 2005, and 2006. These data show an initial decline in tree numbers and health coinciding with an increase in scale densities. Subsequent census data show a sudden decline of scale densities with a slow increase in tree health and recruitment of new individuals trees. Quarterly scale surveys identified patches of remaining high scale infested *Pisonia* on Sand Island. Imidicloprid, a systemic insecticide, was tested as a control measure for the scale in the remaining high scale density patches. The insecticide was applied through injection and uptake and efficacy was monitored over a 3-month period. Leaf samples were taken from reference and treated trees for scale counts and imidicloprid immunoassays. Results show limited uptake of the insecticide and no difference in scale densities between reference and treatment trees. Scale densities were not significantly different in treated and untreated trees at 3-month post treatment, indicating imidicloprid is not a useful management tool for controlling scale outbreaks.

43 Coral Disease at Palmyra Atoll: Patterns of Spatial Distribution, GARETH J. WILLIAMS (gareth.williams@vuw.ac.nz)

Coral diseases are an ever increasing threat to coral reefs. This is clearly a concern for conservation and management of these systems and their reef associated organisms. This baseline survey was aimed at quantifying, in detail, the relationship between coral disease occurrence, environmental variables and coral community structure. Work was conducted over six weeks at the Palmyra Atoll National Wildlife Refuge, Central Pacific, during June to July 2007. Fifty-eight belt transects were haphazardly placed at 11 key sites (5 backreef and 6 forereef) established for long term monitoring around the atoll. Environmental variables measured were temperature, salinity, turbidity and chlorophyll *a* concentration. Sedimentation levels were also measured for all back reef sites. Growth anomalies were recorded on four coral genera (*Astreopora*, *Montipora*, *Fungia* and *Acropora*). In addition, tissue loss was seen on colonies of encrusting *Montipora* sp. These diseases were restricted to the backreef sites and occurred with an overall prevalence of 0.39%, with prevalence at individual sites ranging from 0.2 – 1.0%. This presentation will also discuss how the occurrence of coral disease can be related to environmental variables and coral community structure using explanatory modelling techniques. Palmyra Atoll represents a location where the prevalence of coral disease and the impacts of environmental variables on this prevalence can be monitored in circumstances where more recent major anthropogenic impact has been greatly reduced. Moreover, knowledge of coral disease at this important wildlife refuge will aid its future monitoring and management.

44 Conservation Status of Globally Endangered Sea Turtles at the Palmyra Atoll National Wildlife Refuge (2005-2007), ELEANOR J. STERLING¹, EUGENIA NARO-MACIEL¹, KATHERINE MCFADDEN², KATHERINE HOLMES¹, and PETER J. ERSTS¹ (¹Center for Biodiversity and Conservation, AMNH, New York, NY, 10024; ²Columbia University, New York, NY, 10027; sterling@amnh.org)

To enhance the management of sea turtles and their ecosystems at the Palmyra Atoll National Wildlife Refuge, we initiated a sea turtle research and conservation program in 2005, focused on turtle ecology, distribution, and health. We undertook six atoll-wide surveys between August 2005 and June 2007 to investigate sea turtle distribution in the near-shore waters of the atoll. Sea tur-

bles were encountered throughout the waters surrounding the atoll, but were most frequently observed on the southern flats. We discuss plausible factors that could contribute to differences in distribution, including diet, shelter, tidal variation, and energy expenditure. We also discuss methodological limitations that could bias survey data, such as the likelihood of double counting, the effects of visibility conditions and tides, and the short length of the survey periods. We undertook analyses to explore possible relationships between sea turtle and algal distributions, combining sea turtle count data, algal sampling, and satellite imagery. We characterized the Atoll's south reef flats, focusing on algae, the presumed main diet item of the Atoll's most common turtle, the green sea turtle (*Chelonia mydas*). We found numerous species of algae and other potential prey items heterogeneously distributed along the southern flats in varying densities. We therefore hypothesize that the diet of green sea turtles at Palmyra is relatively diverse, and this will be investigated through formal and comprehensive feeding ecology studies. These data will inform potential management strategies for lagoon restoration and its potential effect on sea turtle foraging and other behavior.

Hawaiian Anchialine Pool Ecosystem Conservation and Management: The Present Status and Future of Anchialine Pools

Monday, 10:00 a.m. in the HPA CASTLE Lecture Hall

45 Submarine Groundwater Discharge and Its Role in Anchialine Pond Dynamics of Kaloko-Honokohau National Historical Park on the Arid Kona Coast of Hawaii, USA, ERIC GROSSMAN¹, DELWYN OKI², KAREN KNEE³, ADINA PAYTAN⁴, DAVID FOOTE⁵, and SALLIE BEAVERS⁶ (¹US Geological Survey, Pacific Science Center, Santa Cruz, CA, 95060; ²US Geological Survey, Pacific Islands Water Science Center, Honolulu, HI, 96813; ³Department of Geological and Environmental Sciences, Stanford University, Stanford, CA, 94305; ⁴Institute of Marine Sciences, University of California, Santa Cruz, Santa Cruz, CA, 95064; ⁵US Pacific Island Ecosystems Research Center, P.O. Box 44, Hawaii National Park, HI 96718; ⁶Kaloko-Honokohau National Historical Park, Kailua-Kona, HI, 96740; egrossman@usgs.gov)

Analyses of nearshore water temperature, salinity, radium isotopes, nutrients, waves, and tidal currents indicate that submarine ground-water discharge (SGD) along the arid western coast of Hawaii Island is high and the principal form of terrestrial discharge to the sea. Ground-water discharge is important to coastal aquatic and marine ecosystems. Seasonal surveys between December 2003 and April 2006 in Kaloko-Honokohau National Historical Park showed generally persistent discharge of cool, Ra-rich ground water through anchialine pools and the shallow part of the aquifer into the nearshore. Estimated discharge of ground water to coastal waters ranged between 9.4 and 47.0 m³/d per meter of coastline and this discharge affects extensive areas of the reef complex. Nutrient concentrations in ground water were an order of magnitude higher than surrounding coastal waters. Diurnal surveys show lateral, vertical, and temporal variability in salinity, temperature, and nutrient concentration in anchialine pools owing to diurnal tidal and biological processes. These parameters may be altered by changes in ground-water withdrawals, quality, and transport pathways associated with expected population, land use, sea-level, and climate changes. Anchialine pool, fishpond, and coastal marine ecosystems may be vulnerable to these changes. Conceptual models of possible

effects to anchialine pool distribution and function resulting from changes in SGD associated with land-use changes and sea-level rise will be explored to identify gaps in our knowledge and the scientific and management actions needed to sustain coastal resources.

46 Status of the Hawaiian Anchialine Resource – 36 Years of Observations, RICHARD E. BROCK¹, JULIE H. BAILEY-BROCK² and ALAN K. H. KAM¹ (¹Water Resources Research Center, University of Hawaii, Honolulu, Hawaii 96822; ²Department of Zoology, University of Hawaii, Honolulu, HI 96822; brockr@hawaii.edu)

The study of Hawaiian anchialine resources commenced in the early 1970's. The distribution of Hawaii's anchialine pools are primarily along the southeastern and western coasts of Hawaii, on Maui to Cape Kinau and to the east. No complete inventory of pools has been made but it is estimated that about 900 pools exist with the majority being located in West Hawaii. Coastal development commenced in the late 1960's and has continued unabated to present in West Hawaii, but the anchialine habitat has been protected by federal, state and county statutes. Despite protection, the biological integrity of the anchialine resource has been largely destroyed by the introduction and spread of alien predatory fish. In their natural state, anchialine pools are mostly colonized by a suite of fugitive species that cannot tolerate predation pressures found in most aquatic habitats. Most predators cannot colonize anchialine pools because of difficult access due to physical barriers, or to unsuitable ecological conditions. The isolation and life history strategies of many anchialine species have led to their success. However, the spread of alien fish has reduced the viable habitat to less than 10% of what it was 35 years ago. The only successful way found to control the spread of alien fish in anchialine pools is with ichthyocides which are now illegal through federal statute. Thus despite the best of intentions, government regulations are enhancing the final demise of this unique resource.

47 Understanding the Species Richness and Distribution of Anchialine Pools in Hawai'i, STEPHANIE LU (The Nature Conservancy, 923 Nu'uuanu Ave, Honolulu, HI 96817; sl@tnc.org)

The Nature Conservancy (TNC) conducted a statewide assessment of anchialine pool. This was part of TNC's Hawaiian High Islands Ecoregion coastal upland assessment, which evaluated seabird nesting sites and coastal strand vegetation also.

Each geospatially-represented anchialine pool complex (point data) was associated with the aquifer it occurs in since anchialine populations are generally bounded by aquifer extent. Anchialine pool complexes were categorized by their species richness. Species lists were associated with each complex, when available. Nearby development and encroaching vegetation were noted as threats to the pools, when present. Goals and priority sites for conservation of anchialine pools are based on this information.

The geospatial and tabular (dbf) data were compiled from Hawai'i Biodiversity Mapping Unit's Natural Diversity Database (2007), Brock's 1974 report, and various smaller-scale reports. The pool complexes were cross-referenced to Brock's 1974 naming convention.

48 Reviving a Native Anchialine Community; A Case Study of Rotenone Use in Two Anchialine Pools at Hualalai Resort, Kaupulehu-Kona, Hawaii, DAVID CHAI and AMBYR MOKIAO-LEE (Hualalai Resort, P.O. Box 5440, Kailua-Kona, HI 96745; dchai@

hualalairesort.com)

In the period 1993-1995, six anchialine pools with a combined water surface area of 35m² we excavated of sediments and expanded to a current area of 10,513m². These newly expanded pools were quickly colonized by representative anchialine organisms. In 2004, non-native minnows (*Gambusia affinis* and *Poecilia reticulata*) from an undetermined source were introduced into three of the best representative anchialine pools containing a healthy assemblage of anchialine species. Within a few month so their introduction, the native ecology was altered and adverse ecological changes were observed throughout these systems. All native crustacean disappeared during daylight hours and only two of these emerged in limited numbers at night. Encrusting calcareous algae was replaced by filamentous Chlorophytes and Cyanobacteria in the form of dark slime epilithon. Senescence, characterized by expanding algal mats, deepening sediments, and decreased flushing rates accelerated. Numerous techniques were employed to decrease or eliminate the minnow population, but nothing worked. When rotenone became legal to use in anchialine pools in 2007, it was immediately determined as the best means to revive the degraded pool habitats based on past experience with the chemical. This paper examines the procedures and results of rotenone application in two pools, the rapid re-colonization of native species to these systems, and the reverse of senescence.

49 Anchialine Pools and Candidate Conservation, LORENA WADA (U.S. Fish and Wildlife Service, 300 Ala Moana Blvd. Rm 3-122 Box 50088 Honolulu, HI 96850; Lorena_Wada@fws.gov)

The U.S. Fish and Wildlife Service is working in coordination with the State's Division of Aquatic Resources to conserve anchialine pools throughout the State of Hawaii. In particular, the Service is interested in those pools that contain the four candidate anchialine pool shrimp, *Metabetaeus lohena*, *Procaris hawaiana*, *Palaeomonella burnsi*, and *Vetericaris chaceorum*. The Service is working with the State to identify priority areas for long term management and monitoring and conducting restoration activities within the Kalaeloa Unit of the Pearl Harbor National Wildlife Refuge. This talk will focus on the Service's efforts at anchialine pool restoration at the Kalaeloa Unit of the Pearl Harbor National Wildlife Refuge.

50 Population Genetics of an Anchialine Shrimp, Metabetaeus lohena, in the Hawaiian Islands, ATLANTIS D. RUSS and CEDRIC C. MUIR (Department of Tropical Conservation Biology and Environmental Science, University of Hawaii at Hilo, 200 West Kawili Street, Hilo, HI 96720; atlantis_russ@hotmail.com)

To investigate the population structure of an anchialine shrimp native to Hawai'i, *Metabetaeus lohena* (Banner and Banner 1960), we analyzed 605 bp of mitochondrial cytochrome c oxidase subunit I gene sequence and inferred gene flow estimates among pool populations. A survey of 127 individuals from 7 populations collected on the islands of O'ahu, Maui and Hawai'i revealed 43 haplotypes. The most common haplotype was represented in similar proportions from all sites sampled, accounting for 44% of sequences surveyed. AMOVA, pairwise Φ_{ST} values, Bayesian estimates of migration (M), Mantel Test and Nested Clade Phylogenetic Analyses all failed to produce evidence of major barriers to gene flow among most pool populations separated by expanses of open ocean.

Low levels of population structure were observed between a select few pool populations and may be attributed to unique substrate barriers or prevailing currents precluding recruitment and

promoting retention of larvae. Genetic connectivity of the meta-population of this candidate endangered species has implications for ecosystem management strategies in the face of burgeoning coastal development.

51 Wildlife Forensics: What DNA Reveals about the Biology and Conservation of Organisms from Hawaiian Anchialine Environments, SCOTT R. SANTOS (Department of Biological Sciences, Auburn University, 101 Life Sciences Building, Auburn, AL 36849; santos@auburn.edu)

Anchialine environments are defined as land-locked bodies of mixohaline water that fluctuate with the tides but have no surface connection to the sea. Approximately 1,000 of these habitats have been reported from around the world and are home to a number of endemic species. Unfortunately, these ecosystems are threatened on a global scale due to a variety of anthropogenic causes. This is particularly evident in the Hawaiian Islands, where it is estimated that >90% have been degraded or lost in the last few decades. Since the Hawaiian Islands possess the only anchialine ecosystems in the US and the single largest concentration of them on the planet, it's been recognized that there is an immediate need to design and implement sound conservation strategies for mitigating this situation. To aid managers in this pursuit, my laboratory has been utilizing molecular (*i.e.*, DNA) tools to examine patterns of gene flow and population structure in the most common faunal constituents of these ecosystems, the atyid *Halocaridina rubra* and the amphipod *Paramoera paakai*. For *H. rubra*, this "wildlife forensics" approach revealed 13 distinct genetic groups belonging to eight divergent lineages. In general, these genetic groups and lineages are restricted to a particular region of a single island, with no individuals being exchanged between them. Similar patterns have also been observed for *P. paakai*. The significant genetic structure and evolutionary differentiation of these species over limited geographic ranges will need to be taken into consideration in future management plans for anchialine ecosystems across the Hawaiian Islands.

52 Biological Surveys of Anchialine Pools in Hawaii's National Parks. DAVID FOOTE¹, LORI TANGO², CYNTHIA KING², MEREDITH ACLY² and KARL MAGNACCA² (¹US Pacific Island Ecosystems Research Center, P.O. Box 44, Hawaii National Park, HI 96718; ²Pacific Cooperative Studies Unit, University of Hawaii, 3190 Maile Way, Room 408, Honolulu, HI 96822; foote@usgs.gov)

Inventories of invertebrates associated with anchialine pools were conducted at 10 pool complexes within National Parks on the island of Hawaii. A total of approximately 142 pools were surveyed with the primary goal of documenting native and alien arthropod fauna. Native crustaceans, including two species of anchialine pool shrimp, comprised approximately 25% of the fauna, followed by mollusks. The dominant native invertebrate group present was aquatic insects. Native diptera (flies) and odonates (dragonflies and damselflies) comprised 53-70% of the fauna at the 10 pool complexes. The rarest native pool arthropod was the endemic orangeblack damselfly, *Megalagrion xanthomelas*, an insect that is currently a candidate for listing under the Endangered Species Act by the U. S. Fish & Wildlife Service. Seventy-nine percent of orangeblack damselfly sightings were at 3 pools (mean of 42 sightings per pool) surrounded by Milo (*Thespesia populnea*), 18% (28 sightings) occurred at 1 pool surrounded by Christmas berry (*Schinus terebinthi-*

folius) and Naupaka kahakai (*Scaevola taccada*), and 3% (5 sightings) were found at 1 pool with no canopy cover. Current recommendations for anchialine pool restoration call for the removal of all surrounding vegetation to improve habitat for endemic shrimp; however these results indicate that orange-black damselflies as well as many other native arthropods favor pools with at least partial canopy cover. Differences in habitat preferences among anchialine pool fauna may also reflect important differences in underlying tolerances for the shifting physical environment of the pools, including changes in temperature and salinity.

53 Regional Protection and Management Strategies for Anchialine Pools, SALLIE BEAVERS¹, MARISKA WEJERMAN², ELIZABETH MARRACK², and KELLY KOZAR³ (¹National Park Service, Kaloko-Honokohau National Historical Park, Kailua Kona, HI 96740; ²University of Hawaii, Cooperative Ecosystems Studies Unit, Kaloko-Honokohau National Historical Park, Kailua Kona, HI 96740; ³National Park Service, Inventory & Monitoring Program, Hawaii National Park, HI 96718; sallie_beavers@nps.gov)

Hawaii's anchialine pools are threatened by multiple anthropogenic activities including introductions of alien flora and fauna, and alterations to water quality and water quantity from land and ground-water development. Rapid population growth and land-use changes present significant challenges for the effective management and preservation of these important cultural and biologic resources. Kaloko-Honokohau National Historical Park, located on coastal lands in the North Kona district of Hawaii Island, contains 155 known anchialine pools, potentially 20% of the state's estimated pool resources. A daylight, rapid visual assessment survey of all pools shows 18.7% contain fish species (8.4% contain aliens; 10.3% to be identified), 43% contain endemic shrimp, and 50% have associated invasive vegetation (e.g., *Batis maritima*, *Thespesia populnea*, *Schinus terebinthifolius*, *Prosopis pallida*). These ground-water dependent pools are significant living-cultural resources and also provide habitat for candidate endangered species. North Kona lands are developing rapidly. Currently, 3,743 acres are undergoing, or are proposed for development within 2.5 miles of the National Park. Water use is expected to more than double from present use, 11.5 Mgal/day, to an estimated 30 Mgal/day. The National Park Service is working to protect its anchialine pool ecosystems from the potential adverse effects associated with increased non-point source pollution, ground-water pumping, and saltwater intrusion. These challenges, data requirements, and strategies for management will be discussed. This overview includes a geospatial inventory and database of anchialine pool resources, water chemistry, and biological data; ground-water studies; development of long-term pool-monitoring criteria; and collaborative efforts with land and water-development stakeholders.

Physics, Materials Science and Nanotechnology Monday, 10:00 a.m. in HPA Room 41

54 The Evolution of Cluster Early-Type Galaxies over the Past 8 Gyr, ALEXANDER FRITZ and INGER JØRGENSEN (Gemini Observatory, 670 NorthA'ohoku Place, Hilo, HI 96720, USA; afritz@gemini.edu)

Galaxy Clusters at intermediate redshift are useful laboratories to study the formation and the evolution of early-type galaxies. By

measuring the kinematics (velocity dispersion) and structure parameters (size and surface brightness) of these galaxies their evolution in mass and mass-to-light ratios can be derived. This allows us to put constraints on the formation epoch and subsequent evolution of spheroids up to the present-day.

We have carried out a detailed spectroscopic study of the galaxies in the distant galaxy cluster RXJ1415.1+3612 at redshift of unity. This cluster is part of the Gemini/HST Galaxy Cluster Project, an extensive observational program to investigate the stellar populations of galaxies in 15 rich, massive and X-ray luminous galaxy clusters from $z=1$ to the present-day universe. We have acquired deep high-quality spectroscopy of 37 galaxies over a 5.5 arcmin field centered on RXJ1415.1+3612 using the Gemini Multi-Object Spectroscopic (GMOS) instrument mounted at the 8.1m Gemini North telescope on Mauna Kea, Hawaii. High-resolution archival photometric data of the galaxy cluster is provided with the Advanced Camera of Surveys (ACS) onboard the Hubble Space Telescope (HST).

We present the Fundamental Plane (FP) of 14 early-type galaxies in the cluster RXJ1415.1+3612. This is the first detailed investigation of the FP at redshifts $z=1$. The combination between high-signal-to-noise spectroscopy and HST/ACS photometry allows us to critically test the theoretical galaxy formation scenarios that involve a hierarchical structure growth.

55 Undergraduate Special Studies Projects in Support of the Development of the Galbreath Wildlands Preserve Observatory, SCOTT A. SEVERSON (Department of Physics and Astronomy, Sonoma State University, 1801 East Cotati Ave., Rohnert Park, CA 94928; scott.severson@sonoma.edu)

The gift of the Galbreath Wildlands Preserve (GWP) and the associated seed funding for an astronomical observatory has given Sonoma State University (SSU) an extraordinary opportunity for the development of an enduring resource for education and research in Science, Technology, Engineering and Mathematics (STEM) related fields. GWP consists of 3,670 acres of land sixty miles north of SSU in a remote and dark location suitable for astronomical observations. The observatory (GWPO) will consist of an advanced robotic telescope built around ecologically sustainable technology. The development of the facility involves student participation in an integrated fashion. Undergraduate research opportunities are available in astronomy, optics, computer science and engineering. One example is the current development of the Mt. Cuba Astronomical Foundation Adaptive Optics Testbed at SSU. Another is the study of the observatory's energy requirements and research into solar concentration technology to reduce the use of expensive photovoltaic material in solar energy generation. The Galbreath Wildlands Preserve Observatory will provide SSU with an important resource for undergraduate education and research during its development and its operation.

56 Electrical Conductance Anisotropy in a Shear Banding Micellar Solution, PANOS PHOTINOS (Department of Physics and Engineering, Southern Oregon University, Ashland, OR 97520; photinos@sou.edu)

AC conductance measurements in the micellar system 10% (weight by volume) of cetylpyridinium chloride/sodium salicylate (molar ratio 2:1) in 0.5 M NaCl brine are presented. For shear rates above 3s^{-1} the flow curve of this system exhibits a plateau, attributed to shear banding and the appearance of a low viscosity phase.

We used a cylindrical glass cell with a gap of 1 mm, and measured the conductance in the direction of the velocity and in the direction of the velocity gradient. The onset of the shear plateau results in a noticeable change in slope in both components of the conductance. More marked is the change in the relaxation behavior as the shear is turned on. The experiments that involved shear rates corresponding to the plateau region show transient behavior characterized by at least three time constants. The results are discussed in terms of recent theoretical models.

57 Towards A General Theory of Complex Systems PHILIPPE BINDER (Department of Physics and Astronomy, University of Hawaii – Hilo; pbinder@hawaii.edu)

The talk will begin with examples of complex systems. That will be followed by a brief review of measures of complexity, and by a widely accepted explanation of why systems can be complex. Finally, an alternative will be proposed: systems are complex when they exhibit dynamical frustration, the unresolvable coexistence of opposite tendencies. A long-term research program to develop this alternative will be proposed.

58 Structural and Mechanical Characterization of Spider Silk, VILUPANUR A. RAVI¹ and DAVID E. CHAVEZTICAS² (¹Department of Chemical and Materials Engineering, California State Polytechnic University, 3801 W. Temple Avenue, Pomona, CA 91768; ²Department of Mechanical Engineering, California State Polytechnic University, 3801 W. Temple Avenue, Pomona, CA 91768; dchavezticas@yahoo.com)

Spider silk is a natural material which has been experimentally determined to have unique mechanical properties, in particular high specific mechanical strength and toughness. The structure of spider silk is also fascinating no matter whether it is observed visually (macrostructure) or probed down to the molecular and/or atomic levels.

In this talk, we report on the current status of our work on the structure of spider silk using a range of techniques, i.e., optical and electron microscopy and atom force microscopy. We will also present our current work on the mechanical properties of these materials and discuss strength and stiffness relative to strain rate. Our overall objective is to relate the mechanical behavior to the structure of these materials. The spider species of interest will be *Nephila clavipes* (the golden orb weaver) and *Aurantia argiope*.

59 Biosensors Based on Functional Nanoparticle Labels YUEHE LIN, HONG WU and JUN WANG (Pacific Northwest National Laboratory, PO Box 999, Richland, WA 99352; Yuehe.Lin@pnl.gov)

The utilization of functional nanoparticles (NPs) for biosensing has generated a great deal of interest because they are found to enhance sensitivity of various given methods greatly. Electrochemical biosensors based on nanoparticle labels are very attractive for such bioassays, due to their high sensitivity, inherent simplicity, miniaturization, and low cost. We report electrochemical biosensors based on functional Au or silica NPs as labels. This method is simple, sensitive and can be used for DNA/protein analysis. A remarkable Low detection limit has been achieved through signal amplification by functionalized nanoparticles. The work demonstrates the feasibility to develop a cheap, sensitive and portable device for multiplexed detection of different protein biomarkers.

60 Spin Acoustic Effect, PRASHANT SHARMA (Department of Physics, Suffolk University, 41 Temple Street, Boston, MA 02114; psharma@suffolk.edu)

Spin-orbit coupling in semiconductor materials allows for a variety of interesting effects involving the electronic spin that can be understood by a semiclassical approach. It is theoretically predicted that a traveling shear wave will create a spin current in direct-gap (for example III-V compound) semiconductors with contributions from both the valence bands and the conduction band (for Sn-doped semiconductors). We show that this spin-current is a property of the Fermi-Dirac sea, and is controlled by a geometric phase accumulated by the strain-induced Rashba parameters in a cycle.

61 Undergraduates using a 17 Tesla Superconducting Magnet System, JEREMY S. QUALLS (Department of Physics and Astronomy, Sonoma State University, 1801 East Cotati Avenue, Rohnert Park, CA 94928-3609; quallsj@sonoma.edu)

In the discipline of material science, new and exciting materials are discovered daily which display unusual properties. These properties help to realize new frontiers of science as well as pave the way for future technology. An established method for probing fundamental electronic and magnetic properties of materials includes the use of high magnetic fields. Unfortunately often times the work is beyond the background capabilities of undergraduate students. The SSU department of Physics and Astronomy is currently developing an undergraduate based 17 Tesla research facility. NSF support has allowed the lab to explore systems rich in physics and the new lab is focused on undergraduate students actively probing the magnetic properties of a number of materials such as organic charge transfer salts, molecular magnets, and photonic crystals infiltrated with magnetic mediums. At SSU we are a small department with students with a wide range of abilities and at different background levels.

I outline many of the capabilities of the new lab as well as current and future research to be carried out. I will summarize the success and failures we have had with integrating undergraduates as well as report on our new magnetization data for molecular conductors and organic charge transfer salts.

Progress in Vaccine and Drug Development Wednesday, 8:25 a.m. in HPA CASTLE Lecture Hall

62 Intersecting Recycling Pathways: Biochemical Analysis of *E. histolytica* MTA Nucleosidase as a Target for Antiparasitic Drug Development, DANIEL QUAPP and KEN CORNELL (Department of Chemistry and Biochemistry, Boise State University, Boise, ID 83725; danielquapp@u.boisestate.edu)

Entamoeba histolytica is a protozoan parasite that causes amebiasis, an enteric dysentery that afflicts approximately one quarter of the world's population. Of these, some 260 million cases do not respond to current therapies. As with other parasitic protozoans, *Entamoeba histolytica* is a purine and methionine auxotroph, and thus has developed unique salvage pathways to obtain and recycle these compounds. In order to develop new and better therapies for treating amebiasis, the gene encoding the central salvage pathway enzyme, 5' methylthioadenosine nucleosidase (MTN) was amplified, cloned, and expressed as a recombinant protein in *E. coli*. Purified recombinant *Entamoeba* MTN was biochemically character-

ized for substrate specificity and kinetic parameters, and the activity of a number of transition state analogs examined. Several analogs were potent MTN inhibitors with nanomolar K_i values, and are potential new lead drugs to treat amebic dysentery.

63 Reconstitution of Autoinducer II Effects in *E. coli* MTN Knock-out Strains. J.A. MARTINEZ and K.A. CORNELL (Department of Chemistry and Biochemistry, Boise State University, Boise, ID 83725; TonyMartinez@mail.boisestate.edu)

The enzyme 5' methylthioadenosine/S-adenosylhomocysteine nucleosidase (MTN) is essential for the salvage of adenine from the metabolic byproducts of cellular polyamine, methylation, and autoinducer I synthesis. The enzyme also supplies precursors for bacterial autoinducer 2 (AI-2) synthesis. AI-2 is a universal "quorum sensing" signal used by bacteria to indicate overall population number and govern such events as biofilm formation and nutrient metabolism. In this study we present evidence that MTN gene deletions in *E. coli* alter growth rates, eliminate AI-2 production, and decrease biofilms formation. These altered phenotypes were rescued by the transformation of *E. coli* MTN knockout strains with plasmid encoded MTN, further underscoring the importance of this enzyme in bacterial growth and survival.

64 Adventures in Paradise: Research at the College of Pharmacy, University of Hawaii Hilo, ROBERT P. BORRIS (College of Pharmacy, University of Hawaii Hilo, 34 Rainbow Drive, Hilo HI 96720; borris@hawaii.edu)

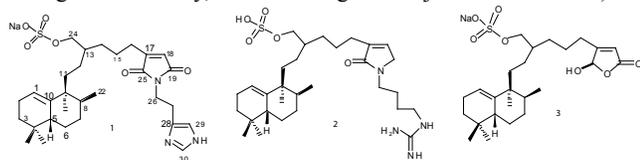
When the UHH College of Pharmacy opened in 2007, it established Hilo as a center for biomedical education and scholarship in the Pacific. The curriculum of the Doctor of Pharmacy program has been designed not only to train pharmacy practitioners, but also to allow interested students to explore areas of multidisciplinary pharmaceutical research extending well beyond the realm of pharmacy practice. The members of the faculty come from a variety of backgrounds, with a broad range of interests, but share a passion and commitment to the advancement of biomedical science. Together, this collection of research interests, and the projects and programs through which they are being expressed, offer the student the opportunity to explore the pharmaceutical enterprise from the earliest stages of drug discovery through development to clinical trials and post-marketing surveillance. An overview of the research programs in place and under development at the UHH College of Pharmacy will be presented.

65 Bioactive Sulfated Sesterterpene Alkaloids from the Marine Sponge *Fasciospongia* sp. GUANG MIN YAO¹, TAMARA P. KONDRATYUK², JOHN M. PEZZUTO² and LENG CHEE CHANG² (¹Department of Chemistry and Biochemistry, University of Minnesota Duluth, Duluth, MN, 55811; ²Department of Pharmaceutical Sciences, College of Pharmacy, University of Hawaii at Hilo, Hilo, HI, 96720; lengchee@hawaii.edu)

Recently, protein kinases have emerged as extremely promising molecular targets in anticancer therapy. The Ras/Raf/MEK pathway is necessary for Ras regulated proliferation, and plays a role in tumorigenesis and cancer progression. Two whole-cell models were adopted in our study. A hyphae formation inhibition (HFI) assay in *Streptomyces* 85E was used to rapidly screen and identify protein phosphorylation inhibitors. Aerial hyphae formation in *Streptomyces* species requires protein kinase activity, and a variety of kinase inhibitors that block this process have been reported. A

genetically modified *Saccharomyces cerevisiae* strain was used in the search for naturally occurring Ras/Raf-1 inhibitors.

The organic extract of the marine sponge *Fasciospongia* sp. was found to significantly inhibit activity in the HFI assay. Bioassay-guided fractionation of this organic extract yielded two unusual new sesterterpene alkaloids (**1** and **2**), and a new sesterterpene sulfate (**3**), along with four known compounds. The structures were elucidated on the basis of spectroscopic analysis. Compounds **1-7** exhibited significant inhibitory activities in the HFI assay. These compounds were further evaluated in cytotoxicity assays with various cancer cell lines as described previously. The structure elucidation and biological activities of these compounds will be presented. (This work was supported by UHH Research Starter Grant from College of Pharmacy, and NCI Program Project P01 CA48112).



Acknowledgments: 1. Department of Microbiology and Immunology, University of British Columbia, Canada. 2. Natural Product Branch, DTP, NCI, USA. 1. Davies, J. 2. Cragg, G., Newman, D., Brown, E.

66 The Marine Environment as a Resource for Discovery of Chemopreventive Agents, TAMARA P. KONDRATYUK, LAURA E. MARLER, JACKIE GUILFORD, KATHERINE MALONEY, WILLIAM FENICAL and JOHN M. PEZZUTO (Department of Pharmaceutical Sciences, College of Pharmacy, University of Hawaii at Hilo, Hilo, Hawaii 96720, kondraty@hawaii.edu)

Marine microorganisms are sources of secondary metabolites with pharmacological activity. We have tested over 3,000 samples from marine organisms submitted by Scripps Institution of Oceanography to identify cancer chemopreventive agents. A good percentage of the samples (11%) were found to inhibit TPA-activated NFκB activity. Further mechanistic studies are under way.

A large portion of tested extracts induced activity of quinone reductase (QR). Of the 61 fractions most active in QR, nine showed induction with mutant TAOc1 indicating that these samples are monofunctional and do not induce the potentially harmful activity of phase I enzymes. A few isolates from streptomycetes CNS284, code M0468 were especially interesting. Of seven pure compounds from this strain, originally noted for their NFκB activity, six inhibited aromatase and two were active in QR.

Recently, two unusual bicyclic polyketides obtained from the marine actinomycete *Salinispora arenicola* were found to inhibit ornithine decarboxylase induction in cell culture.

We have also developed a natural products screen to identify ligands of retinoid X receptor (RXR) and identified 28 promising extracts from marine organisms which are presently being further purified.

The impact of marine natural products in order to identify chemopreventive agents is clear. Lead compounds should be highly significant as chemopreventive agents.

Acknowledgement: The authors are grateful to the National Cancer Institute for support provided under the auspices of program project P01 CA48112 entitled "Natural Inhibitors of Carcinogenesis."

67 Oncostatin M is a Potential Target for Inhibiting Breast Tumor Metastasis, CHERYL L. JORCYK (Department of Biology, Boise State University, Boise, ID 83725; cjorcyk@boisestate.edu)

Oncostatin M (OSM) is a pleiotropic cytokine in the interleukin (IL)-6 superfamily and functions in the immune system cascade, inflammation, and cell proliferation. OSM inhibits the proliferation of breast cancer cells *in vitro* and was previously evaluated as a potential cancer therapy. Evidence from the literature and our preliminary data; however, suggest that OSM may promote metastasis of breast cancer cells and stimulate the formation of bone metastases. We have shown that OSM induces in human and mouse breast cancer cells expression of several proteins known to participate in metastasis including proteinases, cyclooxygenase-2, vascular endothelial growth factor (VEGF), and hypoxia inducible factor 1 alpha. We have also demonstrated that OSM promotes the development of a metastatic phenotype in 66c14 and 4T1.2 murine mammary cancer cells *in vitro*. In the presence of OSM, the mammary cancer cells stimulate an increase in osteoclastogenesis. Additionally, we have co-cultured mouse calvarie bone with mouse mammary cancer cells to look for stimulation of osteolysis in the presence of OSM. Our findings suggest that OSM stimulates the formation of osteoclasts and osteoclast activity. To date there are no therapies that inhibit OSM as a therapy to reduce osteolytic burden and our findings suggest that inhibiting OSM may have a positive effect on osteolytic breast cancer metastases. NIH grant P20RR16454.

68 Marine Sources of New Alzheimer's Drug Leads, PHILIP WILLIAMS (Department of Chemistry, University of Hawaii at Manoa, 2545 McCarthy Mall, Bilger 208B, Honolulu, HI 96822, philipwi@hawaii.edu)

The discovery of penicillin from the fungus *Penicillium notatum* in 1937 sparked a medical revolution that translated into an increase in the average life expectancy. One undesired result of this increased life expectancy is the new prevalence of chronic illness. The incidence rate for Alzheimer's disease continues to rise exponentially despite significant advances in our understanding of the molecular biology of the disease. While these advances have revealed a wealth of new potential drug targets, including the beta-secretase BACE1, the discovery and development of new Alzheimer's drugs have been slow. Marine organisms represent a tremendous resource for the discovery new lead structures for the development of drugs to treat Alzheimer's Disease. This talk will focus on some of our more recent work in this field, specifically focusing on the discovery and characterization of two most recent leads.

69 From Snail Venom to Therapeutics: How Conotoxins Provide Insight Into Drug Design, OWEN M. MCDUGAL (Department of Chemistry and Biochemistry, Boise State University, Boise, ID 83725; owenmcdougal@boisestate.edu)

Snails of the genus *Conus* are predators of fish, worms or other snails. Their venom is a complex mixture of peptides called conotoxins that have been found to be amazingly potent and selective for binding to a wide variety of receptors throughout the human body. These attributes have provided researchers templates for the rational design of drugs that are specific to a given ailment. This presentation will explore Cone snails, conotoxins, and how conotoxins can be utilized toward the development of therapeutic drugs.

70 *In Vivo* Regulation of Hepatocyte Proliferation by the Aryl Hydrocarbon Receptor, KRISTEN A. MITCHELL¹ and CORNELIS J. ELFERINK² (¹Department of Biological Sciences, Boise State University, Boise, ID 83725; ²Department of Pharmacology and Toxicology, University of Texas Medical Branch, Galveston, TX 77555; kristenmitchell@boisestate.edu)

The liver possesses a remarkable capacity for regeneration. Following partial surgical resection, viable hepatocytes enter and progress through the cell cycle to repopulate the liver and restore organ mass. Despite this regenerative capacity, inadequate hepatocyte proliferation remains a major obstacle to recovery from liver disease and transplantation procedures, as the precise mechanisms that regulate hepatocyte proliferation in the regenerating liver are unclear. Recent *in vitro* studies indicate that hepatocyte proliferation is modulated by activation of the aryl hydrocarbon receptor (AhR), a soluble, ligand-activated transcription factor in the basic helix-loop-helix family of proteins. Prototypic exogenous AhR ligands include the potent and persistent environmental pollutant 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD) and other structurally related halogenated aromatic hydrocarbons. To determine if these observations could be extended to hepatocyte proliferation in the regenerating liver, we used a mouse model of liver regeneration following 70% partial hepatectomy (PH). Our investigations indicate that treatment of mice with TCDD suppresses liver regeneration, accompanied by a G1 cell cycle arrest in hepatocytes. The implications of these studies for regulation of liver regeneration will be presented and discussed.

71 Immunodominance in Dengue Virus Infection, ALLISON IMRIE¹, JANET MEEKS², MUNKHZUL SUKHBAATAR¹ and ALEXANDRA GURARY² (¹Department of Public Health Sciences; ²Department of Pediatrics, John A. Burns School of Medicine, University of Hawaii at Manoa, Honolulu, HI 96822; imrie@pbrc.hawaii.edu)

Infection with any of the 4 dengue viruses may be asymptomatic or may result in dengue fever. Some dengue fever cases progress to dengue hemorrhagic fever (DHF), or to the more severe dengue shock syndrome (DSS). Epidemiological observations suggest that disease severity is associated with secondary infection with heterologous DV serotypes. CD8⁺ T cell cross-reactivity, because of amino acid sequence similarity between heterologous DV, has been described for dengue and we have shown that this may result in biased activation of T cells with higher affinity for the original infecting virus. Preferential expansion of memory T cells biased towards heterologous DV may therefore prevent effective priming of T cell responses to the current infecting virus and ultimately fail to control virus replication. We assessed how antigenic variation between DV serotypes can modify the T cell receptor repertoire hierarchy in individuals in whom we have identified an immunodominant HLA-B*5502-restricted CD8⁺ T cell response to DV1 NS5329-337. Using CDR3 length spectratyping, we showed that the DV-specific memory TCR repertoire may be conserved up to several years after infection and that asymmetric cross-reactivities occur upon stimulation with variant antigens representing heterologous DV. Our findings suggest that skewing of the T cell repertoire during a first or primary infection determines the plasticity of the DV-specific memory pool and the ability of the host to respond in secondary infection. These data have direct significance for dengue vaccine design that may improve safety by avoiding potential cross-reactivity in T cell responses.

72 Bacterial Population Signaling: Examining the Effects of Natural and Unnatural Messages, KEN CORNELL (Department of Chemistry & Biochemistry, Boise State University, Boise, ID 83725; kencornell@boisestate.edu)

Microbes use a variety of secreted small molecules and peptides to signal cell density or “quorum” dependent events that may be species specific or universal. These autoinducer (AI) signals affect population-wide alterations to gene expression that ultimately influence global changes in phenotype, such as the development of antibiotic resistance, elucidation of virulence factors, and the formation of biofilms. Using a variety of genetic and pharmacologic approaches, my lab is investigating how interruption of quorum sensing pathways alters bacterial phenotype. In particular, we are studying the interruption of two signals: universal AI-II dependent quorum sensing path and gram-positive peptide specific signaling, in a variety of bacterial model systems. In each case, compounds designed to mimic substrate transition states (for AI-II path) or peptides derived from the “unproteome” (for gram positive signals) are being examined for their effects on cellular growth and antibiotic resistance with the goal of developing new antibacterial drugs or attenuated vaccine strains for bacterial diseases.

Evolution and Conservation of Hawaiian Birds Wednesday, 8:30 a.m. in HPA Gerry CLARK Art Center

73 Origin, Radiation, and Current Status of Hawaiian Birds, REBECCA L. CANN¹ and LEONARD A. FREED² (¹Department of Cell and Molecular Biology, University of Hawaii at Manoa, Honolulu, HI 96822; ²Department of Zoology, University of Hawaii at Manoa, Honolulu, HI 96822; rcann@hawaii.edu)

The Hawaiian Islands are the most remote islands in the world. Nevertheless, 9 orders of birds are represented in Hawaii. These include 3 orders of seabirds, 3 orders of waterbirds, and 3 orders of landbirds, with endemism ranging from subspecies to subfamily. Endemism among the islands is limited to the perching birds, at levels of subspecies and species. The Hawaiian honeycreepers are the premier example of adaptive radiation. Both morphological and molecular evidence indicate that the 64 or more species and subspecies are descended from a single ancestor. The radiation involves multiple cases of convergence with different families of birds of the world, particularly by the nectarivorous and insectivorous honeycreepers. The radiation is also exemplified by differences among closely related honeycreepers endemic to different islands. For example, the amakihi on all main islands have greater differences in bill morphology than any other honeycreeper. Molecular studies indicate that the ancestral amakihi evolved on the oldest main island of Kauai, and sequentially colonized newer islands. Bill length has reversed four times during the evolutionary history of the bird. These reversals are associated with presence or absence of potential competitors. Hawaiian birds are also the classic example of extinction and endangerment of island forms. Studies of fossil birds, not known to 18th century naturalists, indicate extensive radiation of honeycreepers and other avian groups that went extinct after humans colonized the Hawaiian Islands. Numerous historically known birds are extinct, and most remaining species are endangered.

74 Life History Diversification of Hawaiian Honeycreepers, LEONARD A. FREED¹ (¹Department of Zoology, University of Hawaii

at Manoa, Honolulu, HI 96822; lfreed@hawaii.edu)

Hawaiian Honeycreepers (Drepanidinae) are a tropical insular clade of cardueline finches (Fringillidae) that have diverged substantially in diet, morphology, plumage, and life history from a continental seed-eating ancestor. These characters have diverged in concert from the ancestral state. Seed-eating honeycreepers have life histories and bill morphologies most similar to tropical non-honeycreeper cardueline species. Clutch size mostly exceeds 2 eggs and multiple clutches can be produced each year. Nectarivorous and insectivorous honeycreepers lay smaller clutch sizes, usually 2 eggs. Nectarivorous and generalist insectivorous honeycreepers have more than one clutch per season. Specialized insectivorous honeycreepers have only one clutch per year. These differences are established both by studies of banded individuals and by ratios of hatch year birds to adults captured in mist-nets. The duration of fledgling care varies considerably with diet and with foraging specialization within diet. The fledgling period may constrain the number of clutches and even clutch size. The specialized insectivorous honeycreepers thus manifest the conservative life history assumed of most tropical birds. We can exploit the fact that these different life histories occur in the same environment, and investigate the relationship between reproductive rate and adult survivorship taking into account extrinsic and intrinsic causes of mortality. Reproductive rate, based on number of broods, and adult survivorship are inversely related. Annual adult survival is not based on body size, eliminating this important variable as a source of intrinsic mortality. When adjustment is made for extrinsic sources of mortality, a trade-off exists between number of broods and adult survival.

75 Adaptation of the Hawaii Akepa to Molt and Breed During a Seasonal Food Decline: The Importance of Offspring Mass, MATTHEW C. MEDEIROS¹, LEONARD A. FREED², and J. SCOTT FRETZ² (¹Department of Biology and the Whitney Harris World Ecology Center, University of Missouri-St. Louis, St. Louis, MO 63121-4499; ²Department of Zoology, University of Hawaii at Manoa, Honolulu, HI 96822; mcmn92@umsl.edu)

The annual cycle of organisms consists of a sequence of events associated with reproduction and self-maintenance between reproductive attempts. Natural selection is assumed to drive the peak energy demands of these activities to coincide with a peak in resource abundance. For birds, this generally means reproduction is initiated during an increase in food abundance such that the energetically expensive activity of raising nestlings and fledglings are synchronized with high food availability. No study to date has identified a bird that initiates breeding during a seasonal food decline. An adaptation may be necessary to cope with such a decline. Here, we show that the Hawaii akepa (*Loxops coccineus*) initiates breeding during a seasonal decline in canopy arthropods, the main food source of the bird. The timing of akepa reproduction may be constrained by cold temperatures and a phylogenetically-fixed molting phenology. We found that nestlings weigh more than their parents and hypothesize that this is an adaptation evolved in response to these seasonal food dynamics. Fat and mass dynamics over the fledgling period support this hypothesis. Moreover, fledglings of greater mass have higher survival to adulthood independent of month of capture or skeletal morphometrics. A low rate of individual mass changes implies fledgling mass is largely determined by nestling overgrowth. The highest mass fledglings have apparent survival that is equivalent to adults. The nestling overgrowth adaptation may indicate a form of prospective parental care in which parents bank reproductive effort

during a time of relatively higher resources.

76 Sexual Dimorphism and the Evolution of Seasonal Variation in Sex Allocation in a Hawaiian Bird, REBECCA L. CANN¹ and LEONARD A. FREED² (¹Department of Cell and Molecular Biology, University of Hawaii at Manoa, Honolulu, HI 96822; ²Department of Zoology, University of Hawaii at Manoa, Honolulu, HI 96822; rcann@hawaii.edu)

Seasonal variation of sex allocation occurs when females produce more of the larger sex during good food conditions, or bias their reproduction toward the sex with the greatest likelihood of successful breeding the following year. It is usually documented by sexing nestlings within broods. For sexually dimorphic birds, changes in dimorphism of slow growing skeletal characters of male and female fledglings may reveal the seasonal variation in sex allocation if the dimorphism among fledglings initially exceeds that of adults and reaches the adult level as fledglings grow. We provide evidence from fledglings that males are produced mainly by early nesting females in the Hawaii akepa (*Loxops coccineus coccineus*), a Hawaiian honeycreeper with minor sexual size dimorphism in bill and wing length. Fledglings in June include individuals from nests in March-June, and male fledglings are larger. Sexual dimorphism of bill length of June fledglings exceeds that of adults and approaches that of adults as fledglings grow. Sons from early nests grow their bills under better food conditions before parents begin to molt. There is stabilizing selection against shorter billed males of reproductively mature age classes in relation to energy expenditure. Seasonal variation in sex allocation increases long-term survival of sons and reduces the cost of reproduction to parents by minimizing the conflict of molt-breeding overlap. However, seasonal variation in sex allocation has become a maladaptation in association with food limitation. Now, only females in the best condition are breeding successfully, and they are doing what they evolved to do – produce sons.

77 Explosive Increase in Ectoparasites in Hawaiian Forest Birds, GUSTAV R. BODNER¹, LEONARD A. FREED¹ and MATTHEW C. MEDEIROS² (¹Department of Zoology, University of Hawaii at Manoa, Honolulu, HI 96822; ²Department of Biology and the Whitney Harris World Ecology Center, University of Missouri-St. Louis, St. Louis, MO 63121-4499; gbodner@hotmail.com)

Ectoparasites, particularly chewing lice in the Phthiraptera (Insecta), affect the ecology of numerous host species. Most lice are highly host specific, and there are no documented cases of major increases of chewing lice within populations over years. During continuous study from 1987-2005 at upper elevation forests on the Island of Hawaii, chewing lice were exceedingly rare in 12 species of native and introduced birds until 2003. From 2003-2005, there was explosive increase in prevalence of chewing lice in all host species. There was no change in humidity or behavior of hosts that could have caused ecological release of existing lice. Based on reduced fat levels and more broken wing and tail feathers for most host species, food limitation preceded the increase. The increase coincided temporally with detection of a non-native bird recently found in elevations below the study sites. Isolated sightings of this bird occurred on the study sites; also, seasonal movements of some native birds could have brought lice onto study sites. Prevalence of birds with lice, and intensity as number of body regions parasitized, were both lower in native species with greater bill overlap, a character that could help birds control lice. Seasonally, low prevalence

preceded molt and high prevalence followed molting of birds. The number of major fault bars in wing and tail feathers, a sign of nutritive stress, was correlated with intensity of infection, indicating an indirect cost to parasitized hosts. In addition, birds with lice were less likely to be recaptured than birds without lice.

78 *Why Introduced Birds Are the Most Important Threat to Hawaiian Forest Birds*, **LEONARD A. FREED¹, REBECCA L. CANN² and GUSTAV R. BODNER¹** (¹Department of Zoology, University of Hawaii at Manoa, Honolulu, HI 96822; ²Department of Cell and Molecular Biology, University of Hawaii at Manoa, Honolulu, HI 96822; lfreed@hawaii.edu)

Native Hawaiian birds are threatened by habitat elimination, degradation, and introduced species. Introduced species include mosquito-borne diseases, insect competitors such as yellow-jacket wasps and parasitoids, mammalian and avian predators, and avian competitors. Less attention has been directed at introduced birds, because most of these are not found in forests with endangered birds, and those in such forests have apparently coexisted with endangered species since the Hawaii Forest Bird Survey conducted in the 1970's. But this static perspective may be misleading. We documented an increase in numbers of the introduced Japanese white-eye (*Zosterops japonicus*) that has resulted in all native birds at Hakalau Forest National Wildlife Refuge showing signs of food limitation. This is likely exploitative competition for food. The problem is severe for the endangered Hawaii akepa (*Loxops coccineus coccineus*), which is most similar to the white-eye in bill length and foraging substrates used. The two species coexisted from 1987-1999, and the population of the akepa was viable. With the increase in white-eyes, beginning in 2000, the akepa population has become non-viable and crashed in 2006. Every demographic parameter is significantly lower since the increase. There is evidence that it is replacing akepa throughout its range of highest density, and the white-eye may be responsible for the distribution and abundance of the akepa established during the 1970's. Recent problems with insectivorous native birds on the island of Kauai are also associated with an increase in white-eyes. Management of introduced birds will become essential for conserving native birds.

Putting the Science into Informal Science Education: Pathways to Broader Impacts Wednesday, 1:15 p.m. in HPA Library

79 *Integrating Research and Education – Opportunities and Mandates*, **MARGARET GOULD BURKE** (California Academy of Sciences, 55 Concourse Drive, Golden Gate Park, San Francisco, CA 94118; mburke@calacademy.org)

The mandate for broader impacts for scientific research is driven both by federal funding requirements and societal needs. It has led to the development of numerous federal funding opportunities, as well as to science institutions including the integration of research and education in their strategic planning, and to exciting new collaborations between a diverse cast of characters ranging from universities to natural history museums, science centers, planetaria, zoos and aquaria to media to elementary and secondary schools. Institutions interested in informal science education need science content for exhibits and programs, and researchers need public venues for sharing research processes and results; it is a natural and mutually beneficial match.

The California Academy of Sciences, one of the oldest natural history museums in the country, is about to reopen to the public after a complete physical renovation and serious programmatic restructuring. Research strengths of the Academy were key drivers in determining general exhibit topics and specific content of exhibits and educational materials, and an institutional commitment was made to integrate research and education whenever and wherever possible in the new Academy.

Effective integration, however, does not have to be restricted to only such large-scale projects. Whether securing educational grants tied to active research grant projects, including scientists in exhibit development teams, or providing teachers and students with access to active research and researchers, there are many pathways for bringing authentic science to the public and leveraging basic research for broader impacts.

80 *Engaging the Public in Science – It Matters*, **JUDITH G. SCOTCHMOOR** (University of California Museum of Paleontology, 1101 Valley Life Sciences Building #4780, Berkeley, CA 94720-4780; jscotch@berkeley.edu)

The 2006 Science and Engineering Indicators published by the National Science Board indicate that “most Americans do not understand the scientific process and therefore may lack a valuable tool for assessing the validity of various claims they encounter in daily life” and that belief in pseudoscience is relatively widespread. Given the impact of science on public life, we cannot afford to ignore a growing public confusion and complacency about and disengagement from science.

Numerous efforts to engage the public in science are now emerging. These range from citizen science projects, to the burgeoning number of science cafés, to national coalitions and celebrations of science. Two such projects focus on improving the public understanding of how science works, why it matters, and who scientists are. (1) The Year of Science 2009 is a year-long celebration of science sponsored by a grassroots network, the Coalition on the Public Understanding of Science. (2) *Understanding Science* is a collaborative project of the University of California and the Museum of Paleontology. At its core is a website scheduled to launch later this year that offers a new approach for K-16 teachers – one that focuses on how science *really* works and how we can integrate an emphasis on the process of science into our teaching. These two initiatives welcome participation from the scientific community and provide avenues through which researchers can share their science with a broader audience.

81 *Bridging the Gap between Research and Informal Education – A New Model*, **JESSICA I. NEELY** (KQED Public Broadcasting, 2601 Mariposa St., San Francisco, CA 94611; jneely@kqed.org)

KQED Public Broadcasting has developed a new model for the role of public broadcasters in bringing scientific information to the public with its local series, *QUEST*. Its mission is to provide entertaining and quality science resources, in a variety of media including radio, TV, website and education activities, to spotlight scientific research, the process of science and raise science literacy.

Independent research conducted by the Gordon and Betty Moore Foundation, the National Science Foundation, Pew, and others, have shown that America's achievement gap in the sciences continues to affect the nation in important ways—from everyday family decisions, to the implementation of regional and national policy, and the growing demand for skilled personnel. Informed by

these pressing needs, KQED created *QUEST* to enhance science literacy, improve opportunities for science education, and highlight the San Francisco Bay Area's richness as a center for environmental stewardship, scientific research, and technological innovation.

Designed as a cross-platform project, *QUEST* distributes its audio and video stories online through the *QUEST* website and downloads such as YouTube and iTunes. *QUEST*'s educational reach is extended by the production of education guides that correlate to California science standards and 21st Century skills. Much of *QUEST*'s success is due to community partnerships with renowned science research centers, museums and parks. For the future, it is KQED's hope that the scientific research community finds support from public broadcasting to reach new audiences – particularly the generation of youth in which the future of our scientific innovation lies.

82 *The Value of Sharing Our Science*, **DAVID R. LINDBERG** (University of California Museum of Paleontology, 1101 Valley Life Sciences Building #4780, Berkeley, CA 94720-4780; drl@berkeley.edu)

In 1997, the National Science Board took a critical step in creating a cultural change in the scientific community by requiring explicit consideration of the broader impacts of research in every submitted research proposal. Though this may have been met with some concern by members of the research community, it also provided us with a much-needed incentive and a wealth of opportunities. Outreach is often equated with a trip to a second grade class to talk about our science – an uncomfortable situation at best for most of us. In reality, outreach takes place with each conversation with others outside of your own laboratory, in each lecture hall where you speak, and on every fieldtrip that you coordinate. Outreach is simply sharing your science with another audience, which you do on a daily basis. Moving from an academic sharing into a public sharing is an easy, fulfilling, and extremely important transition.

With the use of the Internet, new media, social networking, and a rise in collaborations between academia and informal science, a researcher today has the opportunity to interact with the public through a broad range of venues. But perhaps our most important interactions are not the sharing of content, but the sharing of how we do our science – our unique and exciting journeys as we learn about the natural world.

Celebration and Politics: Race and Ethnicity in America Seen Through United States World's Fairs and Expositions

Wednesday, 1:15 p.m. in HPA Room 42

83 *America's World's Fairs: Negotiating Boundaries of Race and Ethnicity*, **ROBERT W. RYDELL** (Department of History and Philosophy, 2-155 Wilson Hall, Montana State University, Bozeman, MT 59717 USA; rwydell@montana.edu)

As primary vehicles for the ongoing cultural reconstruction of the United States after the Civil War and through much of the twentieth century, America's world's fairs reflected and shaped debates about ethnicity and race. The paper begins with an examination of the tension between these two categories in ethnological villages along the Midway Plaisance at the 1893 Chicago World's Columbian Exposition and concludes with an analysis of the "confluence of cultures" theme at the 1968 San Antonio HemisFair. Examining

how world's fairs shifted from being "iron cages" of race to becoming dancing floors of ethnicity within the context of changing US government foreign and domestic policies requires an assessment of the American Common at the 1939 New York World's fair and may well carry some important lessons for the future as the United States government thinks through how the US should be represented at the 2010 Shanghai World Expo.

84 *Chinese-American Identity in the Making: World Fairs in Chicago and Seattle*, **CHUIMEI HO** (Ph.D., Independent Scholar, 8417 NE Paulanna Lane, Bainbridge Island, WA 98110 USA; hochuumei@gmail.com)

Two early world fairs, the 1893 World's Columbian Exposition in Chicago and the 1909 Alaska-Yukon-Pacific Exposition in Seattle, were unique in that they included Chinese exhibits that were organized not by the Chinese government but only by local Chinese-Americans. No other world fair in either North America or Europe featured an exhibit representing a non-Western country in which messages about ethnic image and identity were controlled by immigrants rather than colonial and national officials. When the Chinese government did agree to join Chicago's Century of Progress Exposition in 1933-34, entrepreneurs in the local Chinese American community could not be kept away.

In a broader sense, such fairs were not only community unifiers for Chinese in the U.S. but constituted crises that confronted Chinese communities with questions of cultural identity and political allegiance in the conflicting demands of their motherland and their host country. My discussion will maintain that these and other American world fairs played a key role in the development of a new Chinese-American consciousness within a marginalized but surprisingly self-confident minority ethnic group.

85 *Japanese Participation in the Two Chicago World Fairs: The Road Leading to Manchuria*, **ANDREA L. STAMM** (Librarian, Northwestern University Library, Northwestern University, 1970 Campus Drive, Evanston, IL 60208-2300 USA; astamm@northwestern.edu)

In both the 1893 World's Columbian Exposition and the 1933-34 Century of Progress, Japanese participation stands in stark contrast to Chinese participation. In 1893, when only a handful of Japanese Americans resided in Chicago, the Japanese government built on their previous success in the 1876 Centennial Exposition in Philadelphia, distancing themselves from the Chinese and highlighting their wide-ranging modernization efforts along Western lines in the fields of science and technology, education, and especially the fine arts, their most impressive exposition success. Public entertainment, so pronounced among the other ethnic groups in the Midway, was conspicuously absent for the Japanese who had officially adopted Western dress by this time. Due to its success in the 1893 fair, Japan was able to meet both of its goals: to strengthen its commercial ties to U.S. markets as well as to demonstrate its march towards Western modernization. Although Japan escaped nearly all of the negative stereotyping applied to the Chinese, fairgoers often viewed the Japanese with condescension and characterized them as "child-like."

The political scene had markedly changed by the 1933 Chicago fair. With only some 500 Japanese Americans living in Chicago, Japan waffled about officially participating until it learned that China would actually officially participate. Japan had recently invaded Manchuria and Shanghai, and Korea was a Japanese colony. Japan's

troubled economy, affected by the American Great Depression, was the primary goal of the 1933 fair where luxury items such as silk, pearls, and tea were featured along with tourism. However, Japan's second goal of showcasing the Japanese development of Manchuria worked against them. A series of lectures on Japan caused severe political tension between Japan and an increasingly vocal Chinese and Chinese-American community, enough to cause Japan to not return for the second fair season in 1934. In spite of this, Japanese businessmen from several provinces continued to ply their wares in 1934, but with limited success.

86 *Modern Displays and the Skeptical 'Savage': Revisiting the Philippine Experience in St Louis, 1904*, **CHERUBIM A. QUIZON** (Department of Sociology and Anthropology, Seton Hall University, 400 South Orange Avenue, JH 512, South Orange, NJ 07079 USA; quisonch@shu.edu)

The display of peoples in world's fairs is a specific representational device deployed directly by colonial governments, or indirectly through its agents. There exist parallel displays of living peoples by private citizens of such colonial governments who engage in such activities for profit, for philanthropy, or both. Despite the ideological complexity of these displays, they propose to explain the colonial "Other" to a mass audience in patterned ways and often seek to justify the colonial project itself.

This paper seeks to re-examine the display of a thousand Filipinos at the 1904 Louisiana Purchase Exposition by focusing not on the well-studied claims of the United States colonial government in the Philippines, nor on its private citizens as entrepreneurs, but on the perspectives of the displayed Filipinos. Through a consideration of contemporary field-based research in the communities of origin, fresh perspectives on museum and archival collections as well as first-person creative projects in documentary film and theatre, this paper seeks to address the dilemmas of being a colonized subject in a multicultural nascent state a century ago and contribute to a broader understanding of the depth and complexity of the Philippine experience.

87 *Chinese and Japanese Participation in the Panama-Pacific International Exposition*, **ABIGAIL MARKWYN** (Department of History, Carroll College, 100 N. East Avenue, Waukesha, WI 53186 USA; amarkwyn@cc.edu)

In 1915, San Francisco hosted the Panama-Pacific International Exposition, a nine-month long extravaganza intended to boost San Francisco and encourage economic ties between the United States and the Pacific Rim. In the minds of fair organizers, the nations of China and Japan were essential participants in the fair, for without them the fair could not claim to be truly "international" and might fail to lure eastern businessmen and Europeans interested in trading with Asia. But China and Japan were skeptical about participation since Chinese and Japanese immigrants faced stiff opposition and entrenched anti-Asian racism in California. This paper will explore the ways in which California's anti-Asian political and social climate complicated attempts by fair officials to bring China and Japan to the fair. It will also argue that despite this anti-Asian climate, both nations as well as local Asian residents attempted, and at times succeeded, in using the grounds of the Exposition to create alternate visions of Asia and Asians, for visitors to the exposition.

Pacific Science: U.S.–Asia/Pacific Scientific Collaboration in the 21st Century

Wednesday, 1:25 p.m. in HPA Gerry CLARK Art Center

88 *The Pacific Science Association: Advancing International Collaborative Research in the Asia-Pacific Since 1920*, **NANCY D. LEWIS¹** and **JOHN BURKE BURNETT²** (¹Vice-President, Pacific Science Association and Director, Research Program, The East-West Center, 1601 East-West Road Honolulu, Hawaii 96848, USA; ²Executive Director, Pacific Science Association, 1525 Bernice Street, Honolulu, HI 96816, USA; lewisn@eastwestcenter.org)

The Pacific Science Association (PSA) is a regional non-governmental, scholarly organization with a Secretariat in Honolulu, Hawaii that seeks to advance science, technology, and sustainable development in and of the Asia-Pacific region by actively promoting interdisciplinary and international research and collaboration. Through quadrennial Congresses and Inter-Congresses held throughout the region as well as the scholarly journal *Pacific Science*, PSA is actively involved in linking scientists and their research to their regional counterparts. PSA also promotes awareness and commitment among West-based scientists to broader issues of international collaboration, such as capacity-building, dissemination of information, and work with communities.

PSA also facilitates research initiatives and Scientific Working Groups on critical emerging issues for the region, including biodiversity loss, climate change, infectious diseases, and the societal implications of globalization. In many ways, the future of science lies in interdisciplinary or even multidisciplinary approaches: increasingly complex issues and problems are often only fully understood when approached from a variety of critical perspectives. Science has a crucial social role in providing crucial information required by both policymakers and the public to make sound and informed decisions; PSA is also geared to help provide tools to scientists to more effectively communicate their research agenda and results to the non-scientific community.

89 *Highlights of International Cooperation in the Study of Plant Diversity in Vietnam, 1993-2008*, **JACINTO C. REGALADO, JR.¹**, **LE XUAN CANH**, **TRAN HUY THAI**, **TRAN MINH HOI**, **NGUYEN TIEN HIEP**, **VU XUAN PHUONG**, **NINH KHAC BAN²**, **PHAN KE LOC**, **NGUYEN NGHIA THIN³**, **NGUYEN VAN TAP⁴**, **VU VAN DUNG**, **NGUYEN HUY DUNG⁵** and **LEONID V. AVERYANOV⁶** (¹Missouri Botanical Garden, P.O. Box 299, St. Louis, MO 63166-0299; jack.regalado@mobot.org; ²Institute of Ecology and Biological Resources, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet Road, Cau Giay, Hanoi, Vietnam; ³Hanoi National University, 334 Nguyen Trai St., Thanh Xuan, Hanoi, Vietnam; ⁴National Institute of Medicinal Materials, Ministry of Health, 3b Quang Trung Street, Hanoi, Vietnam; ⁵Forest Inventory and Planning Institute, Ministry of Agriculture and Rural Development, Thanh Tri, Hanoi, Vietnam; ⁶Komarov Botanical Institute of the Russian Academy of Sciences, Prof. Popov St. 2, St.-Petersburg 197376, Russia)

Accelerated progress in field explorations in Vietnam and scientific studies of plant diversity of this once isolated country has resulted in the discovery of new taxa and new additions to the flora of Vietnam. The collaborative efforts of the *Vietnam Botanical Conservation Program*, a scientific cooperation between the Institute of Ecology and Biological Resources and the Missouri Botanical

Garden have significantly contributed to the revitalization of plant diversity research in Vietnam. More than two hundred new taxa, including thirteen genera, of higher vascular plants have been described and seventy seven new records of plants have been similarly documented. These findings accounted for a remarkable 3% increase in the flora. In addition to research activities, the Program has worked closely with Vietnamese partner institutions to develop competence and build capacity for the conservation and sustainable use of plant diversity. Over the past fifteen years, through its many research and training activities, the Program helped to establish local infrastructure that can increasingly assume responsibility for conserving and sustainably managing Vietnam's rich biodiversity. A recent grant supported the expansion of capacity-building programs for research and conservation in Laos and Cambodia.

90 *Global Forest Observatories: An International Network Monitoring the Health of Tropical Forests*, **STUART J. DAVIES** (Center for Tropical Forest Science, Smithsonian Tropical Research Institute and the Arnold Arboretum of Harvard University, 22 Divinity Avenue, Cambridge MA 02138, USA; sdavies@oeb.harvard.edu)

Tropical deforestation continues at around 13 million hectares per year. This and other land-use change in the tropics contributes greenhouse gases to the atmosphere, reduces the ability of forest to regulate climates, and threatens the many species that are only known from tropical rain forests. Regrettably, there is a tremendous gap in our understanding of the role of tropical forests in the global carbon cycle, in regulating hydrological cycles, and the likely impact of these changing global conditions.

The Center for Tropical Forest Science developed methods to understand how deforestation and climate change are affecting tropical forests. CTFS coordinates research activities using standardized methods on forest plots ranging from 16-148 hectares in 20 sites in 15 tropical forest countries. Twelve of these sites are in Asia.

The CTFS plots involve hundreds of scientists from more dozens of institutions. Over the past 25 years, the CTFS network has created the first actuarial table for tropical trees around the world, thus providing a basis for determining quantitatively how trees and forest ecosystems are responding to Earth's changing climate. This international collaboration is now monitoring the growth and survival of 3.5 million trees in over 6,500 species – over 12% of all known tropical tree species - to investigate key indicators of global environmental health. In this talk, I will discuss some of the key findings of this global network of tropical forest research.

91 *DNA Barcoding: International Collaboration for Species Identification in Research, Conservation, and Regulatory Affairs*, **DAVID E. SCHINDEL** (Executive Secretary, Consortium for the Barcode of Life, Smithsonian Institution, MRC-105, Washington DC 20013-7012, USA; schindeld@si.edu)

"DNA barcoding" was proposed in 2003 as an approach to identifying the species to which biological specimens belong using a short, standardized DNA sequence. Reference barcode data records are obtained by sequencing the barcode gene region of specimens identified by expert taxonomists. There are currently more than 350,000 barcode records from about 40,000 species. Reference records are deposited in GenBank for public access. Non-taxonomists such as government regulators and border inspectors can obtain identifications by comparing barcode sequences from unidentified organisms with the reference records. Only a tiny amount of

tissue is needed, enabling identification of immature stages, tissue fragments, and processed products.

Barcoding projects, networks, and collaborative initiatives have been launched for basic research on an array of taxonomic groups and on a wide range of applied regulatory issues (e.g., species conservation, environmental monitoring, consumer protection). Two examples of great importance to Pacific nations are the use of barcodes to control the spread of invasive and pest species, and to better characterize and protect commercial fish species. The Consortium for the Barcode of Life (CBOL; www.barcoding.si.edu) promotes international participation and collaboration and has 170 Member Organizations from 50 countries and promotes. CBOL held an international barcode conference in Taipei in September 2007 with 350 participants from 45 countries. Barcoding projects are active or being planned in many Asian countries.

92 *Global Collaboration to Address Global Problems: Trans-Pacific Collaboration for Research on Global Change and Sustainable Living on Arid Lands*, **J. SCOTT HAUGER¹, QINGWEI SUN² and ATSUSHI TSUNEKAWA³** (¹Desert Research Institute, 2215 Raggio Parkway, Reno, NV 89512, ²Cold and Arid Regions Environmental and Engineering Research Institute, Donggong West Road, Lanzhou 730000, China, ³Arid Land Research Center, Tottori University, 1390 Hamasaka, Tottori, Japan 680-0001; scott.hauger@dri.edu)

Global change in climate and in demographics is strongly impacting arid lands and the people who live in them in ways that are vitally important, but not always well understood. Understanding the nature, scope, timing, and impacts of change will be critical to the nature and quality of life in arid lands.

International research collaboration to address global problems can have a multiplier effect for intellectual capital and facilitate knowledge transfer. It provides a platform for comparative and parallel studies of phenomena as observed across the world's drylands, and provides researchers with access to facilities and equipment not locally available. Well-managed collaborations can combine resources and make for a more efficient research enterprise.

Since 2004, the Desert Research Institute, an element of the Nevada System of Higher Education, and an internationally recognized leader in drylands' research, has worked with its counterparts in China and Japan to develop and implement collaborative research to address problems of sustainable living on arid lands. Japan's Arid Lands Research Center is a division of Tottori University in Tottori. The Cold and Arid Regions Environmental and Engineering Research Institute is an arm of the Chinese Academy of Sciences, located in Lanzhou, China. This paper will document the course of building these collaborations. It will consider our successes to date and identify the problems and barriers to effective collaboration. It will consider lessons learned that can be applied for their future development and help inform other research institutes working for effective research collaboration across the Pacific rim.

93 *Exploring the Unanticipated Consequences of Ocean Acidification by Fossil Fuel CO₂*, **PETER G. BREWER** (Monterey Bay Aquarium Research Institute, 7700 Sandholdt Road, Moss Landing, CA 95039; brpe@mbari.org)

The massive on-going transfer of fossil fuel CO₂ from air to sea is now drawing scientific attention. Some 530 billion tons of fossil fuel CO₂ have now been disposed of in the ocean; the invasion rate is now about 1 million tons CO₂ per hour. Such quantities

and rates rival or exceed those of major geologic events in Earth's history, and the resulting rise in dissolved oceanic CO₂ and lowering of ocean pH are, when combined with global warming, widely believed to pose challenges for much marine life. Early scientific attention has been focused on calcifying marine systems, such as coral reefs and calcareous phytoplankton, as the degree of upper-ocean supersaturation with aragonite is progressively lowered. Issues of experimental technique and the adaptability of differing strains of marine organisms are now being vigorously debated. So far as I am aware no documentation of thinning of the annual growth rings of marine reef building corals from the 20th century atmospheric CO₂ invasion has yet been demonstrated.

The oceanic regions that already face the most CO₂ stress are the huge mid-depth oxygen minimum regions in the tropical oceans, and these regions may be expected to expand and intensify. There are formal thermodynamic limits beyond which animals cannot adapt, and these will begin to exert controls. Here I describe the problem, the observing strategies, and the likely consequences.

94 International Scientific Collaboration at the NOAA Pacific Islands Fisheries Science Center, SAMUEL G. POOLEY (NOAA's Pacific Islands Fisheries Science Center, 2570 Dole Street, Honolulu, HI 96822; Samuel.Pooley@NOAA.gov)

NOAA's Pacific Islands Fisheries Science Center engages in international collaboration on a wide range of fronts, from fisheries management research with Asian fishing nations to fisheries bycatch research in Latin America and the South Pacific, to sea turtle research throughout the Pacific. All of this work requires strong person-to-person connections between researchers at PIFSC with their international peers.

Asian American Women: Health and Welfare

Thursday, 8:00 a.m. in HPA Kono Center for English Studies

95 The Role of Health Insurance and the Safety Net in Reducing Cancer Screening Disparities Among Asian American Women, NINEZA. PONCE (Department of Health Services, UCLA School of Public Health, 31-254CHS, University of California, Los Angeles, Los Angeles CA 90095-1772 USA; nponce@ucla.edu)

Asian American women are the only group in the United States for whom cancer is the leading cause of death. Cancer rates among Asian American women in the United States are both higher and rising faster than among those living in Asia. Breast cancer is the most prevalent; cervical cancer is high among some Asian American subgroups; colorectal cancer is the second most commonly diagnosed cancer. Despite high prevalence and later stage of diagnosis for some subgroups, Asian American women have among the lowest cancer screening rates of all ethnic groups in the United States. Although cultural and linguistic barriers have been well-identified in the literature as major determinants of low screening rates among Asian women, factors such as health insurance coverage and the health care safety net may play a dominant role in ensuring access to physicians and consequently access to cancer prevention services. Focusing on breast, cervical and colorectal cancer screening, this presentation links the relationship between the enabling factors of health insurance coverage and the health care safety net with the disparities in cancer screening rates among Chinese, Filipina, Japanese, Korean, Vietnamese, and South Asian women. Empirical work will primarily use the California Health

Interview Survey, a multiethnic population-based survey administered in 5 Asian languages, in addition to English and Spanish, and extensively culturally-adapted for Asian American subgroups. The findings aim to inform health policy makers in identifying the groups most at-risk of low screening rates and to what extent coverage and proximity to safety net clinics mitigate this risk.

96 Suicide and Depression Among Asian American Women, ELIZA NOH (Asian American Studies Program, California State University, Fullerton, H-312E, CSUF, 800 N. State College Blvd., Fullerton, CA 92834-9480 USA; enoh@fullerton.edu)

This presentation will cover the findings of my research study on suicide among Asian American women. Based on interviews with Asian American women suicide survivors, this is a qualitative study of how race and gender, as well as racism and sexism, influence how Asian American girls are socialized within their family, community, and social environments to become suicidal or depressed women. Primary themes that emerge deal with the role of the model minority ideology in suicide, creating tremendous pressures for Asian American women to perform and achieve in school and at work; the intergenerational transmission of gender and racial trauma, particularly from mothers to daughters, in which gendered and racialized notions of self-worth are passed on; problems of healing for Asian American women within conventional therapeutic frameworks that promote individual adjustment to the social status quo, rather than challenging socially pathological racial and gender dynamics; and finally, the actual strategies that Asian American women employ for healing, from alternative methods, such as social activism and creative expression, to conventional psychotherapy and medication.

Past and Future of the Fauna of the Pacific Basin

Thursday, 8:20 a.m. in HPA Gerry Clark Art Center

97 Climate Change in the Pacific Basin: Past and Future, DAVID R. LINDBERG (University of California Museum of Paleontology, 1101 Valley Life Sciences Building #4780, Berkeley, CA 94720-4780; drl@berkeley.edu)

The Pacific Basin and associated mainland and island habitats are a mosaic of old and young physical features. Similarly, biodiversity in the basin also includes deep lineages and younger, shallow lineages. Basin geomorphology and geographical position will mediate the biological effects of climate change, and because of the north-south trend of the continents that border the Pacific Basin, movement along the latitudinal gradient may buffer the effects of temperature change for near shore, continental taxa. However, islands and their biodiversity are especially vulnerable to climate change because there are fewer options on islands compared to the larger continental landmasses. Other changes such as sea level rise, ocean circulation patterns, ocean acidification, and storm tracks will likely impact both islands and coastal areas more equally. Changes in benthos availability associated with sea level change may be especially critical for benthic and near shore feeding taxa.

98 Late Ordovician Climate Change: Related Biodiversity Changes, WILLIAM B. N. BERRY (Department of Earth and Planetary Science, 307 McCone #4767, University of California, Berkeley, CA 94720-4767; bberry@berkeley.edu)

An approximately one million year glaciation centered on the South Pole disrupted long-term non-glacial global climates near the

end of the Ordovician. Significant biodiversity changes occurred among marine organisms both at onset of glaciation and during deglaciation. Shallow marine environments were reduced markedly during glaciation as a consequence of sea level fall of about 100 meters. Significant extinctions occurred among shelf sea dwelling organisms. Ocean circulation changes led to extinctions among graptolites, the prominent marine plankton at that time. Certain basins on broad shelves were not fully drained during glaciation. Habitats in them were sites of continued speciation and origination of new lineages. Certain benthic taxa became adapted to relatively cold water conditions. Sea level rise, ocean circulation changes and warmer sea surface temperatures during deglaciation resulted in extinctions among benthic faunas adapted to cold sea surface temperatures. Taxa in new lineages and certain existing lineages of marine benthic organisms and of planktic graptolites spread from constrained habitats present during glaciation. Many organisms radiated significantly in the newly-developing habitats as marine waters spread across shelves. Biodiversity change was linked closely with alterations of the marine environment during the Late Ordovician global climate changes.

99 Documenting Species Diversity Along the Verde Island Passage, Philippines: The Apex of the Coral Triangle, TERRENCE M. GOSLINER (California Academy of Sciences, 55 Concourse Drive, San Francisco, CA 94118; tgosliner@calacademy.org)

Recent studies by Carpenter and Springer (2005) have shown that the Verde Island Passage, separating Luzon and Mindoro Islands in the northern Philippines, supports the world's highest known diversity of shorefishes. This region has been characterized as the "center of the center of marine biodiversity" based on these data. The diversity of few other taxa has been documented from this region. For more than 16 years, we have been undertaking studies of the opisthobranch mollusk fauna of this area based largely on shallow water studies made by scuba and snorkeling.

Compilation of these data demonstrates several major trends. The opisthobranch fauna is composed of a high percentage of undescribed taxa. Approximately 40 % of the species we have found there are undescribed. Since 1992, the species accumulation curve appeared to be leveling off in 2001, but subsequent studies in 2004 and 2008 demonstrate that many additional taxa have been documented recently and the list of species from the region still remains far from complete. The presently known opisthobranch fauna of the Verde Island Passage consists of more than 630 species and is the richest known fauna from any of the world's oceans. This work corroborates the work of Carpenter and Springer that this region is the center of the center of marine biodiversity. Future work will examine species diversity in many more taxa to further investigate the universality of this pattern.

100 Islands, Evolution and Feral Animals, MARGARET GOULD BURKE (California Academy of Sciences, 55 Concourse Drive, Golden Gate Park, San Francisco, CA 94118; mburke@calacademy.org)

Islands are living laboratories of evolution, but their flora and fauna are also frequently very vulnerable to external ecological disturbances. Since the first days of seafaring and colonizing, island ecosystems have been exposed to the introduction of numerous plant and animal species brought intentionally and unintentionally by humans. The same conditions that make islands evolutionary hotbeds – isolation, patchy taxa representation, low levels of com-

petition, and available niches – also make native species unprepared for new competitors, predators or parasites.

Feral goats are one of the most ubiquitous and problematic of the introduced mammalian species plaguing islands. High reproductive potential combined with a usual lack of predators on their new island homes leads to population explosions and devastating impact on native flora and any associated or dependent fauna. Goat eradication campaigns are time, labor and cost intensive and notoriously difficult in terms of achieving 100 percent success.

The Galápagos Islands and Aldabra Atoll, Republic of Seychelles, are the only two places in the world that have both giant land tortoises and feral goats. They present interesting parallels and contrasts in how feral goat populations respond to ecological and human parameters in unusual settings and the impact they have on native species. While feral goat population densities on Aldabra have never reached the levels seen in the Galápagos, multiple eradication efforts have been undertaken in both places, with varying degrees of success and permanence.

North Meets South: Special Neuroscience Research Programs in the Pacific
Thursday, 8:50 a.m. in HPA Library

101 North Pacific Exposure: Neuroscience, Melatonin and Behavioral Health in the North Pacific, LAWRENCE K. DUFFY¹, KRYIA DUNLAP¹, ARLEIGH REYNOLDS², ABEL BULT-ITO¹, KIMBERLY CLAPP¹ and GIANLUCCA TOSINI³ (¹Specialized Neuroscience Research Program, University of Alaska Fairbanks, Fairbanks, AK 99775-6160; ²Nestle-Purina Research Station, Salcha, AK; ³Specialized Neuroscience Research Program, Morehouse School of Medicine, Atlanta, GA)

Arctic and sub-Arctic people are spread across the Pacific bordering countries of the United States, Canada and Russia. Although Arctic residents, including many indigenous people, have very diverse cultural and social systems, they have health issues related to environmental exposure, such as light, temperature, diet and knowledge/treatment disparities, that are common to other Pacific peoples. Research that explores the neuroscience and behavioral aspects of stroke, depression, sleep dysfunction and nutrition has been organized through a NIH (NINDS-NIMH) funded specialized neuroscience research program. One broad research area being developed is the investigation of the interaction of light and seasonality on neuronal and neuroendocrine function. For example, using early stage cell culture model oxidative stress was studied. Amyloid-β (Aβ1-40) induced the secretion of both IL-1β and IL-6. Melatonin, an anti-oxidant and pineal hormone, reduced interleukin secretion in a concentration dependent manner. We also observed that melatonin, alone, at a concentration of 500μM induced the secretion of IL-6. In a dog model study, the peak in melatonin production was prolonged in high latitude dogs (65° N) compared with lower latitude dogs (45°N). Dogs at both latitudes show a reduction in peak melatonin levels with exercise, and winter melatonin levels in both locations were higher than the summer. In a microtine field study model, Alaskan northern red-backed voles show remarkable circadian phenotypic variation that has a genetic component and may be an adaptive trait to deal with light-dark cycle extremes in the Arctic.

Funded in part by NIH NINDS/NIMH 2 U54NS041069-06A1

102 Mu-opioid and NK1 Receptor Immunofluorescence and Involvement in the Neuroventilation Bullfrogs, BRITTANY L. DAVIES, CORD M. BRUNDAGE and BARBARA E. TAYLOR (Institute of Arctic Biology, University of Alaska Fairbanks, Fairbanks, AK 99775; fyabnp@uaf.edu)

The investigation of functional homologies between anuran and mammalian respiratory rhythm generators (RRGs) has been limited by difficulty in defining the sites and neuronal composition of the RRGs. Mu-opioid (μ OR) and neurokinin-1 (NK1) receptor colocalization has been used as a method of identifying the pre-Bötzing complex RRG in mammals. We conducted immunocytochemical staining for μ OR and NK1 receptors of *Lithobates* (formerly *Rana*) *catsebeiana* brainstem slices to determine if a similar region or regions could be identified in the bullfrog. Coexpression was located in a distinct site near the facial nucleus in juvenile bullfrogs. Receptor coexpression was not distinct in developing tadpoles. NK1 receptor intensity measurements had no trend during development, while μ OR intensity increased significantly from late stage to juvenile frogs. Substance P (SP), the NK1 receptor agonist, significantly increased lung burst absolute and instantaneous frequencies, episode absolute and instantaneous frequencies, lung burst amplitude and area, and significantly decreased lung bursts per episode and lung burst duration. Antagonist D, the NK1 receptor antagonist, significantly decreased lung burst absolute and instantaneous frequencies, episode absolute and instantaneous frequencies and lung bursts per episode, and significantly increased lung burst duration and area. DAMGO, the μ OR agonist, significantly decreased lung burst absolute and instantaneous frequencies, episode absolute frequency, lung bursts per episode and significantly increased all lung burst parameters. Naloxone, the μ OR antagonist, significantly increased lung burst absolute and instantaneous frequencies episode absolute frequency, lung bursts per episode and significantly decreased all lung burst parameters. These results collectively support the identification of a bullfrog RRG, one that is closely associated with lung ventilation and potentially homologous to the mammalian pre-Bötzing complex RRG. NIH 2U54NS041069-06A1

103 Chronic Ethanol Exposure Causes a Persistent Developmental Deficit in the Neuroventilatory Response to CO₂, CORD M. BRUNDAGE and BARBARA E. TAYLOR (Institute of Arctic Biology, University of Alaska Fairbanks, Fairbanks, AK 99775; fyabnp@uaf.edu)

Acute and chronic exposures to ethanol during developmental are associated with neurological and ventilatory impairments; however, the neuroventilatory impairments have not been extensively studied. Neuroventilation of the tadpole brainstem has been well characterized and is an excellent model for assessing neuroventilatory impairments that may result from teratogen exposure. We recorded neural correlates of breathing from tadpole brainstems challenged with hypercapnia (high CO₂) during acute bath application of ethanol and after chronic exposure of the intact animals for 10 wk. Tadpole brainstems decreased lung bursting following acute ethanol exposure, but appropriately responded to hypercapnic challenges with increases in lung bursting. Brainstems from tadpoles chronically exposed to ethanol failed to respond to hypercapnia, but exhibited no reduction in lung bursting prior to hypercapnic challenge. These data indicate that chronic and acute ethanol exposures differentially impair neuroventilation. Tadpoles were also exposed to chronic ethanol for 10 wk and then allowed 3 wk of ethanol-free recovery. Neuroventilation of these “recovery” tadpoles exhibited

similar impairments as chronically exposed tadpoles. From these data we conclude that chronic ethanol exposure causes a persistent developmental deficit in the neuroventilatory response to CO₂. NIH 2U54NS041069-06A1

104 Pharmacology of a Novel Positive Allosteric Modulator for Neuronal Nicotinic Receptors, ANSHUL PANDYA¹, MAEGAN WELTZIN¹, BRIAN EDMONDS², MARVIN SCHULTE¹ and RICHARD GLENNON³ (¹Department of Chemistry and Biochemistry, University of Alaska Fairbanks, Fairbanks, AK 99775; ²Department of Biology and Marine Biology, School of Arts & Science, University of Alaska Southeast, Juneau, AK 99801; ³Department of Medicinal Chemistry, School of Pharmacy, Virginia Commonwealth University, Richmond, VA 23284; ftaap@uaf.edu)

Allosteric modulators targeting neuronal nicotinic acetylcholine receptors (nAChRs) are emerging as treatment options in neurological disorders. Compounds such as galantamine are used clinically in the treatment of Alzheimer’s disease and may also be useful in the treatment of other disorders involving alterations in nicotinic tone including dementia and smoking cessation. Galantamine and Physostigmine are acetylcholinesterase inhibitors that also act as non-selective direct modulators of nAChRs.

The metabolite des-formylflustrabromine (dFBr) obtained from the marine Bryozoan *Flustra Foliacea* was recently identified as a selective modulator of the alpha4beta2 nAChR subtype. We have synthesized this compound and evaluated its action on heteromeric alpha4beta2 and homomeric alpha7 subtype of nAChRs using two-electrode voltage clamp. We confirm the action of dFBr as an allosteric potentiator of acetylcholine responses on the human alpha4 beta2 subtype of nAChRs. dFBr did not potentiate human alpha7 subtype of nAChRs.

We also evaluated 10 synthetic analogues of dFBr. Only two compounds (JSK-062) and (NG-089) were found to potentiate acetylcholine induces responses on alpha4beta2 receptors. Potentiated responses were inhibited at higher concentrations of test compounds. On alpha7 receptors, all 10 compounds inhibited acetylcholine induced responses with no potentiation observed on these receptors.

In order to determine if the dFBr class of compounds was acting through a similar mechanism to other allosteric potentiating ligands, we evaluated the effects of co-application of galantamine and physostigmine with dFBr. Potentiation by dFBr is not inhibited by either Galantamine or Physostigmine. When co-applied with dFBr, both galantamine and physostigmine produced a higher level of potentiation than when applied alone. This concerted effect suggests independent and interacting mechanisms of action for these compounds. The selectivity of dFBr compared to the non-selective nature of Galantamine and Physostigmine also suggests alternate mechanisms. This data suggest that dFBr represents a unique class of positive allosteric modulators with selectivity for the heteromeric alpha4beta2 nicotinic. The selectivity of this agent makes it a valuable lead molecule for the treatment of disorders involving decreased nicotinic tone resulting from decreased alpha4beta2 receptor expression.

105 Dose Dependent Effects of Arsenic Exposure on Morphology, Caspase-3 Activation, and Metabolic Status of SH-SY5Y Neuroblastoma Cells, MARINA R. CASTILLO, EMMA FLORES, NJIDEKA CHUWKU and CARLA CARTAGENA (Department of Chemistry and Biochemistry, Biochemistry and Molecular Biol-

ogy Program, College of Science, Engineering and Mathematics, University of Alaska Fairbanks, PO Box 757160, Fairbanks Alaska, 99775-6160; ffmrc@uaf.edu)

Exposure to arsenic in the drinking water represents a world wide health hazard. Although there is evidence that chronic arsenic exposure has a toxic effect on the nervous system, few studies have addressed this issue. The lethal effects of trivalent arsenic are believed to be mediated by interaction of the metal with vicinal cysteine residues on proteins resulting in oxidative stress. Neuronal exposure to sublethal concentrations of arsenic has the potential to modify neuronal function without killing the cell i.e. by impacting intracellular signaling cascades. The purpose of this study was to perform a preliminary characterization of arsenic induced neuronal injury and establish a range of non lethal exposures for our future studies.

Our results show that dose dependent exposure of SH-SY5Y neuroblastoma cells to sodium arsenite has at least two distinct stages. The first stage, observed at the lowest tested arsenic concentration, was characterized by axonal blebbing in the absence of any significant caspase-3 activation, decreased formazan absorbance (MTT assay), or LDH leakage. In a second stage, observed at higher arsenic doses, morphological alteration of the cell bodies and axonal degeneration were accompanied by caspase-3 activation and decreased formazan absorbance. These events suggest induction of apoptosis and compromised metabolic cellular capacity. Lastly, lactate dehydrogenase leakage denoted neuronal death which was overall proportional to the arsenic concentration in the media but insensitive as indicator of neuronal injury at the lower doses of arsenic in the study.

Hawaii Archives and Special Collections
Thursday, 10:00 a.m. in HPA Kono Center for English Studies

106 *Adventures in Medical Archives: Access and Use of Medical Archives and Databases at Kapi'olani Medical Center for Women and Children*, **MARCELLA ALOHALANI BOIDA** (Research and Database Associate, Retinopathy of Prematurity Subproject, Research in Minorities in Institutions Project, 200 West Kawili Street PB 10-2, University of Hawaii at Hilo, Hilo, HI 96720 USA; Boido@hawaii.edu)

Medical records research is part of human subject research. Ethical and practical issues in medical records research need consideration from researchers and record managers, whether they be academics, hospital staff (including doctors and hospital privacy officers), archivists or librarians. This paper arises from a research project at a major hospital. Ethical access to and use of medical records for this project and our cooperative solutions to privacy concerns within the hospital will be presented.

Medical records are created by vast numbers of medical personnel and others, for medical, billing, and some statistical purposes. Researchers are using records and data which were generally not created for research purposes. These records are kept in various media, including paper, tape recordings, electronic databases and microfiche. Different software programs are used at different times and sometimes for differing purposes. Gaining even very partial access to these records and databases within the context of the Health Insurance Portability and Accountability Act of 1996 requires considerable understanding, care, work and cooperation with hospital privacy staff and other hospital personnel.

107 *The Doctors Wetmore: Hilo's First Family of Medicine*, **LIBBY BURKE** (Archivist, Lyman Museum, 276 Haili Street, Hilo, HI 96778 USA; Archives@Lymanmuseum.Org)

Dr. Charles Wetmore arrived in Hilo in the 1840's, sent from Boston with the Protestant Missions to the Sandwich Islands. He was an enthusiastic physician, with passions for botany, astronomy and mineralogy that he shared with his wife, Lucy. Dr. Wetmore acted to vaccinate native Hawaiians before any evidence of smallpox had arisen. This proved to be an important step in preventing a potentially disastrous epidemic in the area.

The Wetmore's eldest son, Charlie, was an active boy who assisted in his father's dispensing pharmacy, the first in Hilo. Charlie planned to follow his father into the profession of medicine. Their first daughter, Frances (Fanny), also worked and enjoyed learning science in the pharmacy. When Charlie died suddenly at age 14, the 12-year-old Frances stepped up to announce that she would become the next doctor of the family, taking her brother's place. She was sent away to school in Pennsylvania, returning to Hilo upon graduation to help her father. She eventually returned to the mainland to get her M.D., and was the first woman doctor in Hawai'i.

The archives of the Lyman Museum hold the papers, letters, diaries, and journals of Charles Wetmore and his family, including letters to and from Frances during her education, and letters about her progress written by him to his sister in Massachusetts. This paper uses these primary sources as well as photographs and maps to illuminate the story of these two doctors and their singular mission for the people of the Island of Hawai'i.

108 *Hawaiian Sugar Planters' Association Plantation Archives*, **DORE MINATODANI** (Librarian, Hawaii Specialist, Hawaiian Collection, University of Hawaii at Manoa Library, 2550 McCarthy Mall, Honolulu, HI 96816, USA; dorem@hawaii.edu)

The Hawaiian Sugar Planters' Association (HSPA) Plantation Archives is a unique collection of records from plantations on the Hawaiian islands of Kauai, Oahu, Maui and Hawaii. It is a rich resource, providing detailed insight into plantation life and the sugar industry in Hawaii, spanning the years of 1850 to 1991. Researchers in the fields including history, business, agriculture, sociology and literature have used the HSPA Plantation Archives for a wide variety of research projects.

Because the plantation workers were contract laborers from China, Japan, Korea, the Philippines and Portugal, it is not surprising that many of the research inquiries, at least in part, address issues relating to ethnicity and race. Because the collection documents almost all aspects of plantation life, within strictly confined geographical areas and within relatively brief periods of time, these issues can be examined in detail. If a researcher were looking into health issues of plantation workers, he or she could search a broad array of factors, such as working hours and conditions, living situations, housing photographs and floor plans, records of plantation store purchases or leisure activities.

But while the collection promises rich and unique detail, researchers need to be aware of its limitations. What is the time and subject scope of each plantation's collection? What happened to the records that were withheld by the plantation owners, in many cases now out of business? What privacy concerns are there with regard to the collection's personnel and medical records?

109 *Identifying and Accessing the Lesser Known Archival Collections*, **HELEN WONG SMITH** (Librarian and Archivist, Edwin H. Mookini Library, University of Hawai'i at Hilo, 200 W. Kawili Street, Hilo, HI 96720 USA; smith@hawaii.edu)

While the Hawaii Sugar Plantation Archives (HSPA) is the largest single collection of materials documenting plantation life in Hawai'i, other repositories contain plantation records and special collections of interest to researchers. Two of those collections are held at the Mamiya Medical Heritage Center (MMHC) in Honolulu and the Lyman Memorial House Museum in Hilo.

MMHC holds materials regarding plantation medicine, Margaret Catton (an early sociologist cognizant of ethnic differences when providing social services and health care) papers, government and private records and papers regarding Hansen's Disease, and Pālama Settlement of Honolulu. The MMHC also holds the papers of Dr. Nils Larsen who, in 1930, became medical advisor to HSPA and developed a medical and health education program which contributed to Hawai'i's plantations' record of the lowest incidence of disease and mortality among American industries.

The Lyman Museum holds the archives of the Hamākua and Kohala Sugar Companies, and partial records of C. Brewer & Co., Hawaii Railroad Company, the Homestead Plantation, Kehena Water, Kohala Ditch, Kohala Pineapple, and Māhukona Terminal.

Although these institutions make such resources available to researcher more often than not these collections are incomplete. Often, the missing records are in the hands of entities who do not allow public access. In this session I will also discuss the collections of the two institutions mentioned above related private collections and their accessibility.

110 *Contribution of the Hawaiian National Museum to the Hawaii Exhibits at World's Fairs in the 1880's*, **MARTHA HOVERSON** (Hawaii Documents Librarian, Hawaii and Pacific Collection, Hawaii State Library, 478 South King Street, Honolulu, HI 96813, USA; martha@imail.librarieshawaii.org)

Emma Metcalf Beckley Nakuina (1847-1929), was a Hawaiian intellectual, who among her other activities was a writer of legends. Descended from Hawaiian chiefs on her mother's side and whose father was a Harvard trained engineer, Nakuina was in a unique position to interpret cultural materials. Under her direction while curator at the Hawaii National Museum, 1883-1887, the Museum provided Hawaiian artifacts and information on indigenous culture for a number of world's fairs. These cultural materials were sent along with commercial displays on sugar, coffee and other cash crops from the islands. Archival material and contemporary publications about exhibits sent to London, Boston, New Orleans, Sydney and Paris give a picture of how Hawaiian culture was presented to the world.

This session discusses Emma Nakuina, the work she did on behalf of Hawaii and the exhibition that the Hawaii State Library displayed regarding her activities while curator of the Hawaiian National Museum.

Impacts of Disease on Native Hawaiian Species **Thursday, 10:00 a.m. in HPA CASTLE Lecture Hall**

111 *Don't Use That Shrimp For Bait!* **T.D. LEWIS, D. MONTGOMERY-BROCK, A.R. EGGERS and J.C. LEONG** (Hawaii

Institute of Marine Biology, School of Ocean and Earth Science and Technology, University of Hawaii at Manoa, P.O. Box 1346, Kaneohe HI 96744)

Frozen commodity shrimp originating from countries where White Spot Syndrome Virus (WSSV) and other Animal World Health Organization (OIE) listed shrimp pathogens are well established are routinely imported into Hawaii to supply the local demand for seafood. In 2007, a survey of wild decapod crustaceans was conducted to determine a baseline and address whether shrimp viruses are already established in local populations. Commodity shrimp was purchased from various grocery stores proximal to the areas wild samples were collected and all samples tested for the "Big Four" OIE listed shrimp viruses (WSSV, Infectious Hypodermal and Hematopoietic Virus <IHHNV>, Taura Syndrome Virus <TSV>, and Yellowhead Virus <YHV>). None of the wild shrimp or crabs included in the survey tested positive for these viruses. However, PCR or RT-PCR methods identified DNA or RNA from all "Big Four" shrimp viruses in various grocery store samples tested. Bioassays using WSSV first-step PCR positive commodity shrimp showed *per os* (ingestion) exposure in shrimp causes rapid morbidity and mortality, and crabs that ingest infected shrimp may carry the virus without signs of disease. While these results confirm observations made in other regions involved in shrimp aquaculture, they also highlight the need for local public awareness of the risk commodity shrimp may pose to wild and farmed populations of decapod crustaceans. Hawaii's natural environment may not currently reservoir harmful shrimp pathogens identified in other regions but the risk of introduction of these viruses by commodity products is very real.

Funding acknowledgement: CTSA # 2005-38500-15720 from USDA/CSREES.

112 *Investigations of Coral Disease across the Hawaiian Archipelago*, **THIERRY WORK¹ and GRETA AEBY²** (¹USGS-National Wildlife Health Center, Honolulu Field Station, PO Box 50167, Honolulu, HI 96850; ²Hawaii Institute of Marine Biology, PO Box 1346, Kaneohe, HI 96744)

Diseases in marine ecosystems are taking increasing visibility, particularly for certain organisms like corals. In the Caribbean, diseases of corals and echinoderms have led to severe degradation of coral reef ecosystems. Over 90% of coral reefs under US jurisdiction lie in the Pacific ocean, highlighting the importance of understanding the factors that drive mortality of marine organisms in this region. Yet compared to the Caribbean, there are relatively few data on causes of disease in coral reef ecosystems in the Pacific. Recent collaborative efforts between managers and scientists in federal and state agencies have shed some light on potential causes and ecology of diseases in various marine organisms such as corals and fish in Hawaii and the Indo-Pacific. This collaborative effort has led to systematic approaches to investigating causes of morbidity and mortality in corals. Using basic biomedical tools has allowed us to standardize nomenclature of lesions in corals that thereby provide the foundation for many case definitions of coral diseases. These approaches have been applied directly to field situations in various regions of the Pacific Ocean, and examples of this are provided.

113 *Pathology and Pathogenesis of Disease in Sea Turtles from Hawaii*, **THIERRY WORK¹ and GEORGE BALAZS²** (¹USGS-National Wildlife Health Center, Honolulu Field Station, PO Box 50167, Honolulu, HI 96850; ²Marine Turtle Research Program,

NOAA, National Marine Fisheries Service, Pacific Islands Fisheries Science Center, 2570 Dole Street, Honolulu, Hawaii 96822-2396)

Sea turtles globally face numerous threats including bycatch from trawl and longline fisheries, depredation of eggs in nesting beaches, and loss of nesting habitat. Diseases also play an important role, however, understanding the role that disease plays in marine reptiles poses unique challenges. In Hawaii, NOAA and USGS have collaborated closely on investigating causes of mortality and morbidity in green turtles throughout the archipelago. The major cause of sea turtle strandings in Hawaii has been the tumor disease fibropapillomatosis. This disease was first documented in HI in the 1950s and prevalence in wild turtles peaked in the mid 1990s but has decreased steadily since for unknown reasons. Other health issues in sea turtles include interactions with fishing gear and various traumas (boat strikes and shark attacks). Latest findings on fibropapilloma research will be presented and challenges in investigating health of free-ranging marine Reptiles will be discussed.

114 *Climate Change, Avian Malaria, and Endemic Hawaiian Forest Birds: Dynamics of a Changing System*, **CARTER T. ATKINSON¹, DENNIS A. LAPOINTE¹, BETHANY L. WOODWORTH¹, and MICHAEL D. SAMUEL²** (¹U.S. Geological Survey, Pacific Island Ecosystems Research Center, Hawaii National Park, HI 96718; ²Wisconsin Cooperative Wildlife Research Unit, University of Wisconsin, Madison, WI 53706)

Hawaiian honeycreepers are spectacular examples of adaptive radiation, but face one of the highest rates of extinction in the world. Of more than 50 species and subspecies documented since discovery of the islands by the Western world, only 13 are believed to be extant and more than half of these are critically endangered. Both population declines and dramatic changes in the altitudinal distribution of native birds have been tied closely to the introduction of mosquito vectors, avian malaria (*Plasmodium relictum*) and avian pox virus (*Avipoxvirus spp.*). In this presentation, we will discuss how biotic components of this disease system interact with climatic factors in Hawaii, affecting transmission across steep altitudinal gradients of temperature and rainfall, with subsequent impacts on endemic forest birds. Keys to maintaining the diversity of this endemic avifauna likely lie at the extremes of these altitudinal gradients; both in the lowlands where natural selection is fostering evolution of disease resistance and in remaining high elevation refugia where restoration efforts are seeking to improve and expand habitat.

115 *Genetic Diversity of Avian Pathogens in East Hawaii*, **MARGARET E.M. FARIAS¹, CARTER T. ATKINSON², ALEXIS GIANNOULIS¹ and SUSAN I. JARVI¹** (¹Department of Biology, University of Hawaii at Hilo, 200 W. Kawili Street, Hilo, HI 96720; ²U.S. Geological Survey-Biological Resources Discipline, Pacific Island Ecosystems Research Center, Hawaii National Park, HI 96718)

Avian malaria (*Plasmodium relictum*) and *Avipoxvirus* have contributed significantly to the decline of the native Hawaiian honeycreepers. The avian disease system in Hawaii may be driven in part by complex interactions between these pathogens. Extensive sequencing of the Poxvirus 4b core viral protein has revealed at least two variants of *Avipoxvirus* in Hawaii, one of which appears to be more virulent than the other. *Avipoxvirus* infections seem to be restricted to a single variant, while most malaria infections appear to be a mixture of variants. Detailed PCR-RFLP studies of

the TRAP (thrombospondin-related anonymous protein) gene in 13 experimental and wild malaria infections of native forest birds have shown a minimum of 28 malaria variants in the islands, with a single bird harboring as many as eight variants. Sequencing of 39 cloned TRAP fragments allowed the identification of nine loci to be used in a single nucleotide polymorphism (SNP) analysis of malaria infections in 125 hatch-year amakihi (*Hemignathus virens*) captured in East Hawaii between 2002 and 2004. This study showed consistent transmission of two TRAP variants (locus 1293), with much lower prevalence of rare alleles at other loci. Continued investigation of genetic variation in both *Avipoxvirus* and *Plasmodium relictum* will increase understanding of this disease system and the interactions between these pathogens.

116 *Efficacy of Irradiated Sporozoites as a Vaccine for Avian Malaria (Plasmodium relictum)*, **D. ALLAN HALL¹, CARTER T. ATKINSON² and SUSAN I. JARVI¹** (¹University of Hawaii at Hilo, Biology Department, 200 W. Kawili St, Hilo HI 97820; ²U.S. Geological Survey, Pacific Island Ecosystems Research Center, Hawaii National Park, HI 96718)

Since its introduction to Hawaii, avian malaria (*Plasmodium relictum*) has had detrimental effects on Hawaii's terrestrial avifauna, limiting both the geographic and altitudinal distribution of highly susceptible native forest birds. The high transmission rates, abundance of highly susceptible hosts, and high parasite pathogenicity make this system a good model for vaccine studies. We evaluated ability of live, irradiated sporozoites to induce protective immunity to *P. relictum* in House Sparrows and Hawai'i 'Amakihi. Birds were exposed to the bites of infected, irradiated mosquitoes (either a lower dose or a higher dose) and then challenged approximately 4 weeks later with infective mosquito bites to determine whether protective immunity had been produced. Parasitemia and leucocyte counts were measured prior to vaccination, after vaccination, and after challenge with viable sporozoites to evaluate host response. Irradiated sporozoites failed to produce sufficient protective immunity in 'Amakihi to result in significant reduction in parasitemia after challenge with malaria. Potential reasons why will be discussed.

117 *Experimental Infections of Hawaii Amakihi and Mortality Due to West Nile Virus*, **DENNIS A. LAPOINTE¹, ERIK HOFMEISTER², CARTER T. ATKINSON¹, and ROBERT J. DUSEK²** (¹U.S. Geological Survey, Pacific Island Ecosystems Research Center, Hawaii National Park, HI 96718; ²U.S. Geological Survey, National Wildlife Health Center, 6006 Schroeder Road, Madison, WI 53711-6223)

Introduced mosquito-borne avian disease is a major limiting factor in the recovery and restoration of native Hawaiian forest birds. Annual epizootics of avian pox, (*Avipoxvirus*), and avian malaria, (*Plasmodium relictum*), likely led to the extinction of some species and continues to impact populations of susceptible Hawaiian honeycreepers. The introduction of a novel pathogen, such as West Nile virus (WNV), could result in further population declines and extinctions. We challenged Hawaii amakihi (*Hemignathus virens*) with a North American isolate of WNV by needle inoculation and mosquito bite to observe susceptibility, mortality, and illness in this endemic passerine, and to determine the vector competence of the co-occurring, introduced mosquito, *Culex quinquefasciatus*. All experimentally-infected birds became viremic with a mean titer > 10⁵ plaque-forming units (PFUs)/ml and experienced clinical

signs ranging from anorexia and lethargy to ataxia. The combined mortality in inoculation trials ($n = 16$) was 31.3% but mortality in free-ranging birds is likely to increase due to predation, starvation, thermal stress, and concomitant infections of avian malaria and pox. Surviving birds appear to clear WNV from the peripheral blood by 7 – 10 days post-infection (DPI) and neutralizing antibodies were detected from 9 – 46 DPI. In transmission trials, Hawaiian *Cx. quinquefasciatus* proved to be a competent vector and Hawaii amakihi an adequate amplification host of WNV suggesting that epizootic WNV could readily become an additional limiting factor of some native Hawaiian bird populations.

118 Protective Efficacy of a Recombinant Subunit West Nile Virus Vaccine in Domestic Geese (Anser anser): A Surrogate Species for Vaccination of the Endangered N \square n \square (Branta sandvicensis), SUSAN I. JARVI¹, MICHAEL M. LIEBERMAN², ERIK HOFMEISTER³, VIVEK R. NERURKAR⁴, TERI WONG², and CAROLYN WEEKS-LEVY² (¹Department of Biology, University of Hawai'i at Hilo, 200 W. Kawili Street, Hilo, HI 96720; ²Hawai'i Biotech, Inc., 99-193 Aiea Heights Drive, Aiea, HI 96701; ³USGS National Wildlife Health Center, 6006 Schroeder Road, Madison, WI 53711-6223; ⁴University of Hawai'i at Manoa, Department of Tropical Medicine, Medical Microbiology and Pharmacology, John A. Burns School of Medicine, 651 Ilalo Street, BSB 325AA, Honolulu, HI 96813)

Introduction of the West Nile virus (WNV) to Hawai'i will undoubtedly be devastating to many populations of critically endangered avian species which are indigenous to Hawai'i. The protective efficacy of a protein-based WNV subunit vaccine formulated with adjuvant was evaluated in domestic geese to serve as a surrogate species for the endangered Nene, the state bird of Hawai'i. ELISA and plaque reduction neutralization tests demonstrate that significant levels of vaccine antigen-specific antibody were produced in groups of birds vaccinated with 5 or 10 μ g of the WN-80E antigen formulated with ISA720 adjuvant. Moreover, after challenge with WNV, no viremia was detected in vaccinated birds, whereas viremia was detected up to 4 days after and virus was detected by oral swab for 6 days after infection among control groups. Safe and effective vaccination of managed or captive endangered bird populations will protect species with critically low numbers that could not survive the added mortality of introduced disease.

CONTRIBUTED ORAL PRESENTATIONS

Western Society of Crop Science
Monday, 8:15 a.m. in HPA Gerry CLARK Art Center

119 Irrigation and Nitrogen Effects on Teff in the Southern High Plains, LEONARD M. LAURIAULT (Plant and Environmental Sciences Department, New Mexico State University, Tatum, NM 88401)

Interest in teff (*Eragrostis tef*) for horse hay has increased throughout the USA; however, no information is available about its performance in the semiarid Southern High Plains. A study was conducted to evaluate teff yield at Tatum, New Mexico, under furrow irrigation regimes [all furrows irrigated at planting

only (dry), all furrows irrigated at planting, again after 60 days, and after the first two harvests (full), and all furrows irrigated at planting but only one-third of furrows irrigated, again after 60 days, and after the first two harvests (limited) and nitrogen treatments (30, 60, or 90 lb N/ac applied preplant incorporated and 30 lb N applied preplant incorporated and after the first two harvests (split 30) in four randomized complete blocks. Teff required continued irrigation to attain satisfactory yields, but yields were maximized with about 1/3 the water typically applied to alfalfa during the summer at this location (0.74, 3.02, and 3.25 tons/acre for dry, limited and full irrigation, respectively 5% LSD = 1.40). Highest total yields under full and limited irrigation were attained by the 60 and 90 lb/ac nitrogen treatments (2.70, 3.28, 3.44, and 3.11 tons/acre for the single 30, 60, and 90 lb/ac and split 30 nitrogen treatments, respectively, LSD = 0.44). Planting in mid-June with 60 lb N/acre and applying approximately half the water normally applied to alfalfa may maximize teff yield in the first two harvests. Thereafter, another application 30 lb N/acre and irrigation comparable to that applied to alfalfa may increase third harvest yields.

120 Five Years of Research with Skip Row Rainfed Corn to Improve Drought Tolerance in the High Plains, ROBERT KLEIN¹, DREY LYON², DAVID BALTENSPERGER³, ALEXANDER PAVLISTA², CHARLES SHAPIRO⁴, STEVEN KNEZEVIC⁴, STEPEH MASON⁵, ROGER ELMORE⁶, ALAN SCHLEGEL, MERLE VIGIL and JEFFERY GOLUS¹ (¹Univ. of Nebraska, North Platte, NE 69101; ²University of Nebraska-Lincoln, Scottsbluff, NE 69361; ³Texas A&M Univ., College Station, TX 77843; ⁴University of Nebraska-Lincoln, Concord, NE 68728; ⁵University of Nebraska-Lincoln, Lincoln, NE 68583; ⁶Iowa State University, Ames, IA 50011; ⁷Kansas State University, Tribune, KS 67879; ⁸USDA-ARS, Central Great Plains Research Station, Akron, CO 80720-1029)

Drought has long been a detriment to yields of rainfed corn crops in the High Plains. The skip row planting method was developed to protect yields of rainfed corn from drought. It does so by keeping developing corn plants from using all of the available water early in the growing season. Field experiments were conducted at North Platte, NE in 2003 and at several locations across Nebraska, Kansas and Colorado in 2004, 2005, 2006, and 2007.

Planting treatments were made up of a combination of four planting schemes and three population levels. In the research that began in 2003 at North Platte all rows of corn were planted May 7 no-till into winter wheat stubble. Plants and/or rows were removed July 2 into no-till winter wheat stubble. Yields were increased 17% to 32% above the conventional control with the skipped rows. Skip rows have improved yields from 2,762 kg/ha to 5,273 kg/ha at Trenton in a plant 2 skip 2 scheme and 9,729 kg/ha to 10,922 kg/ha at Clay Center in a plant 2 skip 1 row scheme. Skip row has decreased yield at North Platte in 2007 from 8,097 to 6,842 kg/ha in a plant 2 skip 2. Usually only a modest decrease in yields has been observed with the skip row at low populations in years with rainfall 50% or more above average during the growing season. This system requires increased weed management along with a higher level of crop management.

121 Canola: Increasing the Value of Winter Canola, CLARK B. NEELY (Dept. of Plant, Soil, and Entomological Sciences, University of Idaho, PO Box 442339, Moscow, ID 83844)

Despite rotational and environmental benefits and increasing

demand for canola products in the US, canola struggles to compete with higher valued grain crops. In the Pacific Northwest canola is grown exclusively for seed, and the non-seed biomass is left unused in the field. If this biomass could be used as a forage feedstock for cattle, without decreasing seed yield, growers could substantially increase the overall value of the crop. Currently, few researchers have examined forage quality of canola. Similarly, few have considered the impacts of harvesting vegetative canola biomass on subsequent seed yield. *Brassica* crops are generally high in crude protein and energy and extremely low in fiber, suggesting that canola silage would be an attractive livestock feed for dairies. Limited research considering canola as a dual crop, has treated the crop as a winter annual. In this study, winter canola will be treated as a true biennial, planted in the spring with multiple leafy biomass cuttings harvested throughout summer in order to ensile (canolage). Thereafter, the crop will vernalize during the winter months, and produce seed the following summer. To examine canolage quality, 'Athena', winter canola, and 'Dwarf Essex', industrial rapeseed, were grown in the greenhouse where two to three cuttings were harvested between September 2007 and February 2008. Ensiled samples were analyzed for dry matter, crude protein, neutral detergent fiber, acid detergent fiber, ash, calcium, phosphorous, crude fat, and glucosinolate profile. Canolage quality results are presented alongside biomass production potential to determine potential feasibility of this production system.

122 Comparison of Harvesting Methods of Winter Canola in the Pacific Northwest, DON WYSOCKI and NICK SIROVATKA (Crop and Soil Science, Oregon State University, Pendleton, OR 97801)

Harvest experiments were superimposed onto fields of winter canola grown near Pendleton, Oregon during the 2004-2005 and 2005-2006 growing seasons. Experiments used random complete block design with four and eight replications respectively. Treatments consisted of 1) force lodging canola at first brown seed on the main raceme, 2) force lodging canola at 1/3 brown seed on the main raceme 3) swathing canola at 1/3 brown seed on the main raceme, 4) swathing canola at 2/3 brown seed on the main raceme, and 5) direct combining canola at fully ripe seed. Individual plot dimensions were 5 x 50 ft. Oil content and seed yield were measured. Yields obtained for various treatments in 2004-2005 and 2005-2006 were contrasting. Direct harvesting taller winter canola is more difficult and may explain the better performance of forced lodging and swathing over direct cutting in the 2004-2005 and 2005-2006 seasons. Excessively, windy conditions did not occur in either year of this study, so wind shatter was not a factor. Crop maturity in the winter canola in 2004-2005 occurred more slowly than canola in the 2005-2006 season. This may also account for the differences observed between seasons. Harvest method did not affect oil content of the seed.

123 Development of Breeding Populations for Genomics Research in Cotton, JINFA ZHANG¹, RICHARD PERCY² and SANJAY BAJAJ¹ (¹Department of Plant & Environmental Sciences, New Mexico State University, Las Cruces, NM 88003; ²Crop Germplasm Research Unit, USDA-ARS, College Station, TX 77845)

Upland cotton (*Gossypium hirsutum*), producing >90% world cotton fiber, is known for its wide adaptation and high yield; whereas Pima cotton (*G. barbadense*), accounting for ~5% world cotton production, has superior fiber qualities. To test the hypothesis that

Upland and Pima cotton each has accumulated different desirable genes through divergent natural and artificial selections after they were derived from a common ancestor about 1-2 million years ago, several breeding populations through interspecific hybridization, backcrossing, and selfing have been developed and tested. This presentation will be focused on one backcross inbred line (BIL) population with regard to its development, field testing, transcript profiling, DNA markers, and quantitative trait locus (QTL) analysis. This BIL population was developed using an advanced backcrossing (AB) strategy with Upland cotton as the recurrent parent followed by several generations of selfing. The BIL population was tested in two locations and three years. The BIL lines have, in general, Upland cotton plant type and morphological characteristics; individual plants within a line are highly uniform, indicating minimal within-line variation; plant height, maturity, boll size, and productivity display tremendous between-line variation; and the fiber quality results reveal successful introgression of varying portions of the Pima cotton genome within the primarily Upland cotton BIL lines. More than 200 AFLP markers, 45 promoter-anchored amplified polymorphic (PAAP) markers, 100 simple sequence repeat (SSR) markers, and 145 functional cDNA-AFLP markers have been generated. Our analysis indicated that many functional cDNA-AFLP markers with known sequence information are associated with the agronomic and fiber traits.

124 Response of the Model Legume *Medicago truncatula* to Aluminum-toxicity, SUSAN MIVASAKA and CHERYN CLAYTON (University of Hawaii, University of Hawaii, 875 Komohana St., Hilo, HI 96720)

Acid soil pH and aluminum (Al)-toxicity are two main factors that limit biological N₂ fixation (BNF) by legumes. Twenty-two accessions of the model legume *Medicago truncatula* were screened in Al-containing agarose plates to determine their short-term (72 h) response to excess Al. Seven of these accessions were studied further in greenhouse studies in an Al-toxic soil following inoculation with a rhizobial symbiont to determine their longer-term (21 to 28 d) response. Accession 6037 was identified as the most Al-tolerant ecotype in both short-term and longer-term studies. These results indicate that a rapid, 72 h screening in Al-containing agarose can be used to identify Al-tolerant ecotypes within the *M. truncatula* germplasm.

125 Pea and Lentil Response to Environments and the Satellite Breeding Program at Montana State University, CHENGCI CHEN¹, KARNES NEILL¹ and KEVIN MCPHEE² (¹Central Ag Research Center, Montana State University, Moccasin, MT 59462; ²USDA-ARS-NPA-SPNRU, Washington State University, Pullman, WA 99164)

Pea (*Pisum sativum* L.) and lentil (*Lens culinaris* Medik.) are excellent rotation crops for cereal-based cropping systems. The production acres of pea and lentil have increased rapidly in Montana in recent years, but yields were influenced by the highly variable soil and weather conditions in Montana. Therefore, a multi-year and multi-location variety testing was identified as one of the top research priorities by the pulse crop producers. A state-wide variety test was carried out at 8 locations across the diverse environments in Montana in 1999 to 2002. Pea and lentil yield varied greatly among years and locations. The average yield ranged from 1268 to 2110 kg ha⁻¹ for pea and from 877 to 1394 kg ha⁻¹ for lentil. Early seeding generally received greater yields and the

yields of early-seeded (before April 18) pea and lentil increased linearly with increasing growing season precipitation, but the yields of late-seeded (after April 18) pea and lentil did not have a good correlation with growing season precipitation. There were cultivar x environment interactions. In order to develop high and stable yielding cultivars that will adapt to different environments, a satellite breeding program has been initiated in conjunction with a state-wide variety test project in Montana since 2008

126 Efficacy of Screening Methods for Identification of Physiological White Mold Resistance in Dry Bean, HENRY TERAN and SHREE SINGH (Plant, Soil and Entomological Sciences Department, University of Idaho, Kimberly, ID 83341-5076)

Availability of screening method with high resolving power that is reliable, economical and easy to use is essential for host-pathogen interaction studies, germplasm screening, genetics, and breeding. Our objective was to determine the efficacy of three screening methods, namely the use of (1) infected oat seed, (2) infected flowers, and (3) cut-stem for physiological resistance to white mold [caused by *Sclerotinia sclerotiorum* (Lib.) de Bary] in dry bean (*Phaseolus vulgaris*). Four dry bean genotypes, namely A 195, 'ICA Bunsu', VCW 54, and 'Othello' with different levels of resistance or susceptibility were evaluated in a randomized complete block design with three replicates in the greenhouse at Kimberly, Idaho. Six plants in each plot were inoculated two times using the three methods. Data on single-plant basis were recorded at 16, 23, and 33 days post inoculations. Large significant ($P < 0.05$) differences among genotypes and screening methods were observed. Resistant interspecific breeding line VCW 54 followed by A 195 had the lowest white mold scores across the three methods. Susceptible Othello had the highest disease scores irrespective of screening methods and evaluation dates. The disease score increased with delayed evaluations. The infected oat seed method was the least effective and the cut-stem method produced most severe disease. Nonetheless, differences between the cut-stem and infected flower methods were non-significant ($P > 0.05$) for highly resistant genotypes such as A 195 and VC 54 or highly susceptible Othello. For the moderately resistant ICA Bunsu, the infected flower method had consistently significantly lower disease score than the cut-stem method.

127 Improving Wheat Straw for Use as a Feedstock for Ethanol Production, MACKENZIE T. ELLISON, J. L. HANSEN, A. KARASEV and ROBERT ZEMETRA (Department of Plant Soil and Entomological Sciences, University of Idaho, Moscow, ID 83844-2339)

Wheat straw has potential for use as a ligno-cellulosic feedstock for ethanol production. One limitation on the use of straw as a feedstock is the presence of lignin. The reduction or modification of lignin could improve access to cellulosic sugars, creating straw that is more effective for ethanol production. This study is currently being conducted to determine if a high level of silencing of the cinnamoyl CoA reductase 1 (*CCR1*) gene involved in lignin biosynthesis will sufficiently lower lignin content to create straw that is more easily utilized as a fermentable suga source for ethanol production.

Previous work using a cDNA copy of *CCR1* to transform wheat resulting in a reduction of up to 20% less non-soluble lignin in the straw demonstrated the potential of targeting the *CCR1* gene for modifying lignin production. While this demonstrated lignin

content in straw could be modified, it is unknown if this level of reduction would result in improvement in straw as a potential for ethanol production. Virus induced gene silencing (VIGS) utilizing barley stripe mosaic virus (BSMV) is being used to evaluate four short fragments of the *CCR1* gene for potential use in a stem-loop construct in siRNA down-regulation. Initial work done with one of the *CCR1* gene fragments inserted into BSMV found that while the plants were infected and the virus was replicated, the plants did not express a phenotype unique from a plant infected with a wild-type BSMV. A significant reduction in lignin content in plants infected by BSMV containing a *CCR1* fragment would identify the best fragment for use in a stem-loop construct for use in genetic transformation experiments targeted at developing stable expression of siRNA for *CCR1*. This stable expression resulting in lower lignin content wheat straw would be a better source for ethanol production.

128 Effects of Phaseolus vulgaris L. on the Development of Experimentally Induced Breast Cancer; MARK BRICK¹, HENRY J. THOMPSON² and MATTHEW THOMPSON² (¹Dept. of Soil & Crop Sciences, Colorado State University, Fort Collins, CO 80523; ²Department of Horticulture and Landscape Architecture, Cancer Prevention Laboratory, Colorado State University, Ft. Collins, CO 80523)

The global economic burden caused by prevalent chronic diseases such as obesity, diabetes, heart disease, and cancer is enormous. Among the staple food crops, little information exists about the role that specific crops can play in the diet to prevent chronic diseases. The addition of dry bean (*Phaseolus vulgaris* L.) in the diet fed to laboratory rats (*Rattus norvegicus*) was used to determine if bean had an effect on the post initiation phase of chemically-induced mammary carcinogenesis compared to the standard diet without bean. Dry bean consumption reduced cancer incidence (No. of animals with one or more cancerous tumor) from 95% in the control to 67% in animals fed beans and cancer multiplicity (No. of cancer tumors per animal) from 3.23 tumors per animal to 1.46 per animal, respectively (both $P \leq 0.001$). Dry bean market classes differed for anticancer activity (white kidney vs. navy, 1.05 vs. 1.87, $P = 0.004$), but anticancer activity was not associated with oxygen radical absorbance capacity (ORAC), phenolic or flavonoid content, seed coat color, or nutrient content assessed by proximate analyses. Dry bean market classes from the Andean center of domestication (COD) had greater anticancer activity than those from the Middle American COD ($P = 0.02$), and dry beans from race Nueva Granada were more protective than those from race Mesoamerican ($P = 0.007$). These results document that dry beans in the diet have anticancer activity based on a preclinical laboratory animal model.

129 Physiological Responses of Potato (Solanum tuberosum L.) Genotypes to NaCl Salinity: Effects of Supplementary Calcium and NaCl Salt Pre-treatment, MASOOMEH ETEHADNIA, DOUG WATERER and KAREN K. TANINO (Department of Plant Sciences, College of Agriculture-University of Saskatchewan, Saskatoon, SK S7N-5A8, Canada)

The effects of CaCl_2 , NaCl and $\text{CaCl}_2 + \text{NaCl}$ on subsequent NaCl salt stress tolerance, growth, water status and ion accumulation of four contrasting potato genotypes, 9506, 'Norland', ABA-deficient mutant and ABA normal sibling were investigated. NaCl pre-treatment was generally the most effective in inducing salt

stress resistance reflected by positive response measurements in all genotypes. ‘Norland’ and ‘9506’ enhanced growth up to 70% via root mass under salt stress and expressed elevated water status under NaCl pre-treatment, possibly via root Na⁺ accumulation. Unlike ‘Norland’, 9506 also tolerated the presence of Na⁺ in the shoot. However, NaCl was excluded from the shoot of ‘9506’ after CaCl₂ pre-treatment and may indicate a genotype-dependent Ca²⁺ requirement for Na⁺ exclusion. In ABA normal sibling, salt stress resistance was largely regulated by two mechanisms under all pre-treatments: a) shoot Na⁺ exclusion and root Na⁺ accumulation; b) enhanced water status by elevation of leaf and shoot water content. This response was facilitated by: 40% - 100% increase in root mass, enhanced root K⁺ uptake, enhanced root-shoot K⁺/Na⁺ ratio and increased leaf osmotic potential. The ABA-deficient mutant expressed only one mechanism of salt stress resistance in response to pre-treatments in which leaf and shoot water content increased. The results that ABA-deficient mutant was not able to adequately increase shoot K⁺ and exclude Na⁺ from the shoot relative to the other genotypes suggests ABA is a requirement for this mode of salt stress defence. Salt stress- and ABA-induced CR expression was associated with root mediated salt tolerance.

130 Winter Wheat Nitrogen Fertilizer Rate and Application: A Conventional and No Till Comparison, STEPHEN GUY and MARY LAUVER (Dept. of Plant, Soil, and Entomological Sciences, University of Idaho, Moscow, ID 83844-2339)

No tillage (NT) systems, versus conventional tillage (CT) systems, can influence nitrogen availability due to lower soil temperature, higher residue, higher organic matter, higher biological activity, and plant growth. Nitrogen fertility is critical for hard red winter wheat (HRWW) grain production, quality, and value. This study near Genesee, Idaho evaluated nitrogen fertilizer rates: 56, 84, 112, 140, 168, and 197 kg ha⁻¹ and application timings: 100% fall, 70% fall + 30% spring, and 60% fall + 25% spring + 15% foliar anthesis on a NT and CT tillage comparison. HRWW followed dry pea in a three year rotation with spring wheat before pea. Average HRWW grain yields in NT were lower in 2006 by 540 kg ha⁻¹ and higher in 2007 by 280 kg ha⁻¹ than in CT. Grain protein in NT averaged lower than in CT by 0.5% in 2006 and 1.0% in 2007. Optimum nitrogen fertilizer rates for yield and protein occur at 28 to 56 lb/a higher in NT than in CT. Split fertilizer applications appeared to be beneficial, especially in 2007. In 2007 heads m⁻² tended to be higher in NT than CT along with test weight, seed weight, and crop biomass; but not harvest index, plant height, or seed hardness. There were fewer differences for these parameters between CT and NT in 2006. Past work has shown that NT can be as productive as CT, and this work shows that split nitrogen application at slightly higher rates can produce quality grain with acceptable protein.

131 Impacts of Metsulfuron and Chlorsulfuron on Greasewood and Rabbitbrush communities, JORDGE J. LAFANTASIE¹, STEPHEN F. ENLOE², MARK A. FERRELL¹, ANDREW R. KNISS¹ and STEVER D. AAGARD¹ (¹Plant Sciences, University of Wyoming, Laramie, WY 82071; ²Agronomy & Soils, Auburn University, Auburn, AL 36849)

Greasewood (*Sarcobatus vermiculatus*) and rubber rabbitbrush (*Chrysothamnus nauseosus*) are important shrub components of several plant communities throughout western North America. While these species may be viewed positively or negatively by

land managers with differing goals, greasewood and rabbitbrush communities may often be invaded by several problem species. Metsulfuron and/or chlorsulfuron are commonly used for controlling these and other invasives, but little is known regarding their impacts on greasewood or rabbitbrush. The objective was to quantify the impact of these herbicides on greasewood or rabbitbrush communities. Field studies were established in the spring of 2004 and repeated twice in 2005 near Laramie, Wyoming in a pasture infested with greasewood and rabbitbrush. Treatments included metsulfuron and chlorsulfuron applied at various rates, and an untreated control. Treatments were applied mid-June to 3.3 by 9 m plots with a handheld broadcast sprayer in a randomized complete block with three blocks per study. Plots were sampled 12, 24, and 36 months after treatment, utilizing visual control estimates, and point frame sampling for vegetative cover of greasewood, rabbitbrush, perennial grasses, and bare ground. Metsulfuron at 42 g/ha and chlorsulfuron at 105 g/ha provided >80% visual control of greasewood 36 MAT while lower rates of both herbicides provided approximately 40% control. For rubber rabbitbrush, metsulfuron at 63 g/ha provided approximately 60% control 36 MAT while chlorsulfuron failed to provide >20% control at any rate. Land managers can expect considerable shifts in greasewood and rabbitbrush community composition when either metsulfuron or chlorsulfuron are broadcast applied.

132 Genotypic Responses to Biological Nitrogen Fixation on Trigonelline Accumulation and Pod Yield in Peanuts, EMMANUEL KODJOE¹, NAVEEN PUPPALA² and YOUNGKOO CHO¹ (¹Department of Biology, Eastern New Mexico University, Portales, NM 88130; ²New Mexico State University, ASC at Clovis, Clovis, NM 88101)

Nitrogen is central to the growth of plants and frequently the limiting factor in crop productivity. Legume species are mostly able to fix atmospheric N₂ through biological nitrogen fixation, which is influenced by environmental factors including water deficit. The objectives were to examine the relationship between trigonelline (TRG) assimilation, agronomic traits, and pod yield in various peanut (*Arachis hypogaea*) genotypes treated with rhizobia and to evaluate biological roles of TRG on symbiosis efficiency and growth traits. TRG concentrations at maturity (120 DAP) in the control, Histick, and Lift treatments under partially irrigated fields increased to 8.6, 30.9, and 61.5%, respectively, as compared with those under fully irrigated fields. Numbers of nodules across genotypes under partially irrigated fields were 89.2 in the control, 111.0 in Lift, and 160.9 in Histick treatments, among which Histick was significant ($P < 0.05$) for nodulation. Pod yield in the control, Histick, and Lift treatments was 1694, 2340, and 1871 kg ha⁻¹, respectively, under partially irrigated fields. Under fully irrigated fields, pod yield was 3352 in the control, 4498 in Histick, and 3411 kg ha⁻¹ in Lift treatment. Genotype ICGS-76 produced the highest pod yield (5133 kg ha⁻¹) as treated with Histick. Genotype FR-458 treated with Histick had the lowest pod yield (863 kg ha⁻¹) with the highest TRG concentrations (56.3 μg g fw⁻¹) under partially irrigated fields. Further results will be reported.

Joint Session of the Chemistry and Biochemistry and the Health Sciences Sections

Monday, 9:00 a.m. in HPA Kono Center for English Studies

133 Novel Approaches to Treat Glioblastoma Multiforme. ALOK BHUSHAN, WAJIHA TAHARALI, SHILPA PULI and JAMES C.K. LAI (Department of Biomedical and Pharmaceutical Sciences, College of Pharmacy and ISU Biomedical Research Institute, Idaho State University, 921 S 8th Avenue, Stop 8334, Pocatello, ID 83209; abhushan@otc.isu.edu)

Glioblastoma multiforme is a type of brain tumor with poor prognosis and invades into surrounding normal tissue. Understanding the mechanisms that block glioma invasion will lead to design of improved therapeutic regimens. Activation of glioma matrix metalloproteases (MMPs) results in the degradation of extracellular matrix surrounding the glioma leading to invasion. Manganese is a neurotoxicant that interacts with cellular and subcellular membranes and induces cell death. Thus, we hypothesized that manganese exerts a modulatory effect on glioma invasion via inhibition of MMPs and induces apoptosis in glioma cells and that combination treatment employing manganese and chemotherapeutic agents blocks progression of glioblastomas. To investigate this hypothesis, we treated U87 glioma cells with various concentrations of manganese chloride (0.1-2 mM) and employed the Mn²⁺ treated and untreated U87 cells for zymography for MMP2 and MMP-9, and western blotting to detect MT1-MMP (Membrane Type 1 – MMP), an enzyme responsible for the activation of MMPs. Our results indicate that manganese treatment of U87 cells induced a gradual decrease in MMP-2 and MMP-9 enzymatic activities and MT1-MMP protein level. We also treated glioblastoma with Carmustine and Cisplatin in combination with manganese chloride (MnCl₂) to study their effects on proliferation and signaling. Consistent with our hypothesis, these findings indicate that manganese and Cisplatin act synergistically to decrease cell viability. Moreover, they may have implications in molecular mechanisms underlying glioblastoma invasion and in the design of new therapeutic strategy to block glioblastoma invasion. (Supported by Idaho NIH-INBRE P20 RR016454 and ISU URC grant FY2007-01).

134 Pharmacology of a Novel Positive Allosteric Modulator for Neuronal Nicotinic Receptors, ANSHUL PANDYA¹, MEAGAN WELTZIN¹, BRIAN EDMONDS², MARVIN SCHULTE¹ and RICHARD GLENNON³ (¹Department of Chemistry and Biochemistry, University of Alaska Fairbanks, Fairbanks, AK 99775; ²Department of Biology and Marine Biology, School of Arts & Science, University of Alaska Southeast, Juneau, AK 99801; ³Department of Medicinal Chemistry, School of Pharmacy, Virginia Commonwealth University, Richmond, VA 23284; ftaap@uaf.edu)

Allosteric modulators targeting neuronal nicotinic acetylcholine receptors (nAChRs) are emerging as treatment options in neurological disorders. Compounds such as galantamine are used clinically in the treatment of Alzheimer's disease and may also be useful in the treatment of other disorders involving alterations in nicotinic tone including dementia and smoking cessation. Galantamine and Physostigmine are acetylcholinesterase inhibitors that also act as non-selective direct modulators of nAChRs.

The metabolite des-formylflustrabromine (dFBr) obtained from the marine Bryozoan *Flustra Foliacea* was recently identified as a selective modulator of the alpha4beta2 nAChR subtype. We have synthesized this compound and evaluated its action on het-

eromeric alpha4beta2 and homomeric alpha7 subtype of nAChRs using two-electrode voltage clamp. We confirm the action of dFBr as an allosteric potentiator of acetylcholine responses on the human alpha4 beta2 subtype of nAChRs. dFBr did not potentiate human alpha7 subtype of nAChRs.

We also evaluated 10 synthetic analogues of dFBr. Only two compounds (JSK-062) and (NG-089) were found to potentiate acetylcholine induces responses on alpha4beta2 receptors. Potentiated responses were inhibited at higher concentrations of test compounds. On alpha7 receptors, all 10 compounds inhibited acetylcholine induced responses with no potentiation observed on these receptors.

In order to determine if the dFBr class of compounds was acting through a similar mechanism to other allosteric potentiating ligands, we evaluated the effects of co-application of galantamine and physostigmine with dFBr. Potentiation by dFBr is not inhibited by either Galantamine or Physostigmine. When co-applied with dFBr, both galantamine and physostigmine produced a higher level of potentiation than when applied alone. This concerted effect suggests independent and interacting mechanisms of action for these compounds. The selectivity of dFBr compared to the non-selective nature of Galantamine and Physostigmine also suggests alternate mechanisms. This data suggest that dFBr represents a unique class of positive allosteric modulators with selectivity for the heteromeric alpha4beta2 nicotinic. The selectivity of this agent makes it a valuable lead molecule for the treatment of disorders involving decreased nicotinic tone resulting from decreased alpha4beta2 receptor expression.

135 Iridium Oxide Nanowire Monitors for Protein Detection, VINU L. VENKATRAMAN¹, RAVIKIRAN K REDDY¹, FENGYAN ZHANG², VICTOR HSU², BRUCE ULRICH² and SHALINI PRASAD¹ (¹Portland State University, Portland, OR 97201; ²Sharp Labs of America Inc, Camas WA 98607; vinu@pdx.edu)

The overarching research objective is the development of a "point-of-care" device based on iridium oxide nanowires for physiological state identification to monitor human health. This device is based on electrical detection of proteins that are biomarkers for the physiological state. Highly sensitive and rapid detection of two proteins C-reactive protein (CRP) and Myeloperoxidase (MPO) in pure form and in serum/clinical samples was achieved with a detection limit in the order of high pg/ml and a response time in seconds. The current scope of work focuses on establishing the feasibility of this technology to detect multiple proteins simultaneously. The methodology that has been adopted is based on measuring capacitance and calibrating its change in magnitude with concentration of proteins.

We demonstrate the following performance metrics: high selectivity, high sensitivity and linear dynamic range of detection with rapid response time. High selectivity is achieved by incorporating monoclonal antibodies (protein receptors) on the nanowires, which bind only to specific antigens (proteins). Iridium oxide has very good conductivity and charge storing capacity, and hence has an ability to detect very small changes to the surface charge. This capability is utilized for demonstrating the performance metrics and forms the basis of the key innovations of this technology, which are, improving the selectivity and sensitivity of detection.

This biosensor could be efficiently used for early disease diagnosis or for early toxicity detection in a pharmaceutical industry. Future work entails detection of multiple proteins simultaneously,

using a single chip with the same accuracy and reliability.

136 Activation Induced Cell Death of Antigen Specific CD4 T Lymphocytes and Its Role in the Immune Evasion of Anaplasmosis, SU-SHAN HAN, JUNZO NORIMINE and WENDY BROWN (Department of Veterinary Microbiology and Pathology, Washington State University, Pullman, WA 99163; sushan@vetmed.wsu.edu)

Anaplasma marginale is a tick-borne rickettsial parasite of cattle that infects erythrocytes and causes severe anemia, fever, and mortality. As with many intracellular pathogens, survivors of clinical anaplasmosis fail to clear low levels of organism and are persistently infected for life, thereby providing an important reservoir of rickettsia to other cohorts. *A. marginale* establishes persistent infection in the immunocompetent host by continually undergoing antigenic variation of surface expressed proteins, which facilitates escape of existing specific humoral and cellular immune responses. We immunized cattle with a non-variable immunodominant surface protein of *A. marginale* which generated a robust antigen-specific CD4⁺ T lymphocyte response. Interestingly, immunization did not confer protection to challenge, but rather antigen-specific T lymphocyte responses rapidly disappeared from peripheral blood concurrent with peaking levels of rickettsemia, and specific responses did not return throughout persistent infection. Tracking antigen-specific T cells with bovine major histocompatibility class II tetramers determined that loss of specific T cells coincided with disappearance of antigen-specific T cells from the peripheral blood. Furthermore, antigen-specific T cells were not sequestered to spleen or lymph nodes. Rapid loss and failure to maintain antigen-specific memory T lymphocytes following *A. marginale* infection is consistent with activation induced cell death and represents another mechanism by which *A. marginale* is capable of evading the host immune response to achieve persistent infection.

137 Inflammation Decreases Lipid Processing by Macrophages during Egg Yolk Peritonitis in the Chicken (Gallus gallus domesticus), **INGRID CORNAX EDWARDS and KIRK C. KLASING** (Department of Animal Science, University of California, Davis, One shields Avenue, CA 95616; icornax@ucdavis.edu)

The interaction between lipoproteins and inflammation is an area of great interest to human health. Chickens provide an interesting new model to study this interaction in a disease called egg yolk peritonitis (EYP). EYP is defined by yolk material in the body cavity that is cleared by blood-derived macrophages. In the presence of an inflammatory stimulus, yolk clearance fails. **OBJECTIVE:** Determine how lipopolysaccharide (LPS) affects lipoprotein uptake and secretion. **HYPOTHESIS:** LPS increases the expression of lipoprotein scavenger receptors CD36 and MARCO and decreases the expression of genes involved in lipid efflux (ABCA1 and SRB1). LPS increases intracellular yolk concentration. **MATERIALS and METHODS:** Experiment 1: Chicken macrophages were grown *in vitro* in the presence of yolk, LPS or both yolk and LPS for 4, 12 and 24 hours of incubation. The expression of CD36, MARCO, ABCA1, and SRB1 was measured by quantitative RT real-time PCR. Experiment 2: Chicken macrophages were grown *in vitro* with 1,1'-dioctadecyl-3,3,3',3'-tetramethylindodicarbocyanine perchlorate (DiD)-labeled yolk and 0, 1, 5, 10 or 20ug/ml of LPS. After 24 hours of incubation, cells were analyzed by flow cytometry to determine intracellular yolk levels. **RESULTS:** Experiment 1: LPS decreased the expression of CD36 and MARCO (p=0.0018 and, p=0.0257, respectively). LPS decreased the expression of ABCA1

and SRB1 (p<0.0001 and p<0.0001, respectively). Experiment 2: In preliminary replicates, increasing LPS concentration up to 10ug/ml showed a linear increase in intracellular yolk content. Further replicates and cell imaging studies are in progress to confirm these results. **CONCLUSIONS:** LPS decreased lipoprotein receptor and lipoprotein secretory genes leading increased intracellular yolk content and possibly yolk clearance.

138 Effect of Mucus Viscoelasticity and Surface Adhesivity on Mucus Displacement during Cough in Sickness and Health, AN-PALAKI J RAGAVAN¹, CAHIT A EVRENSSEL^{1,2} and PETER KRUMPE^{1,3} (¹Dept. of Biomedical Engineering, University of Nevada, Reno, NV 89557; ²Department of Mechanical Engineering, University of Nevada, Reno, NV 89557; ³School of Medicine, University of Nevada, Reno, NV 89557; ragavan@unr.edu)

Due to high correlation between viscous modulus (G'') and elastic modulus (G') of human respiratory mucus, their individual contribution to mucus displacement during cough is unknown although some researchers inadequately use loss tangent ($\delta = G''/G'$) and complex modulus ($G^* = (G')^2 + (G'')^2$)^{0.5}. Mucus adhesivity is a new concept hence its role on mucus displacement during cough is unclear. Interactive influence of G', G'' and adhesivity of simulated mucus on mucus transport was investigated in this study using a simulated cough machine and a model human trachea subjected to discrete vertical angles (0°, 15°, 30°, 45°). Mucus was prepared to represent sputum of patients with a range of respiratory diseases (asthma, COPD, CF) by mixing locust bean gum solutions with solutions of Na₂B₄O₇, sucrose, CaCl₂ and NaCl at different proportions. Displacements of mucus droplets (0.3ml) placed inside the trachea were photographed with a high speed camera video system. A rheometer (TA Ins.) was used to measure G' and G''. Contact angles and surface and interfacial free energies of mucus droplets were measured using a tensiometer. All experiments were repeated after making tracheal surface adhesive. Partial least squares regression was conducted to separate individual influence of G' and G'' on mucus displacement. Correlations between δ and G* were significant (p<0.0001). Extracted factors were uncorrelated and with high loadings for G' (-0.989) and G''(0.967). Mucus displacement increased linearly with G'(R²=0.986) while the relationship between G'' and mucus displacement was negative. Larger contact angles and frontal depth on adhesive tracheal surface reduced cough transport velocity significantly (p<0.0001).

139 Effects of Volcanic Sulfur Dioxide (SO₂) Emissions on Pulmonary Function in Adults, REID HOSHIDE¹, ELIZABETH TAM¹, JOHN GROVE², BARBARA BROOKS³, EDWARD FERNANDEZ¹, JENNIFER ORR¹, A. JEFF SUTTON⁴, TAMAR ELIAS⁴, ANDREW GRANDINETTI², and PETER HOLCK² (Departments of ¹Medicine and ²Public Health Sciences, John A. Burns School of Medicine, University of Hawaii, Honolulu, HI 96813; ³Hawaii State Department of Health; ⁴US Geological Survey, Hawaii National Park, Volcano, HI 96718; ¹BSB 222C, 651 Ilalo Street, Honolulu, HI 96813; hoshide@hawaii.edu)

Kilauea Volcano emits 300 to 6,000 tons of SO₂ daily. SO₂ levels in Volcano Village can exceed 200 ppb during southerly or low wind conditions. We assessed symptoms and airway function in 18 adult residents of Volcano Village to test the hypothesis that adults develop bronchoconstriction when exposed to [SO₂] greater than 200 ppb. Adult residents of Volcano Village (n=18, 18-78 years old, 5 men, 13 women) were recruited according to approved protocol.

We excluded people with diabetes or heart disease, current smokers, or who were pregnant. Height, weight, spirometry, and symptoms were assessed at baseline. Studies were repeated between July 2006 and February 2007. Ambient SO₂ was measured using Interscan SO₂ analyzers. We calculated maximum, average, and cumulative [SO₂] at 1, 24, and 72 hr before spirometry. There were 8 episodes when [SO₂] was 200–450 ppb for more than 1 hr. The generalized estimating equations statistical model indicated a trend toward lower FEV1 as antecedent [SO₂] increased, without an associated decrease in the mean FEV1/FVC ratio (0.767 when ([SO₂])>200 ppb vs 0.769 at <200 ppb). In this small sample of adults, [SO₂] as high as 454 ppb was not associated with significant airway obstruction within 72 hr of the episode. Our findings are limited by the small sample size and limited exposures to high SO₂ during our testing. (Supported by: Centers for Disease Control, Hawaii State Department of Health, American Lung Association of Hawaii, Leahi Fund, Hawaii Community Foundation.)

Joint Session of the Education and the History and Philosophy of Science Sections **Monday, 10:00 a.m. in HPA Room 23**

140 *Exploring Undergraduate Student Conceptions of Environmental Processes*, **BRIANA K MCCARTHY** and **KIMBERLY TANNER** (Department of Biology, Science Education Partnership and Assessment Lab, San Francisco State University, 1600 Holloway Ave. San Francisco, CA 94132; briana.mc@gmail.com)

An overarching goal of university science programs is to prepare majors for careers in the sciences – careers that require students to have both strong foundations of knowledge and the intellectual capacities to apply this knowledge. In the science education research literature, there appears to be a tacit assumption that biology majors and environmental science majors graduate with the above capabilities. This research aims to investigate this assumption. How do advanced undergraduates in biology and environmental science majors at a large, urban university conceptualize key environmental processes? What are the differences, if any, between these two majors' conceptions? In the first phase of our research, we probed students' conceptions of photosynthesis and the greenhouse effect through the analysis of written responses to the challenge statement, "The greenhouse effect can be made smaller by planting trees." Using a unique conceptual rubric developed for this challenge statement, we coded and scored the written responses and compared scores across the two populations. We found that both groups had a strong understanding of plants' roles in carbon sequestration, but that environmental studies majors were better able to apply this knowledge to the enhanced greenhouse effect phenomenon. An unexpected result of this study was that more environmental studies majors than biology majors discussed the role of respiration in carbon cycling. As part of the second phase of this research, we are video-interviewing a subset of students to further probe their conceptions. The results of this research will contribute to the literature on undergraduate students' conceptions of environmental processes, as it is the first study of its kind to compare conceptions between environmental studies and biology majors.

141 *When Mythic and Theoretic Experiences Becomes Shareable: A Case Study of Scholarship and Learning in the Realm of Post-theoretic Emergences*, **BHAVNA HARIHARAN**¹, **COLLEEN**

SAXEN² and **SYED SHARIQ**¹ (¹Kozmetsky Global Collaboratory, 224 Panama Street, Suite 104, Stanford University, Stanford, CA, 94305; ²School of Public Health, Wright State University, Dayton, OH, 45435; bhavnah@stanford.edu)

As scholars we are engaged in understanding how sustainable global prosperity might emerge, given the growing gap between largely poor pre-literate societies and literate, technologically advanced societies. Scholars have learned that ideas and knowledge which have contributed to the development of advanced societies are not readily accessible and adaptable to developing societies. We claim that this problem manifests because these two societies do not share a common context since the developed society has evolved into the theoretic stage while the developing society remains mostly in the mythic stage. We define these stages in accordance with Merlin Donald's theory of the evolution of the modern mind.

Based on this premise, we prototyped face-to-face pre-literate experiences in small group ecologies of scholars who represented and enacted ideas and knowledge for sustaining their aspirations through mythical capabilities. The scholars then shared their sustainability practices face-to-face with small group ecologies in mythic communities in India. These prototyping experiences offer insights into both the value of mythic capability in enhancing the sustainability of theoretic society and the value of collaboration between theoretic and mythic ecologies in accelerating emergences of indigenous aspirations within mythic society as a basis for the creation of a sustainable prosperity.

Primary among implications for future research is the emerging evolutionary theory of post-theoretic society, which is rooted in the sharing of experiences between a mythically enriched theoretic society and a theoretically enriched mythic society. We offer a preliminary outline of this theory and its potential for creating and sustaining face-to-face, small group ecologies in which the aspiration and giftedness of each individual is the basis for learning and being in a world where shared global prosperity is a norm.

142 *Marine Science Graduate Students as Educators*, **ERIN BLACKWOOD** (Romberg Tiburon Center, San Francisco State University, 3152 Paradise Drive, Tiburon, CA 94920; erin70@sfsu.edu)

The Romberg Tiburon Center for Environmental Studies (RTC), located in Tiburon, California, is the marine field campus for San Francisco State University. Graduate students at RTC not only conduct research on a wide variety of estuarine ecology topics, they also spend time disseminating this research to school children and the general public, from "K to Gray". This marriage of science and education enhances both formal and informal science programs with information from and activities led by practicing scientists. Students also receive a valuable education in teaching science to a lay audience.

Whether you work in a university or private research institution, school, or nonprofit educational organization, you can utilize this valuable partnership. In this oral presentation, learn how you can start and maintain partnerships using marine science graduate students as educators.

143 *Introducing the Principles of Electromechanical Energy Conversion with a Low-Cost Experiment for Lower-Division Students*, **THOMAS F. SCHUBERT, JR.**, **FRANK G. JACOBITZ**, and **ERNEST M. KIM** (Department of Engineering, University of San Diego, 5998 Alcalá Park, San Diego, CA 92110-2492; schubert@

sandiego.edu)

The design, implementation, and assessment of an introductory energy conversion experiment in sophomore-level electric circuits courses are described. Two separate courses were enhanced by the addition of a common energy conversion experiment for both students in the electrical engineering program (e.g., as student preparation for an electric power class) and those in other engineering majors (e.g., as student preparation for mechanical engineering lab experiences). The experiential foundation in the lab was designed to solidify the basic concepts of energy conversion and electric motor performance. The experiment used a simple sub-fractional horsepower (Fischertechnik™ #32293: ~1.5 Watt) electric motor together with a unique small-scale dynamometer to investigate electrical-mechanical energy conversion, and a pair of the sub-fractional horsepower motors to investigate electrical-electrical energy conversion. Other topics included modeling of DC electric motors, predicting motor performance, and experimentally obtaining relevant motor constants. Despite the low-cost equipment, experimental results proved to be reliable, accurate, and repeatable. Student learning was assessed through questionnaires at the beginning and end of the laboratory period. The questionnaires addressed both student knowledge and student confidence levels. The assessment showed a significant overall increase of both student knowledge and confidence scores as well as significant incremental increases. Detailed analysis of the assessment data revealed strengths in student preparation for the experiment as well as certain course topics, such as the operating principles of a dynamometer, which will require more in-depth coverage in subsequent offerings of the course. While designed for sophomore engineering students, the experiment could easily be performed by lower-division college students in other technical majors as well as advanced high school students.

144 *A New Approach to Understanding Technological Knowledge and Innovation*, **J. SCOTT HAUGER** (Desert Research Institute, 2215 Raggio Parkway, Reno, NV 89512; scott.hauger@dri.edu)

A recurring theme in the field of Science and Technology Studies has been the distinction and relationship between scientific and technological knowledge, as developed or constructed by different professional communities. Most studies have conflated technological and engineering knowledge. A conceptual model of technology as practice helps to clarify the nature of technological knowledge, and suggests that technological knowledge can be represented as a composite of elements of scientific knowledge (knowledge of natural phenomena), engineering knowledge (knowledge of how to control natural phenomena), and societal knowledge (knowledge of the societal context within which the practice occurs).

This paper will develop the argument for representing technological knowledge as such a composite, and point the way toward a knowledge-based, evolutionary theory of innovation grounded on that theoretical model.

145 *Scourge of the Osage from the Hand that Held the Quill: The Astonishing Nineteenth-Century Survival and Success of the Osage Nation while Plagued by Indian Removal*, **ATHENA STEPHANOPOULOS** (Departments of History and Biology, Wichita State University, 9911 E. 21st Street N., No. 106, Wichita, KS 67206; Athena.Stephanopoulos@gmail.com)

At the dawn of the nineteenth century, the most powerful Midwestern Indians, the Osage nation, found themselves entangled with numerous communities, the most detrimental being the

United States government. The price of continual, unavoidable, contact with American trespassers was immense; in less than two generations the estimated 20,000 Osages dwindled to less than 2,000 sad souls. Their dramatic decline, including an 1830s diet of only bitter acorns, was the direct result of the Osages' invisible intruders, not magic bullets. Up to six separate plagues tainted their food, water, educational facilities and bodies simultaneously. Copper and brass cookware were also forbidden related to severe metal toxicity, sometimes appearing as the distinctive Kayser-Fleiser ring in one's eyes.

Interestingly, when 1870s federal aid failed to reach the tribe, disease is what saved them from near extinction. Their final resting place lay in Oklahoma--notorious for its unable, profitless soil. But shortly after their relocation, throngs of longhorns arrived with anxious Texas ranchers; Osage pastures happened to contain Bluestem grass--legendary for doubling the weight of cattle (and their owners' pocketbooks) in six months. Surrounding states had banned longhorns from their prairies because they carried Texas Fever disease which infected only non-Texas livestock. The Osages ingeniously discovered that washing longhorns removed the sickening vector, a tick, and implemented washing stations along the Kansas-Oklahoma border. Due to their intrepid resourcefulness with Texas Fever and a bit of luck, by 1900 the once destitute Osage Indians again became some of the richest people in America.

Joint Session of the Agriculture and Horticultural Science, the Anthropology and Archaeology, and the Ecology, Organismal Biology and Environmental Sciences Sections

Wednesday, 8:00 a.m. in HPA Room 42

146 *Understanding Island Poverty and Mainland Richness: Seasonal Avifaunas in Western Mexico*, **HARTMUT S. WALTER** (Department of Geography, UCLA, Los Angeles, CA 90095-1524; walter@geog.ucla.edu)

This paper compares the avifaunas of two Mexican oceanic islands (Socorro and Maria Magdalena in the eastern Pacific) to that of the continental avifauna of the Chamela-Cuixmela Biosphere Reserve in coastal Jalisco, Mexico. The three areas are nearly identical in size and lie within two degrees latitude in the same climatic zone. It was the objective of this field study to find out how many landbirds occupy the mainland site during the hottest and driest part of the year. The breeding landbird avifaunas of the two islands are highly endemic (10 on Socorro Island and 34 on Isla Maria Magdalena). Some 99 breeding landbirds have been recorded from the coastal tropical dry forest of the Chamela-Cuixmela reserve.

Bird surveys conducted in April 1999 in the Chamela reserve -- stricken by extreme drought and leafless forest -- yielded only 35 resident terrestrial diurnal bird species. These dry season data indicate that the continental study site was only slightly richer than its island counterpart on Maria Magdalena. This evidence highlights a seldom recognized advantage of mainland existence: spatial flexibility in order to adjust and adapt to seasonal resource shortages and bottlenecks. Species can migrate (long distance movements) or move up the mountain or into a wetland corridor. On oceanic islands, however, all endemic inhabitants are dependent on the bounded island space from season to season and from generation

to generation. The Chamela – Socorro – Maria Magdalena comparison is a fine example of this important driving factor of species diversity.

147 Can Northern Anchovies (*Engraulis mordax*) Serve as Paratenic Hosts for the Parasitic Protozoan, *Toxoplasma gondii*? **GLO-ETA N. MASSIE and MICHAEL W. BLACK** (Department of Biological Sciences, California Polytechnic State University, San Luis Obispo, CA 93407; gmassie@calpoly.edu)

From bottlenose dolphins, to walruses, to sea otters, the parasitic protozoan *Toxoplasma gondii* is infecting marine mammals around the world. Whereas the terrestrial transmission pathways of *T. gondii* (consumption of infectious oocysts found in cat fecal matter and carnivorousness of *T. gondii* infected prey) are well-described, the transmission pathway by which marine mammals are being infected is unknown. Discovering the pathways of transmission of this parasite to marine animals is of vital importance. We hypothesize that migratory filter feeders, specifically northern anchovies (*Engraulis mordax*), are serving as a paratenic hosts for *T. gondii* within the marine environment. We propose that anchovies filter oocysts from seawater and serve as biotic vectors, transporting the oocysts from the nearshore to pelagic environments. We experimentally exposed northern anchovies to *T. gondii* oocysts for various time intervals under laboratory conditions. Following exposure, the digestive tissues of the exposed fish were processed using a novel DNA extraction protocol developed by our lab. The extracted DNA was run through PCR using primers specific to a 164bp repeat sequence in the *T. gondii* genome. 34 out of 54 fish tested positive for *T. gondii*. Our research has demonstrated that northern anchovies filter *T. gondii* oocysts out of seawater and that the oocysts are maintained in the digestive tissues. If the *T. gondii* oocysts remain infectious, this could implicate anchovies as a transmission pathway in the marine environment.

148 Down and Dirty: Examining Mercury Levels in Predatory Pelagic Fish and Their Lower Trophic Level Prey as a Function of Depth in Pelagic Ecosystems Surrounding Hawaii. **C. ANELA CHOY** (Department of Oceanography, University of Hawaii, Honolulu, HI 96822; cachoy@hawaii.edu)

Mercury is distributed throughout the Earth's physical and biological systems, where it biogeochemically cycles and is retained in trace amounts in plants and animals. Of particular interest to the scientific and medical communities is the variation of mercury levels seen in widely consumed pelagic fishes. Inter- and intra-specific variations have been previously linked to size, age, trophic position, and location of capture. Ingestion of mercury from food has been confirmed as the dominant pathway of mercury uptake in fish, thus recording the integrated feeding behavior of the consumer. Furthermore, biogeochemical studies of mercury in the ocean report that low-oxygen, deeper waters are sites for enhanced mercury methylation, and thus have higher concentrations bioavailable to organisms inhabiting and foraging in these deeper waters. The present study examines mercury levels in pelagic fish with distinct foraging behaviors (*Thunnus obesus*, *T. albacares*, *Katsuwonus pelamis*, *Xiphias gladius*, *Lampris guttatus*, *Coryphaena hippurus*) and numerous representatives of their micronektonic prey in relation to vertical depth of occurrence in the water column. Coupling mercury levels with the use of stable isotopes and stomach content analyses, insight is gained on trophodynamics and the flow of energy and contaminants within pelagic ecosystems.

149 Farmland Impact on Seed Dispersal by Flying Foxes in Tropical Dry Forests. **MATTHEW SCOTT LUSKIN** (Department of Geography, University of California, Los Angeles, 3831 Overpark Road, San Diego, CA 92130; tropic.luskin@gmail.com)

Flying foxes (fruit bats of the genus *Pteropus*) and their ecological relationship have been studied in tropical rainforests, but not in a critically endangered tropical dry forest. *Pteropus tonganus* is the only fruit bat or native mammalian species on the Yasawa island archipelago of Fiji. Data was collected on the population, density, feeding habits, and seed dispersal of *P. tonganus* in tropical dry forest remnants on islands. Large seed dispersal (>.4mm) in tropical dry forests is dependent on high feeding densities of *P. tonganus* including aggressive interactions between individuals. Despite widespread deforestation, *P. tonganus* is not endangered on the Yasawa Islands. Roosts were limited to the small remnant forest fragments, but foraging extended over forest and farmland habitat. Evening feeding density in farmland more than doubled that in forests, indicating a strong preference for farmland food sources. Aggressive feeding interactions leading to the carrying of fruit away from a host tree were present in farmland but absent in forests. Feeding in farmland is supporting a large *P. tonganus* population, but has reduced forest density and the behavioral traits crucial to its ecological role as a disperser of large seeds in forests.

150 China's Wildman, the Yeren. **D. JEFFREY MELDRUM** (Department of Biological Sciences, Idaho State University, Pocatello, ID 83209-8007; meldd@isu.edu)

The traditions of hair-covered wildmen have deep roots not only in western cultures, but in the East as well. Contemporary accounts of the Chinese Wildman, or Yeren, have their parallels in reports of the sasquatch from North American forests. A large fraction of Yeren reports emanate from the Shennongjia region of western Hubei Province, a reserve of pristine forest surviving since the Tertiary, harboring rare and endangered species such as the golden snub-nosed monkey. Floral disjunction and forest habitat comparisons between Eastern Asia and Western North American indicate common elements, suggesting comparable ecological context for the Yeren and sasquatch.

Chinese researchers have suggested that the Yeren may be descended from *Gigantopithecus*, a Pleistocene great ape presumed to have gone extinct 300 kya. Fossil remains of *Gigantopithecus blacki* have been recovered in Hubeiprovince near the Shennongjia region. This is the most northern and highest altitudinal indication of *Gigantopithecus*' distribution known to date. Paleontological record of intercontinental faunal exchange suggests a biogeographical context.

Recent sightings of the Shennongjia Wildman, one as lately as November 2007, are taken very seriously by local authorities, in contrast to the official reaction by their American colleagues. Footprints measuring between 30 and 50 cm and hair samples of indeterminate identity have been documented. These are compared with similar specimens collected in western North America, and the potential for homology is assessed.

151 Mitochondrial Markers: A Valuable Tool for the Molecular Taxonomy of Fruit Flies (Diptera: Tephritidae). **SAMIA FKI^{1,2}, DAVID S. HAYMER², MOHAMED RABEH HAJLAOU³ and MOHAMED MAKNI¹** (¹Faculté des Sciences Mathématiques, Physiques et Naturelles de Tunis Campus Universitaire - 1060 Tunis; ²University of Hawaii at Manoa, Cell and molecular Biol-

ogy department CMB 1960 East West Road Honolulu HI 96822; ³Institut National Agronomique de Tunisie, Rue Hédi Karray 2049 Ariana, Tunis, Tunisie; fkih@hawaii.edu)

The family Tephritidae with the order Diptera harbors many examples of true fruit flies that are considered to be major agricultural pests. However, the status of many of these taxa as distinct species remains unclear. Many of these taxa are members of complexes of closely related species, and in these cases traditional methods of identification based on morphological and behavioral traits are often inadequate for distinguishing species.

To overcome this problem molecular taxonomic tools specific to these insects have been developed based on the analysis of DNA. Among these, DNA markers derived from mitochondrial sequences have proved to be very informative for molecular differentiation due in part to their haploid and uniparental (maternal) mode of inheritance and the absence of recombination. Specifically for taxa in the genera of *Ceratitis*, *Bactrocera* and *Dacus*, results have been obtained from the analysis of three different mitochondrial genes, i.e. the 16S, COI and COII genes.

DNA sequences from these three genes have been used to analyze the relationships of populations and species within these genera using specimens collected from various geographic localities around the world.

152 Variation at the DNA Level Within and Between Populations and Species of the *Bactrocera dorsalis* Species Complex, CHRISTIE K. M. NAEOLE and DAVID S. HAYMER (Department of Cell and Molecular Biology, University of Hawai'i at Manoa, 1960 East-West Road, Biomedical Sciences Building T-511, Honolulu, HI 96822, christie@hawaii.edu)

The group of closely related species known as the Oriental fruit fly or *Bactrocera dorsalis* (Diptera: Tephritidae) species complex contains at least 75 described species, some of which are major agricultural pests in the Asia-Pacific region. However, in part because of their extremely close relationships, many of them cannot be easily or accurately identified using traditional taxonomic characters. Nevertheless, the ability to make rapid and accurate identifications of these pests is essential, especially in cases of biological invasions where enormous direct and indirect economic losses may be inflicted. In such cases molecular taxonomic approaches based on DNA analysis may prove useful to increase the speed and reliability of available identification techniques. For this purpose, we have analyzed mitochondrial DNA sequences from three genes (16S, COI and COII) from a large number of individuals from the species *B. dorsalis*, *B. papayae* and *B. carambolae*. Using these data, genetic distances were estimated using the Kimura 2-Parameter model. The results suggest there is low divergence (usually < 1%) between individuals within populations and between populations. This same trend continues between these species. These low levels of diversity have clear implications for using DNA barcode type markers for identification purposes when such closely related species are involved. In addition to the mitochondrial data, surveys of other specimens and other gene sequences such as nuclear genes may aid in resolving the true relationships of species in this complex.

153 Preliminary Evidence for Epistasis between Map-Based QTL Markers Associated with Powdery Mildew Resistance in Hop (*Humulus lupulus* L.), JOHN A. HENNING¹, M. SHAUN TOWNSEND² and DAVID H. GENT¹ (¹USDA-ARS-FSCU, 3450 SW Campus Way, Corvallis, OR 97331; ²Department of Crop

& Soil Sciences, Oregon State University, Corvallis, OR 97331; John.Henning@oregonstate.edu)

Powdery mildew (*Podosphaera macularis*) of hop is a serious problem requiring multiple applications of prophylactic fungicide applications. The only economically reasonable solution for this production issue is the use of resistant hop cultivars. Field-based selection for powdery mildew (PM) resistance is both expensive and imprecise, justifying the need for more accurate seedling-based selection protocols. The objective of this study was to identify map-based QTL's associated with resistance to PM using AFLP molecular markers. Crosses were made between PM susceptible 'Perle' and PM-resistant male 'USDA 19058M'. Both parents and their 135 offspring were clonally propagated and inoculated in a glass-house using a complete randomized design with 3 replications over time in Corvallis, OR. DNA was extracted, purified and analyzed via AFLP using 4 primer pair combinations. Analysis of the resulting markers was based upon the "two-way pseudotestcross" procedure. JoinMap 3.0 was used for mapping and QTL analysis was performed using WinQTL Cartographer 2.5. We identified two QTL markers that mapped onto different linkage groups. Marker, 345D on linkage group 4 appears in all offspring susceptible to powdery mildew. Marker 205A on linkage group 3 appears in individuals resistant to powdery mildew except when marker 345D is present; 345D appears linked to a QTL that overrides the expression of the QTL located near marker 205A. Additional molecular AFLP and microsatellite markers are being investigated to saturate the map for this trait. This is the first known report of molecular-based QTL epistasis in hop governing the expression of any trait.

154 Quantitative Trait Loci Affecting Fatty Acid Composition of Beef. N.O.M. TSHIPULISO¹, L.J. ALEXANDER², T.W. GEARY², W.M. SNELLING³, D.C. RULE⁴, J.E. KOLTES⁵ and B.E. MOTE⁵ and M.D. MacNEIL² (¹Agricultural Research Council, Private Bag X2, Irene 0062, South Africa; ²USDA Agricultural Research Service, Miles City, Montana 59301; ³USDA Agricultural Research Service, Clay Center, Nebraska 68933; ⁴Department of Animal Science, University of Wyoming, Laramie 82071; ⁵Department of Animal Science, Iowa State University, Ames 50011; mike.macneil@ars.usda.gov)

The objective of this study was to search for quantitative trait loci (QTL) that segregate between Japanese Black and Limousin and affect relative amounts of saturated (SFA), monounsaturated (MUFA) and polyunsaturated (PUFA) fatty acids. Six F₁ Japanese Black-Limousin cross bulls were joined with 121 F₁ females over a three-year period to produce 328 F₂ progeny. Calves, aged from 450 to 641 d (average 561 d), were harvested using standard industry procedures. After aging, 2.54 cm thick steaks were cut from the posterior end of the wholesale rib, frozen at -20°C, and held for determination of fatty acid composition. Percentages of the individual fatty acids were classified into percentages of saturated fatty acids (SFA), mono-unsaturated fatty acids (MUFA) and poly-unsaturated fatty acids (PUFA). Two hundred seventeen microsatellite markers covering the 29 bovine autosomes were assayed and QTL were identified by least squares regression. Genome-wise significant QTL with additive effects on SFA (-0.61 ± 0.19 %), MUFA (0.93 ± 0.19 %) and PUFA (-0.52 ± 0.11 %) were observed near the centromere of BTA2. Also observed were five QTL indicative of dominance effects on: MUFA (BTA9, 119 cM, -1.87 ± 0.72 %; BTA22, 47 cM, 1.85 ± 0.60 %) and PUFA (BTA9, 54 cM, -1.49 ± 0.42 %; BTA10, 38 cM, 1.20 ± 0.35 %; and BTA15, 14 cM, 1.11 ± 0.36 %). Based

ABSTRACTS – Contributed Oral Papers

on these results, we conclude that it may be possible to improve healthfulness of beef by manipulating fatty acid composition using genetic markers and appropriate crossbreeding systems.

155 *Seven Habits of Effective Transgenic Product Development*, **PAUL D. OLSON** (Pioneer Hi-Bred International, P.O. Box 609, Waimea, Kauai, HI 96796; paul.olson@pioneer.com)

The tapping of transgenic genetic variation for crop improvement is still in its infancy, but it has already had a dramatic impact on major crops such as maize and soybeans worldwide. The research behind two commercial, European cornborer-resistant (*Ostrinia nubilalis*), transgenic products will be summarized. The principles learned from these investigations provide the frame for the presentation. Vector optimization, event/stack evaluation, and some regulatory aspects will be discussed. Conference attendees will find it interesting to learn that Hawaii continues to play a pivotal role in the development of new transgenic traits.

Joint Session of the Atmospheric and Oceanographic Sciences, the Earth Sciences, and the Industrial Sciences and Technology Wednesday, 10:40 a.m. in HPA Room 41

156 *Enhanced Natural Convection Using Liquid Metals and Alloys during Conjugate Heat Transfer*, **M. McGARRY, C. BONILLA and I. METZGER** (University of San Diego, Department of Engineering, 5998 Alcalá Park, Loma Hall, San Diego, CA 92110; mmcgarry@sandiego.edu)

A validated computational model was created to simulate the heat transfer from a heated surface using liquid metals and alloys during conjugate heat transfer. This model explores the effect of the Rayleigh number, Prandtl number, thermal conductivity ratio, and aspect ratio on the Nusselt number along the hot surface. The data shows three distinct regions that occur as a function of the Rayleigh number for a fixed k^* and d^* . In addition, the higher the Prandtl number the higher the Nusselt number in any region. The data also shows that the thermal conductivity ratio between the fluid and the solid conducting block has little effect on the Nusselt number at a fixed Rayleigh number. However, when examining the effect of the aspect ratio on the Nusselt number two distinct regions can be seen. The first region corresponds to d^* values between 0.5 and 10. In this region the Nusselt number is significantly affected by the Rayleigh number. The second region corresponds to d^* values between 0.05 and 0.1. In this region the Rayleigh number has little effect on the Nusselt number. Finally, two different analytical models were used to derive the correlation equations. The models show good agreement with that data and can be used over the whole range of parameters.

157 *Turbulence in a Velocity Spiral*, **FRANK G. JACOBITZ** (Mechanical Engineering Program, University of San Diego, 5998 Alcalá Park, San Diego, CA 92110; jacobitz@sandiego.edu)

Turbulence and mixing are investigated in stably stratified shear flow using direct numerical simulations. Two different flow configurations with uniform vertical density stratification are compared. In the first flow, the mean velocity magnitude varies in the vertical direction. This flow with a linear mean velocity profile has been studied in many previous investigations from the pioneering work by G.I. Taylor in 1914 to numerous experimental and nu-

merical investigations in the last two decades. In the second flow, the mean velocity magnitude is fixed but its direction varies in the vertical direction. Thus, the mean velocity describes a spiral. Such flows have been observed in the atmosphere and the oceans. The total shear rates of the two flow configurations are matched in the simulations to facilitate a comparison. The turbulent kinetic energy initially shows a similar evolution in both flows. However, a reduced growth of the turbulent kinetic energy is eventually observed in the velocity spiral simulations. The length of the velocity spiral introduces an additional length scale that is not present in the linear velocity profile simulations. Similarity in the turbulent kinetic energy evolution is found as long as the vertical integral scale of the flow is small compared to the velocity spiral length. The growth of the turbulent kinetic energy is slowed in the velocity spiral simulations when the integral scale approaches the velocity spiral length.

158 *Snow Depth and Lake Ice Thickness Estimations Using GPS*, **MARK JACOBSON** (Montana State University – Billings, Department of Mathematics, 1500 University Drive, Billings, MT 59101; mjacobson@msubillings.edu)

This presentation continues an exploration into a method for estimating snow depth and lake ice thickness by using the Global Positioning System (GPS) frequency of 1.5 GHz. During the past two decades, little attention has been paid to microwave interactions of snow pack or lake ice at 1.5 GHz or lower. Snow depth is a key parameter in estimating snow water equivalence (SWE). Seasonal snow cover is the major source of fresh water over wide areas of the mid-latitudes. SWE, the product of snow density and depth, is the most important parameter for hydrological study because it represents the amount of water potentially available for runoff. Lake ice thickness information can be useful in the winter navigation season, like in the Great Lakes region. The theoretical model for estimating either snow depth or lake ice thickness consists of a vertically-mounted antenna located above either a single-layer or a double-layer of snow and/or ice, which in turn is located above a perfectly conducting surface or a water surface. The received power at the antenna is computed from conventional transmission line equivalent circuit theory. The theoretical results for various snow depths are compared with GPS measurements from a 16' X 16' structure. Theoretical results for various lake ice thicknesses are also discussed. Research is ongoing to develop algorithms for inferring snow depth and lake ice thickness for various conditions.

159 *Reports on Current Technological Developments for Post-Petroleum Survival*, **HENRY OMAN** (Consulting Engineer, Seattle, WA)

Data on the growing world's petroleum consumption and diminishing resources shows that within the next two decades our world's available petroleum resources will be gone. This presentation will report on efforts being made to convert from petroleum-based economies to alternative means of generating energy through the development of new hydro and nuclear power plants, high efficiency lithium-ion diode lamps, electric automobiles and even nanotechnological advances in solar power collection.

Social, Economic and Political Sciences Section Thursday, 1:15 p.m. in HPA Kono Center for English Studies

160 *Competent Court Interpreting in Diverse, Low-Caseload*

Court Systems: Dilemmas and Proposed Solutions, **MARCELLA ALOHALANI BOIDO**, (Hawaii Certified Court Interpreter and Retinopathy of Prematurity Subproject, Research in Minorities in Institutions Project, 200 West Kawili Street PB 10-2, University of Hawaii at Hilo, HI 96720; boido@hawaii.edu)

In 1977, Los Angeles Superior Court became the first court system to test and certify court interpreters. California passed a court interpreters act which became law on May 24, 1978. The federal Court Interpreters Act of 1978 (28 USC §1827) followed five months later. These court systems had high caseloads in some areas, and need was concentrated in one language: Spanish. A model was developed for recruiting, paying for, and providing certified court interpreter services. This model became the dominant paradigm. Yet this model does not function very well in jurisdictions and areas where the need for services is fragmented by language and sometimes also by geography, and need for a particular language may be regular but relatively low. Forty states now belong to the Consortium for State Court Interpreter Certification. Court systems around the country are trying to cope with an increasing need for language services in a diversity of low-need (and sometimes extremely rare) languages. The failure of the dominant model to give appropriate guidance in these situations is becoming apparent. What is necessary to provide “linguistic due process” as per *U.S. ex rel. Negrón v. New York*? This paper explores the problems and proposes some solutions.

161 *Redefining Security: Nuclear Weapons at the 1986 Constitutional Commission of the Philippines*, **VINCENT K. POLLARD** (Asian Studies Program, Moore 416, University of Hawai‘i at Manoa, Honolulu, HI 96822; pollard@hawaii.edu)

In the Philippines, protests over the failed presidential election of 7 February 1986 led to a televised mutiny by military officers. This ended the dictatorship of Ferdinand Marcos. Challenger Corazon Aquino’s unusual pathway to power required a new constitution. A minority of her appointed Constitutional Commissioners came from the “Nationalist Bloc opposed to nuclear weapons and foreign military bases. At the 1986 Constitutional Commission, anti-bases commissioners set substantive, procedural and diplomatic traps for the pro-American president. Influenced by the Nuclear Freeze Movement, they embedded *isang malayang patakaran panlabas* (“an independent foreign policy”) in mutually reinforcing constitutional clauses. One was a vague but ultimately potent prohibition against nuclear weapons in the Philippines. Antecedent variables—earlier decisions reached by the Constitutional Commission—further strengthened the anti-bases cause. Taken together, these proposals redefined security as freedom from nuclear weapons and foreign military bases.

Not wishing to alienate Nationalist Bloc enthusiasm for ratification, commissioners favorable to U.S. bases often voted for Nationalist Bloc constitutional proposals—or abstained. Meanwhile, declassified cablegrams reveal that the U.S. Embassy Political Section in Manila underestimated the size and effectiveness of the anti-bases minority. Meanwhile, U.S. President Reagan and Senator Robert Dole complained in vain. Thus far, no other national constitution has surpassed *Ang 1987 Konstitusyon* in implementing the ideals of the Nuclear Freeze movement of the 1980s. And four and a half years after the 1987 ratification, the Senate of the Philippines would handily reject the Military Bases Agreement, reshaping the civil-military landscape in Okinawa and Korea.

CONTRIBUTED POSTER PRESENTATIONS

POSTER SESSION I

MONDAY

12:30 p.m. – 4:00 p.m.

HPA Under the Canopies

EDUCATION

162 *Wetlands Restoration at the University of California Field Site in Richmond, California*, **WILLIAM B. N. BERRY** (Department of Earth and Planetary Science, 307 McCone, University of California, Berkeley, CA 94720-4767; bberry@berkeley.edu)

The University of California Berkeley owns and operates a field facility at Richmond, California which is about 10 miles from the central campus. Wetlands and tidal marsh environments cover a significant part of the site. Mercury and other metals, notably arsenic, as well as PCBs have been removed from the wetlands by order of the Regional Water Quality Control Board. The Berkeley campus contracted with a professional organization to renew/restore the wetlands from which pollutants had been removed. The renewal/restoration project is being used for instruction. Some environmental science students enroll in a field methods course in which they go to the wetlands every week for a semester. They are taught the several aspects of restoring/rehabilitating the wetlands by the professionals and faculty. Students collect seeds of native wetlands plants, grow the seeds in a nursery and plant young seedlings in the wetlands. As well, students remove non-native vegetation and attempt to keep feral cats from disrupting activities of endangered species (salt marsh harvest mouse and California clapper rail) that are encouraged to live in the restored habitat. The course gives students “hands on” experience in a restoration project as well as instruction in appropriate materials needed to carry out a restoration. Students write a short paper describing the restoration project and their role in it, as well as an analysis of the learning experience to satisfy course requirements. The collaboration among students, professionals in the field and faculty has been a rewarding educational experience.

163 *Using Malama ke `Aina to Teach Science and Math in Hawai‘i*, **COLBY KEARNS** [plus K-8 teachers and administrators, and UH Hilo faculty and graduate students] (Tropical Conservation Biology and Environmental Science M.S. Program, University of Hawai‘i at Hilo, 200 West Kawili Street, Hilo, HI 96720; ckearns@hawaii.edu)

For science education to be effective, especially in culturally diverse classrooms, curricula should be engaging, “hands on,” and relevant to the local community. At the University of Hawai‘i at Hilo, the Partnerships for Reform through Investigative Science and Math (PRISM) Program is developing hands-on, investigative curricula that bridge modern scientific and local cultural knowledge by infusing science lessons with Hawaiian values, beliefs, and practices. PRISM curricula are co-developed by Big Island K-8 teachers and students in UH Hilo’s M.S. Program in Tropical Conservation Biology and Environmental Science (TCBES). Curricula that incorporate local beliefs and values (e.g., “Malama ke `Aina,” or “Caring for the Land”) enhance student enthusiasm for science and lead to greater understanding of scientific principles and their connections to traditional knowledge. Over the program’s first two years, 13

TCBES students have partnered with 34 elementary and middle school teachers to develop and implement 12 marine- and terrestrial-based curricula in 50 classrooms with over 1,000 students. All PRISM curricula are designed to take advantage of Hawaii's unparalleled living laboratory, meet student content and performance standards, and ensure enhanced learning through the use of multiple instructional and assessment strategies. PRISM curricula also incorporate elements of math, art, and language arts. PRISM's longer term goals include the development of an integrated curriculum for K-12 classrooms that promotes scientific literacy and skills to better prepare Hawaii's workforce for the challenges of the 21st Century. PRISM is an NSF-funded partnership between Hawaii's DOE and UH Hilo's Education Department and TCBES Program: <http://uhh.hawaii.edu/affiliates/prism>.

164 *San Francisco State Chemistry Students Teach at Family Science Nights*, **MARGARETA SEQUIN¹ and ALEX MADONIK²** (¹Department of Chemistry & Biochemistry, San Francisco State University, San Francisco, CA 94132; ²California Section, ACS, 43 Quail Court, Suite 101, Walnut Creek, CA 94596; msequin@sfsu.edu)

For more than eight years undergraduate and graduate students from San Francisco State University's Chemistry Department have regularly participated and taught at Family Science Nights sponsored by the American Chemical Society. The semiannual events were held at middle schools with diverse student bodies in the San Francisco Bay Area. San Francisco State students guided the middle school students in hands-on experiments and, in the process, gained valuable experience in explaining scientific methods to the youngsters and their families. The college students' enthusiastic participation encouraged middle school students to explore chemistry ideas and made Family Science Night activities accessible and exciting for them.

165 *Involving Students from Pharmacy and Other Professional Schools in Science Education at K-12 Grade Levels*, **JIM BLANKENSHIP¹ AND JUDI WILSON²** (¹Department of Physiology and Pharmacology, School of Pharmacy, University of the Pacific, Stockton, CA, 95207; ²Office of Science and Special Projects, San Joaquin County Office of Education, PO Box 213030, Stockton, CA 95206)

Pharmacy students are well-trained in the sciences, can provide support for science teachers in K-12 grades and can serve as role models for their students. With this in mind, we developed a class to train and send second year pharmacy students into 2nd and 5th grade classrooms to enhance science education. Three afternoon training sessions on teaching methods and rules and on insects and immunology curricula were conducted by the project leaders with teaching materials provided. Each student was then assigned to work (often in pairs) with a teacher in one of 17 classrooms and once each week guided lessons on insects for second graders or on immunology for fifth graders. Pharmacy students kept journals and provided oral and written feedback at the end of the semester-long class. Formal evaluations of elementary student and teacher attitudes on science showed significant improvement from start to completion of the project.

This year we will repeat this program at University of the Pacific and pharmacy faculty at the University of Arizona and Washington State University will conduct parallel classes based on our experiences. Training on teaching, insects and immunology will be

provided for all three schools on a website. Pre- and post-testing of students (pharmacy and 2nd-5th graders) and teachers will be used to evaluate the effectiveness of the program. The long-term goal of this project is to stimulate involvement of pharmacy students and ultimately practicing pharmacists in the community in science education in their local schools. (Supported by NIH grant # 2-R25-RR012319-004A2)

GENERAL and INTERDISCIPLINARY

166 *Archeological Residues, Chemical Clues for Deciphering Stone Tool Uses*, **JEFFREY J. ROSENTERTER** (Department of Chemistry and Environmental Science, Idaho State University, Pocatello, ID 83209; rosejeff@isu.edu)

Understanding the specific use and purpose of archaeological specimens such as stone axes and grinding stones can help better the understanding an area's ecosystem and civilization. Traditional form-function relationships provide strong clues to the specific use of these implements. Yet, chemical analysis of residues preserved on these tools may provide key information in identifying how the tool was implemented. Chemical analysis has the potential to identify trace components associated with plant and animal materials. The basic assumption of residue studies is that different plants and animals produce different types and quantities of organic compounds. The goal of our on going research is to develop and implement the methods needed for the analysis of tools uncovered at the City of Rocks, U.S. National Monument. These analyses implement techniques that do not alter artifact integrity, facilitate analyte modification through transesterification to enhance volatility, and final identification by direct injection GC-MS methods. Our group and others have demonstrated solid relationships between fatty acid ratios and plant/animal types. By evaluating fatty acid ratios rather than individual fatty acids one can mitigate the effect of environmental degradation on the results. Our research has focused on analytical method development and environmental stewardship for the detection of these trace compounds.

167 *Advancing Women Faculty at Utah State: ADVANCE Goals and Outcomes*, **KIM SULLIVAN¹, RONDA CALLISTER², CHRISTINE HULT³, ROBERT H. SCHMIDT⁴, ANN AUSTIN⁵, CHRISTINE HAILEY⁶, and TRISH KALBAS-SCHMIDT⁷** (Departments of ¹Biology and ²Management and Human Resources, ³College of Humanities and Social Sciences, Departments of ⁴Environment and Society and ⁵Family, Consumer, and Human Development, ⁶College of Engineering, ⁷ADVANCE Office, Utah State University, Logan, UT 84322-2905; robert.schmidt@usu.edu)

ADVANCE is a National Science Foundation program to improve the recruitment, retention and advancement of women faculty in the science, technology, engineering and mathematics (STEM) disciplines. Utah State University is 1 of 32 institutions with an ADVANCE Institutional Transformation Award, and we are in the fifth year of our program.

We have focused on the recruitment, retention, and advancement of women in the STEM disciplines. Prior to ADVANCE, Utah State was hiring at 54% of availability. During ADVANCE, Utah State hired at 95% of availability.

Prior to ADVANCE, non-retirement attrition averaged 8%/year for women STEM faculty compared to 3%/year for men. Thirty-nine percent of women STEM faculty members left Utah State in the five years before ADVANCE. Since ADVANCE started, non-

retirement attrition rates have dropped to 4%/year, which are more in line with the rates seen in men.

Prior to ADVANCE, only 5 women were promoted to full professor across the 4 STEM colleges with none of these promotions occurring in the previous 5 years. Eight women have been promoted to full professor since 2005. For the last 4 years, the percentage of women associate professors promoted to full has been higher than the percentage of men associate professors promoted.

We discuss our strategies and initiatives to reach these goals, and we are now focusing on sustainability.

HEALTH SCIENCES

168 *Looking in All the Wrong Places: HIV Patients Seeking Dental Treatment in the Medical Emergency Care System*, **CHIOMA KAS-OSOKA, KAMI LAURENCE, RICHLAND MOSLEY and BENJAMIN FREED** (Southern California Regional Dentistry Post-Baccalaureate Program, University of California, Los Angeles, School of Dentistry, Room 63-007, 10833 Le Conte Avenue, Box 951668, Los Angeles, CA 90095-1668; vball3010@aol.com)

In 2001, 3.1% of the US population experienced a dental problem managed outside of the traditional dental office based care system; 2.7% of that population received dental care in a hospital emergency room (Cohen & Manski 2006). Our objective is to identify the characteristics of HIV-infected adults associated with their use of a hospital emergency room for dental treatment. The HIV Cost and Services Utilization Study (HCSUS) used a weighted sample of 2,466 HIV-infected adult users of medical care to estimate a probable national population (Bozzette et al 1999). HCSUS is the first of its kind to collect information about HIV-infected adults from a nationally representative population, providing data about the services they utilize. HCSUS reported that 4.4% of their respondents utilized a hospital emergency room for dental care. To guide our multivariate analysis, we used the Behavioral Model of Health Services Use (Andersen 1995) to identify the key factors associated with those who do or do not use the emergency room for dental problems. Independent variables were predisposing, enabling, and need characteristics. Preliminary results show that younger individuals (ages 18-34) were more likely to use the hospital emergency room for dental care than individuals over 35 years of age. Furthermore, non-whites were 2.3 times more likely to use the medical emergency room than whites. These findings help us to better understand the HIV-infected population and may contribute to creating programs that will reduce inappropriate emergency room use for non-urgent dental treatment. The California Endowment supported this research.

169 *Complex Dental Treatments For HIV Patients*, **KARONA TUM, MARQUITA JACKSON, IJEOMA IGWE, and BENJAMIN FREED** (Southern California Regional Dentistry Post-Baccalaureate Program, University of California, Los Angeles, School of Dentistry, Room 63-007, 10833 Le Conte Avenue, Box 951668, Los Angeles, CA 90095-1668; karona@ucla.edu)

During the initial stages of HIV research, dental care providers may have avoided performing complex and/or invasive dental treatments on HIV patients due to limited knowledge of the actual correlation between the disease processes and oral complications. This analysis focuses on factors associated with HIV patients receiving complex versus non-complex dental treatments. Complex treatments include: extractions, crowns/bridges, gum surgery/treat-

ment, root canals, removable full/partial dentures, and biopsy of the mouth. This analysis uses data from the HIV Cost and Services Utilization Study (Bozzette et al, 1998), the first study that provides a national estimate of the number of HIV medical patients. To conduct this analysis, a weighted sample of 133,130 individuals that utilized dental care was used. A multivariate analysis was conducted using complex versus non-complex dental treatment as the dependent variable; the Behavioral Model of Health Services Use (Andersen 1995) was used to define the independent variables. Results indicate that: 1) the less educated had 1.3 times the odds of receiving complex care than those with college educations; 2) heterosexuals had 1.6 times the odds of receiving complex care than males who have sex with males; 3) those whose oral health was worse had 2.2 times the odds of receiving complex treatment than those who perceived their oral health as improved since being HIV positive; and 4) smokers were 1.6 times more likely to receive complex care than non-smokers. The study findings reflect the need for broader public health policy to improve oral care in the HIV infected community.

170 *Cysteine Protease Inhibitor CST1 is a Candidate Biomarker of Senescent Cells*, **DANIEL KEPPLER¹, ZHANG, JUN³, TEERU BIHANI⁴ and ATHENA W. LIN²** (¹College of Pharmacy and ²College of Osteopathic Medicine, Touro University, CA94592; ³UCSF, CA94143; ⁴Tufts University School of Medicine, MA02111; Athena.Lin@touro.edu)

Studies have shown that various stress stimuli can induce senescence in normal cells as well as tumor cells. Senescent cells exhibit altered expression of numerous genes, including genes encoding secreted proteins. Identifying the significance of these gene changes may help to advance our understanding of the senescence biology.

CST1 is a potent inhibitor of lysosomal cysteine proteases. A microarray gene analysis has identified CST1 as a gene that is dramatically upregulated in oncogenic ras-induced senescent human IMR90 lung fibroblasts. To test the hypothesis that CST1 upregulation is specific to senescent cells, we further examined the expression of CST1 in senescent cells triggered by various stimuli. Our results confirm that CST1 is upregulated in ras-induced senescent cells, replicative senescent cells, as well as serum-starvation-induced senescent cells, when compared to early-passage or quiescent cells. In contrast, expression of CST1 is diminished in cells immortalized by oncogenes E1A and Ras. Moreover, tumor cells that have undergone senescence also exhibit upregulation of the CST1 gene. Taken together, these results suggest that CST1 upregulation is not due to expression of the Ras gene, but is likely a general event in senescent cells, and is independent of the senescence triggers. Based on the fact that CST1 is a potent inhibitor of lysosomal cysteine proteases, we propose that the specific upregulation of CST1 in senescent cells might play a role in the senescence-associated impairment of lysosomal proteolysis and contribute to a general age-related decline in cellular homeostasis and function.

171 *Skin Test Reactivity to Aeroallergens in Patients ≤ 15 yr old Referred to a Hilo Allergy Clinic, 1995-2007: Comparison to Honolulu Patterns in 1966 and 2006*, **ELIZABETH TAM¹, JOY SAKAI¹, STUART RUSNAK², MARIANNE YOSHIDA¹, B. DYLAN FERN¹ and PHILIP KUO¹** (Departments of ¹Medicine and ²Pediatrics, John A. Burns School of Medicine, University of Hawaii, Honolulu, HI 96813, Office of Student Affairs, JABSOM,

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We hypothesized that atopy in Hawaii has changed since 1966 and that recent patterns differ between Hilo and Honolulu. We reviewed sensitization to inhaled allergens in 48 patients \leq 15 yr old seen in an allergy clinic in Hilo, 1995-2007. Subjects had physician-documented allergic rhinitis and/or asthma with allergen-specific IgE and/or positive skin prick tests to common aeroallergens. Between 2003-2006, we also recruited physician-diagnosed asthmatics and non-asthmatics on Oahu for symptoms, airway hyper-responsiveness, and skin prick testing to 6 aeroallergens. Subjects \leq 15 yr old at the time of study, who had asthma and demonstrated airway hyper-responsiveness are included in this analysis (n=25).

Dust mite, animal dander, or feather sensitivity was documented in 68, 65, and 15% of the patients tested in Hilo, respectively. This is significantly more than the corresponding rates of 16%, 9%, and 4% in Honolulu, 1966. There were no significant increases in sensitization to roach (29% in Hilo, no 1966 data), or to grass, mold, or weed (no data in Hilo, and in Honolulu, 9-20% in 1966 and 12% in 2003-2006). Among the Honolulu pediatric subjects with demonstrated airway responsiveness, sensitivities to dust mite and roach (88% and 40%) were significantly increased. There was no increased sensitivity to animal dander, grass, mold, or compared to Hilo or to Honolulu, 1966. This may indicate unique roles of dust and roach in the pathogenesis of allergic asthma.

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172 Heart Rate Variability in Adults Exposed to Different Levels of Volcanic Air Pollution, **DOMINIC CHOW¹**, **ANDREW GRANDINETTI²**, **EDWARD FERNANDEZ¹**, **JENNIFER ORR¹**, **BARBARA BROOKS³**, **A. JEFF SUTTON⁴**, **TAMAR ELIAS⁴**, **REID HOSHIDE^{1,2}** and **ELIZABETH TAM¹** (Departments of ¹Medicine and ²Public Health Sciences, John A. Burns School of Medicine, University of Hawaii, Honolulu, HI 96813; ³Hawaii State Department of Health; ⁴US Geological Survey, Hawaii National Park, Volcano, HI 96718; ¹BSB 222C, 651 Ilalo Street, Honolulu, HI 96813; dominicc@hawaii.edu)

Heart-rate variability (HRV) can predict all-cause and cardiovascular mortality in epidemiological and clinical studies. Anthropogenic air pollution is associated with changes in HRV, but the effect of volcanic air pollution (vog) is less well studied. Hawaii's Kilauea volcano releases 300-6000 tons of sulfur dioxide (SO₂) each day, resulting in areas with different types of vog exposure. We tested the hypothesis that volcanic air pollution disturbs sympathovagal balance and changes HRV. We studied 19 adults who live in an area exposed episodically to SO₂ levels \geq 200 ppb, 19 adults exposed to prolonged periods of SO₂ 20-200 ppb; 19 adults exposed to sulfate aerosol; and 20 adults from a vog-free community. None had diabetes, used medications or drugs known to alter HRV, nor used over-the-counter medications for 24 hours prior to testing. Heart rate was recorded during a valsava maneuver, and during spontaneous and paced deep breathing at 6 breaths per min. The valsava ratio was calculated as the ratio between the longest R-R interval shortly after the maneuver and the shortest R-R interval during the maneuver. Spectral analysis was performed using Fast Fourier Transformation (FFT) to derive low frequency power (LF), high frequency power (HF), and low to high frequency ratios (LF/HF) during spontaneous and paced breathing. Analysis of variance using the general linear model was used to compare the

communities. No significant difference was observed between the groups in HRV, suggesting little or no chronic effects on heart rate variability.

Supported by: Centers for Disease Control, Hawaii State Department of Health, American Lung Association of Hawaii, Leahi Fund, Hawaii Community Foundation.

173 New Insights: Leprosy as a New Cure for Atherosclerosis? **RITA CHUANG** (USC School of Dentistry, 1246 W. 30th St. # 308, Los Angeles, CA 90007 ryc5@cornell.edu)

Cardiovascular research has established the central role of inflammation in atherosclerosis development. This inflammatory lesion is characterized by elevated Th1 cytokines which cause lesion progression, plaque rupture, and thrombosis. In contrast, a Th2 environment stabilizes the plaques and may be protective in atherosclerosis.

Autopsy analyses of hundreds of leprosy patients demonstrated that atherosclerosis, myocardial infarction and stroke were significantly less common than expected. Further examination revealed curious resemblances between lepromatous leprosy lesions and atherosclerotic plaques. In addition, structural and histological similarities between oxLDL and mycobacteria have been confirmed in several literature reviews.

We hypothesized that the molecular mimicry between the oxLDL and mycobacterial ligands will allow us to extrapolate the mechanism by which the mycobacteria utilize PPAR- γ to create an immunosuppressive Th2 environment to aid in plaque stabilization in atherosclerosis. In addition, we hypothesized that the Th2 environment created by lepromatous mycobacteria may explain the paucity of atherosclerosis in leprosy patients reported. Further, we hypothesized that atherosclerotic lesions in lepromatous leprosy patients will be more stable than found in matched controls.

Our methods include: 1) elucidating the mechanism by which mycobacteria induce PPAR- γ activation. We have obtained various purified mycobacterial lipids from Colorado State University, which we will test for their ability to (a) activate a PPAR- γ -luciferase reporter assay (b) activate downstream target genes of PPAR- γ by real-time quantitative PCR (c) alter dendritic cell functions such as T cell activation. 2) Characterizing the phospholipids in the lepromatous lesions that cross-react with anti-oxLDL antibodies, (a) determine whether these lipids are mycobacterial or host in origin by performing Western blots with EO6 antibody (anti-oxLDL) on mycobacterial extracts and also on extracts of infected monocyte/macrophages and (b) confocal microscopy utilizing specific antibodies against oxLDL and mycobacteria, and assessing for co-localization. 3) Exploring whether lepromatous leprosy patients, characterized by a weak, Th2 cell mediated immunity against mycobacteria, are protected from other Th 1 diseases such as atherosclerosis.

Mycobacterial infection of human monocyte-derived DCs results in upregulation of FABP-4, a PPAR- γ downstream target gene, and this activation can be blocked with the PPAR specific antagonist, GR9662. Activation of PPAR- γ in monocyte-derived APCs has been demonstrated to result in (a) a reduction of CD1 molecules, (b) decreased IL-12 production, and in some reports, (c) inefficient activation of lymphocytes in a mixed lymphocyte reaction (MLR). In general, PPAR- γ activation can lead to APCs that promote a Th2 response *in vitro*. Furthermore, it is already established that infection with mycobacteria results in decreased IL-12 and CD1 expression. We aim to determine if PPAR- γ signaling accounts for these effects.

We demonstrate that mycobacteria activate a nuclear receptor, PPAR- γ , which results in decreased levels of CD1. Interestingly, we also show that the levels of PPAR- γ are elevated in leprosy lesions that are characterized by a weak cell-mediated immune response (Th2-type response). It is our goal to further characterize the components in mycobacteria that activate PPAR- γ , and to determine whether blocking this activation can lead to a more effective immune response against the organism. In addition, we propose that understanding mycobacterial chronic infections will shed light on other chronic inflammatory conditions, such as atherosclerosis.

ECOLOGY, ORGANISMAL BIOLOGY and ENVIRONMENTAL SCIENCES

174 Polymer Nanocomposite Based Chemiresistive Gas Sensors, DIVAKARA MEKA¹, LINDA GEORGE², SHALINI PRASAD¹ (¹Department of Electrical and Computer engineering and ²Department of Environmental Science, Portland State University, Portland, OR; divakara@pdx.edu)

Emission of harmful gases into the atmosphere pollutes the environment. These gases may cause ‘acid rain’, ‘smog’ and some might be responsible for green house effect, which will affect the health of the mankind. In order to control the emission of these harmful gases we first need to detect them. We present here the development of a polymer nanocomposite based gas sensor for detecting trace gas emissions in ambient environment. This project is aimed to build a chemiresistive gas sensor with excellent sensitivity and improved specificity through innovative functionalization and packaging of nanomaterial. The targeted performance metrics are: improve sensitivity of carbon-based nanomaterial sensors from parts-per-million (ppm) levels to parts-per-billion (ppb) under real world levels of air contaminants. The principle of operation of these chemiresistive sensors is based on the measurement of resistance changes associated with the adsorption/reaction of gaseous agents by the nanomaterial matrix.

In contrast to the current techniques in rapid miniaturized gas sensing, the technique that is under development has a simple photolithography based fabrication scheme that can be executed on a non specialized wet bench, thus it is less expensive, highly reproducible and robust. For the current application, the sensor characteristics will be demonstrated for nitrogen oxides (NO_x). Presently we are able to detect the 200ppb of NO₂ gas in the ambient conditions with high specificity and detection time of ~5min.

175 Quantitative Detection of MTBE-degrading Bacteria with Nanoparticle-DNA Probes, REEF B. HOLLAND, AHJEONG SON and KRASSIMIRA R. HRISTOVA (Department of Land, Air, and Water Resources, University of California Davis, One Shields Avenue, Davis, CA 95616, USA; rbholland@ucdavis.edu)

The fuel additive, methyl tertiary-butyl ether (MTBE), is an increasingly widespread contaminant in soil and groundwater. MTBE is highly water soluble and low biodegradation rates under oxygen-limited conditions in underground aquifers were observed.

The objective of this study is to develop a rapid and sensitive DNA detection method for quantification of MTBE degrading bacteria. An accurate quantification of these bacteria provides significant information for predicting MTBE degradation potential in groundwater aquifers and for monitoring during bioremediation.

Magnetic/luminescent core-shell lanthanide nanoparticles (NPs) were used for DNA quantification in a hybridization-in-so-

lution approach. Lanthanide nanoparticles offer long fluorescence lifetime, narrow emission bandwidths, inherent photostability, and low cost production. Multi-functional NPs were designed to achieve the advantages of magnetic property to provide an efficient separation of NP-DNA hybrids and long-lasting lanthanide fluorescence as an internal calibration of DNA quantification. Fe₃O₄/Eu:Gd₂O₃ core-shell NPs were functionalized with NeutrAvidin, which is followed by the immobilization of a biotinylated probe DNA on the surface of the particles. Genomic DNA extracted from PM1 *Methylibium petroleiphilum*, MTBE degrading bacteria, was used as a target in DNA hybridization. Biotinylated NPs were incubated with target DNA and a signal probe DNA labeled with fluorescein isothiocyanate. Between each step particles were separated magnetically and washed with buffer to remove excess DNA and probe. The normalized fluorescence (FITC/NPs) was measured with a spectrofluorometer. The rate of hybridization increased concurrently with the target 16S rDNA concentration. Optimization of the assay for other DNA targets including MTBE degradation genes is currently under development.

176 Free-living and Symbiotic Prokaryotes as Inorganic Nitrogen Sources to Chuuk Lagoon (Federated States of Micronesia), JEANA L. DRAKE and EDWARD J. CARPENTER (Romberg Tiburon Center for Environmental Studies, San Francisco State University, 3150 Paradise Dr., Tiburon, CA 94920; jeana@sfsu.edu)

The goal of our research was to estimate rates of nitrogen fixation in water column and benthic samples collected inside Chuuk Lagoon and around Weno Island in the Federated States of Micronesia. Although tropical coastal ecosystems are often fed by oligotrophic waters, primary productivity and diversity of these systems is high. It is generally accepted that bio-available nitrogen, in the forms of ammonium (NH₄) and nitrate (NO₃), is the limiting nutrient over much of the world’s oceans. Our nitrogenase activity measurements and microscopy work demonstrate that free-living, endosymbiotic, and epiphytic bacteria and cyanobacteria in the water column and benthos may represent a significant portion of the fixed nitrogen introduced to seagrass, mangrove, and coral reef communities in Chuuk Lagoon. The free-living filamentous cyanobacteria *Katagnemene* sp. and *Trichodesmium* sp., and *Richelia* sp. that lives endosymbiotically with the diatoms *Hemiaulus hauckii* and *Rhizosolenia clevei*, may assist in making up the deficit of the nutrient-poor waters feeding these systems. Additionally, bacteria in the tissues of the tunicate *Atrium robustum* and skeletons of the coral *Acropora formosa*, and coccoid cyanobacteria living in the tissues of the sponges *Acanthella cavernosa* and *Pericharax heterorhaphis* represent sources of fixed nitrogen to coral reef ecosystems. Finally, bacteria and cyanobacteria living in sediments and as epiphytes of the seagrass *Enhalus acoroides* and the mangrove *Rhizophora mucronata* contribute fixed nitrogen to these two near-shore systems.

177 Seed Rain and Seed Bank Dynamics after Experimental Removal of Non-Native Species in a Hawaiian Lowland Wet Forest, LINDA R. SWEINHART (Hawaii Community College, Forest TEAM Program, 200 West Kawili Street, Hilo HI 96720; lindars@hawaii.edu)

For the continued existence of Hawaiian lowland wet forests, seed ecology studies on native and non-native plant species are vital for restoration purposes. To test the effects of non-native species affecting competition with native species, removal plots and paired control plots were created in a lowland wet forest at the Keaukaha

ABSTRACTS – Contributed Posters

Military Reservation on the Island of Hawaii on a 1200-year-old 'a'ava lava flow at 30 m elevation. Specifically, this study addressed the impact of non-native species removal on seed rain and seed bank dynamics three years post-removal. The composition and relative abundance of species present in the seed rain and the seed bank were examined by using seed rain traps and by observing germination rates of soil core samples collected within 1m of the seed traps. The total average number of native seeds produced per day (control 8,143/removal 11,433), was significantly greater than non-native seeds (control 411/removal 341) in each treatment. However, there was no significant difference in non-native seed rain between the two treatments. Native seed rain was almost completely comprised of 'ohi'a (*Metrosideros polymorpha*) in both treatments, consistent with 2006 results. On the contrary, only non-native species germinated in the seed bank experiment, with no significant treatment difference in the number of non-native seedlings germinating in the seed bank. In summary, three years after non-native species removal, native species dominate the seed rain, and non-native species dominate the seed bank.

178 Urban Impact on Spider Communities in the San Francisco Presidio, MISHA LEONG, PEDRO MORGADO, THERESA SHELTON, and JOHN HAFERNIK (Department of Biology, San Francisco State University, 1600 Holloway Avenue, San Francisco, CA 94132; mtleong@sfsu.edu)

Research on arthropods in urban environments (outside of pest control) is still in its early stages, and thus is mainly concerned with predicting abundances and distributions along rural to urban gradients. Spiders have the potential to be good indicator species due to their abundance and diversity. For this study, we examine how different urbanization factors affect spider communities on a micro-scale, specifically in ways that can be reasonably altered. Spiders were sampled at 13 sites within the Presidio of San Francisco representing the diversity of habitats and urban impact. Collecting was done bimonthly from February-December 2007 using pitfall trapping, tree beating, brush sweeping, and hand collecting. Habitats of the San Francisco Presidio include serpentine landscapes, coastal sand dunes, and oak woodlands. There is also variability in a number of urban variables (roads, buildings, created edges and isolation, human foot-traffic, proximity to the urban matrix, surface cover, land use history, etc) amongst the 13 sites. We compare effects of these variables to more natural variables such as habitat complexity, moisture, and lithology to analyze how these variables influence distribution of different spider groups such as natives vs. non-natives, large vs. small-bodied, location guilds, hunting-strategy guilds, and taxonomic families. We also show how sites are differentially affected over the course of a year. This project not only further contributes to what is known about urban ecology and spider ecology in general, but it generates practical information for park and city managers to promote arthropod conservation.

179 Using Spiders as Bioindicators to Assess Success of Restoration Projects, PEDRO MORGADO, MISHA LEONG, THERESA SHELTON, and JOHN HAFERNIK (Department of Biology, San Francisco State University, 1600 Holloway Avenue, San Francisco, CA 94132; pdmoragdo@gmail.com)

Land management and restoration project success is often assessed solely through analysis of vegetation growth. While vegetation characterization alone is informative, it does not fully assess the ecological success and sustainability of a site.

Incorporation of faunal patterns improves evaluation of the success of land management and restoration projects. Spiders are important predators whose species richness and abundance are tied to a variety of biotic factors. They are widespread and have diverse life histories making spider sampling feasible for a broad range of habitats. In this study, we investigate how restoration efforts and habitat characteristics affect and shape spider community composition and diversity. We sampled spiders in 13 sites within the Presidio National Park, San Francisco, encompassing various habitats found in the park. Habitats sampled included, riparian oak woodlands, coastal scrub, serpentine grasslands and sand dunes. We sampled bimonthly from February 2007 through April 2008 using pitfall traps, sweeping, beating and hand collecting techniques. Each site was characterized in terms of plant species richness, percent cover and frequency. Additional habitat features measured were shrub canopy cover, sub-shrub canopy cover, ground cover height, and percent cover of debris and litter. Spider distributions and species richness patterns were compared to restoration history and habitat vegetation to determine what features enhance spider diversity and richness. Such information should prove useful to future restoration plans or land management strategies designed to promote diverse animal and plant communities.

180 An Assessment of Watershed Health in the Presidio of San Francisco using Aquatic Macroinvertebrate Communities, THERESA SHELTON (Department of Biology, San Francisco State University, San Francisco, CA 94132; tshelton@sfsu.edu)

Freshwater streams support a diversity of aquatic and terrestrial plants and animals. They are a habitat for numerous organisms as well as a transportation route between wetland areas for water, chemicals, minerals and propagules. Conservation and protection of freshwater stream habitats is critical not only for natural habitats, but because of the many services they provide, including washing out pollutants from the ground, recreation, and both agricultural and drinking water. My study provides an assessment of habitat health at four streams sites within the Presidio of San Francisco, a national park in San Francisco, California, through an analysis of the communities of benthic macroinvertebrates collected during summer 2007, autumn 2007 and spring 2008. Diversity among the sites was compared with measurements of richness, evenness, abundance, % EPT taxa, % of functional groups and the Family Biotic index. The results of two sites are compared with data collected nine years ago to uncover differences in invertebrate community composition after various types of site management. My research also evaluates the success of the restoration in 2005 of one of the four sites through a comparison among invertebrate assemblages at the restored site, a site of the same watershed further upstream, and a site with minimal degradation. The results of this study provide guidance to ecologists and wildlife managers within the Presidio to maintain and improve aquatic habitats and can be applied to management of other small urban watersheds.

181 Efficacy of Irradiated Sporozoites as a Vaccine for Avian Malaria (*Plasmodium relictum*), D. ALLAN HALL¹, CARTER T. ATKINSON² and SUSAN I. JARVI¹ (¹University of Hawaii at Hilo, Biology Department, 200 W. Kawili St, Hilo HI 97820; ²U.S. Geological Survey, Pacific Island Ecosystems Research Center, Hawaii National Park, HI 96718)

Since its introduction to Hawaii, avian malaria (*Plasmodium*

relictum) has had detrimental effects on Hawaii's terrestrial avifauna, limiting both the geographic and altitudinal distribution of highly susceptible native forest birds. The high transmission rates, abundance of highly susceptible hosts, and high parasite pathogenicity make this system a good model for vaccine studies. We evaluated ability of live, irradiated sporozoites to induce protective immunity to *P. relictum* in House Sparrows and Hawai'i 'Amakihi. Birds were exposed to the bites of infected, irradiated mosquitoes (either a lower dose or a higher dose) and then challenged approximately 4 weeks later with infective mosquito bites to determine whether protective immunity had been produced. Parasitemia and leucocyte counts were measured prior to vaccination, after vaccination, and after challenge with viable sporozoites to evaluate host response. Irradiated sporozoites failed to produce sufficient protective immunity in 'Amakihi to result in significant reduction in parasitemia after challenge with malaria. Potential reasons why will be discussed.

182 Nitrogen and Carbon Isotopic Assessment of the Discoloration of Laver Cultivated in Ariake Bay, Japan, SHINGO UEDA¹, CHUN-SIM U. GO¹, YUN-SEOK KIM¹, YOSHIO KAWAMURA², CHITOSHI MIZOTA³, SHOICHI SHIMOYAMA⁴ and TAKAO KATASE¹ (¹College of Bioresource Sciences, Nihon University, 1866 Kameino, Fujisawa, Kanagawa 252-8510, Japan; ²Saga Prefectural Ariake Fisheries Research and Development Center, 2753-2 Nagata, Ashikari, Saga 849-0313, Japan; ³Faculty of Agriculture, Iwate University, 3-18-8 Ueda, Morioka, Iwate 020-8550, Japan; ⁴Faculty of Sciences, Kyushu University, 6-10-1 Hakozaki, Higashi-ku, Fukuoka 812-8581, Japan; katase@brs.nihon-u.ac.jp)

Discoloration mechanisms of laver farmed in Ariake Bay, Japan were examined using the C/N molar ratio and stable isotope ratios of carbon ($\delta^{13}\text{C}$) and nitrogen ($\delta^{15}\text{N}$) of fronds. In cultivation year 2002, the first farming without nitrogen fertilization, the laver was not discolored. However, laver turned pale during the second farming despite application of $(\text{NH}_4)_2\text{SO}_4$ fertilizer. The C/N ratio of fronds was constant, 6.4, in the first through early second farming. It increased thereafter, concomitantly with the culture days, under red tide conditions. It was 12.7 in the discolored laver. These observations suggest that the laver discoloration reflected a nitrogen shortage induced by the phytoplankton bloom. The faded laver showed higher $\delta^{13}\text{C}$ than healthy laver because it fixed dissolved CO_2 enriched with ^{13}C through preferential assimilation of $^{12}\text{CO}_2$ by phytoplankton. The $\delta^{15}\text{N}$ of laver in the first farming was $14.0 \pm 1.9\%$ (mean \pm SE), whereas that of normally colored fertilized laver was $7.3 \pm 2.2\%$. The $\delta^{15}\text{N}$ of the discolored laver decreased further to $1.4 \pm 0.9\%$. Incorporation of ammonium fertilizer with $\delta^{15}\text{N}$ of -2.8% caused that negative shift. Therefore, nitrogen limitation was not the sole cause of discoloration. The chemical composition of seawater suggests that phosphorus depletion was crucial for the CY 2002 discoloration. Discolored laver in CY 2000 was characterized by a high C/N ratio, high $\delta^{13}\text{C}$, and low $\delta^{15}\text{N}$, similar to the CY 2002 case. Results show that monitoring of the C/N molar ratio together with $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ in fronds is applicable to predict cultivated laver discoloration.

183 Conservation of the *Viola adunca*: The Relationship between Native Forbs, Invasive Forbs and Soil Chemistry in the Clatsop Plains, RAYMOND OGLE¹, DYLAN TAYLOR² and RICHARD VAN BUSKIRK¹ (¹Department of Environmental Science, Pacific University, 2043 College Way, Forest Grove, OR 97116; ²Department of Biology, Pacific University, 2043 College Way, Forest Grove, OR 97116; ogle4345@pacificu.edu)

Native prairies along the Oregon coast are home to the federally threatened Oregon Silverspot Butterfly (*Speyeria zerene hippolyta*), a medium-sized fritillary that depends on the early blue violet (*Viola adunca*) as the sole host plant for its larvae. One reason for the butterfly's decline has been the displacement of native species by invasive species such as European pasture grasses. This study focuses on soil differences in Clatsop Plains butterfly habitat located along the northern coast of Oregon. In this experiment, we used point-intercept sampling to determine the percent composition of native and introduced forbs in five sites. In addition, we estimated the density of the *Viola adunca* using belt transects. We then collected soil samples from each of the sites and analyzed each sample for carbon, nitrogen, calcium, magnesium, and potassium levels as well as pH. The results of these soil analyses were then compared to the vegetation point-intercept values for each site. Variation in the density of *Viola adunca* and the frequency of the native and invasive species suggests that soil chemistry may be affecting the competitive abilities of these species. Past fertilizer application may be responsible for some of these soil differences. Using these soil tests, I hope to determine whether the density of violets is dependent on subtle differences in soil chemistry and to see if there is any relation between soil nutrient composition and the *Viola adunca*

184 Recreational Use and Impacts Assessment for Richardson's Ocean Park, Hilo, Hawaii, COLBY KEARNS (General Delivery, Keaau, HI, 96749; ckearns@hawaii.edu)

Richardson's Ocean Park is one of the most heavily used marine recreation sites on the windward side of the Big Island, averaging 138,000 visitors annually with increases driven by tourism rates. This study assessed user frequency, behavior, coral damage, and satisfaction levels for this high-use site. Recreational users were observed in-water while all contacts with and damage to corals were recorded. Sixty-one percent (n=340) of individuals came in direct contact with corals, most of which occurred while standing on or kicking colonies. Individual users made approximately 2.3 ± 0.2 contacts per 5 minutes or an average of 10 per use period. Additionally, results indicate that nonresidents, males, and individuals using accessories such as cameras or spears are more likely to have a negative impact on corals. Although observations demonstrate high contact levels, analysis of coral surveys does not support an overall decline in live coral cover, which indicates that impacts may not be a biological but aesthetic problem. For management purposes the results indicate that current rates of recreational use at Richardson's Ocean Park are sustainable and recreational users are satisfied with their experience. However, the amount of damage caused to corals in the area is increasing along with daily user rates. Therefore, measures should be taken to promote "best practice" user behavior through enhanced education and signage on site. Such management is supported by user survey responses of interest in participating in educational programs and financially supporting marine resource management programs.

CHEMISTRY and BIOCHEMISTRY

185 Three Dimensional Solution Structure for alpha-Conotoxin MII [E11A]: Structure-Function Studies in the Development of Therapeutic Approaches for Parkinson's Disease, MATTHEW TURNER and OWEN McDOUGAL (Department of Chemistry and Biochemistry, Boise State University, 1910 University Ave, Boise, Idaho, 83725)

Parkinson's Disease (PD) is caused by the loss of nigrostriatal dopaminergic neurons, and affects the control of meaningful motor movements in patients. These neurons include the $\alpha 6\beta 2$ nicotinic acetylcholine receptors (nAChRs) localized exclusively on dopamine terminals in striatum. The effort to design ligands which are selective and potent to the binding of $\alpha 6$ nAChRs is important to the understanding of PD, and for potential development of drug therapy. Alpha-Ctx MII is a neurotoxin derived from the poison of the sea snail *Conus magus*, and has proved to be a very useful ligand to study $\alpha 6\beta 2$ expression and regulation in mice and rats. However, because α -CtxMII also binds to $\alpha 3\beta 2$ nAChRs in human and monkey striatum, results are less clear-cut in these latter species. The synthetic analog of α -Ctx MII [E11A] has proven to be the most selective ligand for $\alpha 6$ nAChR binding, with a ~ 50 fold increase in affinity when compared to the native MII conotoxin. Subsequent competition studies using α -CtxMII unexpectedly showed that E11A discriminated between very high-affinity (femtomolar) and high-affinity (picomolar) $\alpha 6\beta 2$ nAChR population in striatum of mice, as well as monkeys and humans. Because mice do not express the $\alpha 3$ nAChR subunit, these two binding sites most likely represent two different $\alpha 6\beta 2$ subtypes. Here we present the three-dimensional solution structure for α -Ctx MII [E11A] determined by NMR spectroscopy, and compare this to the native in an effort to understand the distinct physiological roles observed between the native conotoxin and its analog.

186 *Development of a Passive Diffusive Sampling Device for Assessment of Atrazine in Time-variant Streams of Hawaii*, **SIMONA VADUVESCU and JON-PIERRE MICHAUD** (Department of Chemistry, University of Hawaii at Hilo, Hilo, HI 96720; simonav@hawaii.edu)

In recent years, concerns have been raised regarding the entry of the widely used herbicide, atrazine, into groundwater and aquatic environment, and its persistence. Long after its use, this compound remains in soils and sediments, where it can enter the food chain directly or percolate to the water table. Health issues have also been raised due to the ability of atrazine, known as an endocrine disruptor, to accumulate in the adipose tissue of organisms causing further bioaccumulation and biomagnification at higher trophic levels and eventually in humans.

We describe and characterize a diffusive sampling device designed specifically for the assessment of atrazine in time-variant streams of Hawaii, where atrazine was previously used on sugarcane crops and it might be still in use today as an off-label herbicide for diversified agriculture or weed management of golf courses and athletic fields.

For the optimization of the diffusive sampler, we evaluated various membranes, assessed biofouling of membranes, and examined the effects of pre-wetting, presence of organic solvent or surfactant in C_{18} coated interstitial spaces of the solid phase sorbent. The effect of change in diffusive boundary path length and the comparability of integration with variation of concentration were also examined. Laboratory and field data gathered demonstrated the applicability of this sampling device for the environmental monitoring of atrazine in time-variant streams.

187 *Loss of Antioxidant Gene Function Slows Protein Turnover and Photoinhibition Repair in Cyanobacteria*, **WENDY K. CECIL, BETHANY BORBELY and STEPHEN K. HERBERT** (Department of Plant Sciences, University of Wyoming, Laramie

WY 82072-3165; wcecil@uwyo.edu)

Photoinhibition of photosynthesis is a loss of photosynthetic activity caused by excessive light. It results from oxidative damage to Photosystem II (PS II) of the photosynthetic electron transport system and subsequent proteolysis of the D1 protein at the PS II core. Photoinhibition damage is quickly repaired by rapid turnover of the D1 protein. Reactive oxygen species are thought to cause the oxidative damage of photoinhibition and also to inhibit photoinhibition repair but the significance of antioxidant enzymes in limiting photoinhibition of PS II is unknown. We have examined the role of an Fe superoxide dismutase (SodB), a catalase (KatG), and a thiol-peroxidase (TplA) in photoinhibition damage and repair by quantifying the photoinhibition phenotypes of null mutants for these enzymes in a cyanobacterial model system. We found that all strains showed very similar rates of photoinhibition damage but photoinhibition repair differed markedly among them. Repair was slowed by more than half in the KatG and SodB mutants relative to their wild types, while the TplA mutant showed normal rates of repair. The SodB mutant also showed a prolonged suppression of photoinhibition repair that persisted after the photoinhibition treatment. These findings indicate at least two mechanisms by which reactive oxygen species inhibit photoinhibition repair and highlight the necessity of antioxidant enzymes for resistance to photoinhibition under natural light conditions.

188 *Nle¹AIV Increases Hippocampal Matrix Metalloproteinases in Culture: A Possible Treatment for Alzheimer's Disease*, **BENJAMIN MORESCO, PAIGE CLAIBORNE, LISA RODIN and MICHAEL SARDINIA** (Department of Biology, Whitworth University, 300 West Hawthorne Road, Spokane, WA 99251; msardinia@whitworth.edu)

Memory acquisition and retrieval resides primarily in the hippocampus. This process requires Long Term Potentiation (LTP). One of the current models for how LTP occurs is via the remodeling of the synapse in the hippocampus through the actions of cell adhesion molecules and Matrix Metalloproteinases (MMPs). MMPs are crucial in understanding memory formation based upon their ability to degrade the extracellular matrix (ECM) at the synapse. We postulate that this is a requisite step in the formation of new memory pathways. Overproduction or underproduction of MMPs could potentially have a role in neurodegenerative diseases such as Alzheimer's disease. Inhibition of MMP's has been demonstrated to negatively affect spatial learning. The effects of Norleucine¹ Angiotensin IV (Nle¹AIV) have been observed in recent spatial memory studies. Nle¹AIV has been shown to improve spatial memory in rats in a Morris Water Maze task. This improvement involved the reversal of damage caused by drugs that negatively affect spatial memory acquisition and retrieval by means of the brain cholinergic system. Our lab studied the effects of Nle¹AIV on MMP expression in rat hippocampal slice cell media (HSCM) through gelatin zymography. Nle¹AIV treated HSCM showed a significant increase in MMP 2 and MMP 9 expression when compared to saline controls. These results provide a better understanding of the function of Nle¹AIV and its potential role in the treatment of Alzheimer's disease. Recent experiments further indicate that the C-terminal tetrapeptide of Nle¹AIV retains more than 90% of the activity of the parent hexapeptide.

189 *Binding of Serotonergic Ligands to an Acetylcholine-Binding Protein*, **ANSHUL PANDYA, ABRAHAM HARMS-SMYTH,**

JESTINA KUSINA, MARVIN SCHULTE (Department of Chemistry and Biochemistry, University of Alaska Fairbanks, Fairbanks, AK 99775; ftaap@uaf.edu)

The Acetylcholine-binding protein (AChBP) has been used extensively to model the amino terminal binding domains of cys-loop ligand gated ion channels (LGIC's). The relatively large sequence homology between the AChBP and the amino terminal domains of this family of ion channels makes it a useful protein from homology modeling studies. These studies are commonly used to guide mutagenic and other approaches to studying LGIC mechanisms. However, modeling studies are limited by the lack of pharmacological data on the AChBP itself. Little information is available about the interaction of GABA or Serotonergic ligands with this receptor. Such data would help validate current models and may provide opportunities for developing novel binding proteins. This data would also provide valuable information about the nature of ligand specificity of the LGIC super-family.

In this study, we evaluated a number of compounds representing different structural classes of serotonin type 3 receptor (5-HT₃R) ligands. Using scintillation proximity assay and immobilized AChBP, we determined the binding affinity of a number of 5-HT₃AR agonists, partial agonists and antagonists. Test compounds included: serotonin (5-HT), *m*-chlorophenylbiguanide (*m*CPBG), 2-methyl-serotonin (2-Me-5-HT), phenylbiguanide (PBG), lerisetron, tropisetron, granisetron and MDL72222. AChBP binding affinities for 5-HT₃R antagonists were 2-30 times weaker than their comparative 5-HT₃R binding affinities. Agonists for the 5-HT₃R bound to the AChBP with affinities 500-30,000 times weaker than for 5-HT₃Rs. Differences in binding affinities correlate to differences in putative interacting amino acids in 5-HT₃R binding models. Our data confirm the structural similarity of AChBP with the 5-HT₃R and supports the validity of previously presented AChBP based antagonist and agonist binding models. (Joshi et al., 2006; Suryanarayanan et al., 2005).

190 Desformylflustrabromine Synthesis and Action on Neuronal Nicotinic Receptors, ANSHUL PANDYA¹, JS KIM³, MEAGAN WELTZIN¹, BRIAN EDMONDS², MARVIN SCHULTE¹ and RICHARD GLENNON³ (¹Department of Chemistry and Biochemistry, University of Alaska Fairbanks, Fairbanks, AK 99775; ²Department of Biology and Marine Biology, School of Arts & Science, University of Alaska Southeast, Juneau, AK 99801; ³Department of Medicinal Chemistry, School of Pharmacy, Virginia Commonwealth University, Richmond, VA 23284; ftaap@uaf.edu)

We have synthesized two metabolites of marine bryozoan *Flustra Foliacea*. Both these metabolites, desformylflustrabromine (dFBr; **1**) and desformylflustrabromine B (dFBr-B; **2**) have been previously isolated from its natural sources, and the former has been demonstrated to be a novel and selective positive allosteric modulator of alpha4beta2 subtype of nicotinic acetylcholine (nACh) receptors. Here we report the first total syntheses of **1** and **2** as water-soluble hydrochloride salts and their evaluation on nicotinic receptor subtypes. Using two-electrode voltage clamp, we confirm the action of **1**, and the lack of action of **2** as an allosteric potentiator of acetylcholine responses on the human neuronal alpha4beta2 subtype of the nicotinic acetylcholine receptor. Both dFBr; **1** & dFBr-B; **2** inhibit responses of acetylcholine on the human alpha7 subtype of nicotinic acetylcholine (nACh) receptors.

POSTER SESSION II

WEDNESDAY

8:30 a.m. – 12:00 p.m.

HPA Under the Canopies

PHYSICS and MATERIALS SCIENCE

191 Morphology Effects on Photocatalytic Water Splitting Activity of Niobate Materials, MICHAEL C. SARAHAN¹, FRANK E. OSTERLOH² and NIGEL D. BROWNING¹ (¹Department of Engineering and Materials Science, University of California, Davis, One Shields Avenue, Davis, CA 95616; ²Department of Chemistry, University of California, Davis, One Shields Avenue, Davis, CA 95616; mcsarahan@ucdavis.edu)

Potassium hexaniobate, a water splitting photocatalytic material, has been exfoliated using wet chemical methods. Its structure has two distinct interlayers which are chemically unique from each other. When exfoliated, the product can consist of either bilayer or monolayer sheets, with the latter being prone to rolling in on themselves. This rolling behavior results from a difference in the Young's modulus for either side of a monolayer, and the material rolls in on itself to relieve the strain from the differing moduli. It has been observed using macroscopic spectroscopy (UV-visible diffuse scattering) that the absorption edge of the rolled-up material is red-shifted relative to the bulk material. This is correlated with higher photocatalytic activity (increased hydrogen generation rate) of the scrolls relative to the bulk material, perhaps due to greater absorption of the irradiation energy. It is thought that these strain-bandgap properties could be used to enhance the photocatalytic activity of materials by shifting their absorption into the more abundant visible region of the solar spectrum. To study the strain-defect-bandgap relationship more closely, the energy surface of sheets has been mapped using scanning transmission electron microscopy and electron energy loss spectroscopy (STEM/EELS). The high spatial resolution of STEM combined with the high energy resolution of EELS allows accurate imaging of defects and measurement of the bandgap as it varies across minute areas, and clarifies the relationship between strain, defects, and bandgap.

192 Palladium/Polymer Nanocomposite Chemiresistive SO₂ Sensor, DIVAKARA MEKA¹, VALMIKANATHAN ONBATTUVELLI², SUNDER ATRE² and SHALINI PRASAD¹ (¹Department of Electrical and Computer Engineering, Portland State University, Portland, OR 97201; ²Department of Industrial and Manufacturing Engineering, Oregon State University, Corvallis, OR 97330)

Here we present a highly sensitive nanocomposite based Chemiresistive SO₂ sensor. The main objective of this research is focused on developing a cost effective, portable and disposable gas sensor, which detects SO₂ gas molecules in the ambient air with sensitivity in lower parts per million range (0.5ppm – 5ppm) and with improved specificity. These parameters can be achieved by employing nanomaterials in sensing the SO₂ gas molecules.

Sulfur Dioxide (SO₂) is one of the six common air pollutants that are released into the atmosphere which causes a wide variety of health and environmental impacts like respiratory effects, visibility impairments, acid rains, etc., because of the way it reacts with other substances in the air. So, it is necessary to control the emission of this gas into the atmosphere by various sources. In order to control the emission of this harmful gas it should be first detected.

The technique used in the detection of the SO₂ gas molecules

is **Chemiresistive technique**, in which there will be a change in electrical resistance associated with the adsorption of SO₂ molecules by the nanocomposite. Since, Palladium has a very high affinity towards adsorbing sulfur compounds; Pd is a promising element for the selective detection of SO₂ gas in the ambient air. There will be a change in electrical properties of the Pd/Polymer nanocomposite due to the adsorption of the SO₂ molecules by the Pd nanoparticles. Thus, Pd/Polymer nanocomposite acts as a transducer, which translates the change in SO₂ gas concentration in air to a detectable electrical signal. Incorporation of carbon nanoparticles into the nanocomposite improves the change in electrical signal resulted due to the adsorption of SO₂ gas molecules in the air. Moreover, the carbon nanoparticles improve the surface to area ratio of the chip. Presently, we are able to detect the SO₂ in parts per million (1.5 ppm) ranges in ambient conditions.

Another advantage of this detection technique is it requires only a simple **PCB** based inter digitated electrode pattern which makes this sensor less expensive and robust. The main drawback with this detection technique is lack of selectivity. But, by employing the Pd nanoparticles in sensing the SO₂ gas molecules overcomes this particular drawback to certain extent. Future work of this research is mainly focus on proper tailoring of the Pd/Polymer nanocomposite in order to improve the selectivity of the nanocomposite towards SO₂ gas, and secondly on improving design of the electrode pattern in order to improve the sensitivity of the sensor from ppm range to ppb range.

193 A Comparative Analysis of Iridium Oxide Nanowires in Electrical Detection of Biochemical Reactions, VINU L. VENKATRAMAN¹, RAVIKIRAN K REDDY¹, FENGYAN ZHANG², VICTOR HSU², DAVID EVANS², BRUCE ULRICH², and SHALINI PRASAD¹ (¹Portland State University, Portland, OR 97201; ²Sharp Labs of America Inc, Camas, WA 98607; vinu@pdx.edu)

Pt, Ir, Au and few other precious metals have highly conductive electrical and chemical properties; hence have been widely used in pH sensors and biomolecular sensing applications. The chief objective of this research is to highlight and demonstrate the advantages that Iridium Oxide (IrOx) nanowires offers over these competing metals in improving the performance metrics of biomolecular sensing.

Ionic interaction and immune-complex studies were conducted on Pt, Ir, Au, TiN and IrOx thin films compared with IrOx nanowires to find that nanowires highly increase the sensitivity of detection. DC potential responses and cyclic voltammetry curves were also plotted and compared to find that IrOx nanowires had a higher sensitivity for a larger range of potential. Optimal densities and lengths of nanowires were determined to yield best performance metrics. C-Reactive Protein (CRP) and Myeloperoxidase (MPO) and their respective antibodies were used as the study proteins as they have already been characterized using this specific electrical arrangement.

Iridium oxide has very good conductivity and very high charge storing capacity, and hence has an ability to detect very small changes in the surface charge. Nanowires have an ideal morphology to crowd protein molecules and highly increase the surface area of interaction. Higher area of interaction along with iridium oxide's high intrinsic physical adsorption rate, strongly enhance the rate of immobilization of biomolecules and hence enabling high sensitivity detection.

194 Phase Transitions and Ferroelectricity in NaSb₃F₁₀, R. J. CHRISTIE, J. MATTHEWS, P. WU, P. PHOTINOS and S. C. ABRAHAMS (Department of Physics and Engineering, 1250 Siskiyou Blvd., Southern Oregon University, Ashland, OR 97520; sca@mind.net)

The structural prediction that NaSb₃F₁₀ is a new ferroelectric has been confirmed experimentally. The mean phase transition temperature $T_c \approx 461$ K with an associated entropy change ~ 6 J mol⁻¹ K⁻¹. The colorless crystals melt at $T_m \approx 515$ K with decomposition starting at ~ 600 K. A thermal hysteresis in T_c of ~ 35 K between heating and cooling at 25 K min⁻¹ is typical of a first order phase transition. The space group in ferroelectric phase III is $P6_3$, that in the predicted antiferroelectric phase II is $P6_322$, a supergroup of $P6_3$. The space group of prototypic nonferroic phase I is supergroup $P6_3/mmc$, of which the space group of phase III is not a subgroup. The dielectric permittivity at 100 Hz increases more than an order of magnitude from 350 K before undergoing a major inflection at $T_c = 460(10)$ K; it increases thereafter to T_m . The dielectric loss at 100 Hz is low but increases an order of magnitude from its value at ~ 350 K before undergoing an inflection at ~ 460 K, also rising steadily thereafter to T_m . The reproducible dielectric hysteresis loop, with $P_s \approx 20$ mC m⁻² at room temperature under the application of 0.3 MV m⁻¹ a.c. or greater, unambiguously verifies the predicted ferroelectric property. The pyroelectric coefficient $\langle p \rangle = 17(5)$ mC m⁻² K⁻¹ at 298 K.

WESTERN SOCIETY of CROP SCIENCE

195 The Effect of Intercropping Annual Ryegrass with Pinto Beans in Mitigating Iron Deficiency in Calcareous Soils, EMMANUEL OMONDI¹, MIKE RIDENOUR², CINDY RIDENOUR² and RIK SMITH³ (¹Plant Sciences, University of Wyoming, Laramie, WY 82072; ²Meadow Maid Foods, Yoder, WY 82244; ³Department 3354, University of Wyoming, Laramie, WY 82071)

Dry beans (*Phaseolus* sp) are grown extensively throughout the western Great Plains. The high pH soils prevalent in this region limit the availability of many micronutrients, especially iron. Iron deficiency in high pH soils results in interveinal chlorosis in beans and a higher susceptibility to insect and disease damage, thereby reducing yield and quality. In 2002, a Goshen County, Wyoming farmer observed that pinto beans (*Phaseolus vulgaris* L.) intercropped with annual ryegrass (*Lolium multiflorum* L.) did not exhibit iron-deficiency chlorosis and produced better yield than beans grown without the ryegrass intercrop. Field studies were conducted on the same farm in the summer of 2006 to test the hypothesis that an annual ryegrass intercrop would result in increased iron concentration in pinto beans. Treatments included beans planted in annual ryegrass residue incorporated in the soil, bean-annual ryegrass intercrop, and beans planted alone as a control. The bean-annual ryegrass intercrop resulted in significantly higher soil iron concentration compared to beans planted alone. There was also a significantly higher soil organic matter content and marginally significant lower pH in the intercropped plots compared to the beans monoculture. There were no significant differences between treatments for tissue iron concentration.

196 The Legume Integrated Pest Management-Pest Information Platform for Extension and Education (Legume ipm-PIPE) in Idaho, HENRY TERAN¹, RAM SAMPANGI², S. KRISHNA MOHAN², HOWARD SCHWARTZ³ and SHREE SINGH⁴

(¹Plant, Soil and Entomological Sciences Department, University of Idaho, Kimberly, ID 83341-5076; ²Plant, Soil and Entomological Sciences Department, University of Idaho, Parma, ID 83660; ³Colorado State University, Fort Collins, CO 80525; ⁴University of Idaho, Kimberly, ID 83341-5076)

Monitoring and dissemination of near real-time information regarding the incidence and severity of diseases and insect pests is essential for their timely integrated management to reduce crop losses, increase profitability of producers, and reduce adverse environmental and health impacts. Idaho began participation in the national *ipm*-PIPE to monitor for soybean rust (SBR) and soybean aphid (SBA) in 2006. As an extension of that system, the Legume *ipm*-PIPE was implemented nation-wide in 2007 on a pilot basis and will become fully operational in 2008. Our objective is to briefly report on the activities carried out in Idaho in 2007. Eight Sentinel Plots were established in southern Idaho covering dry and green bean, lima bean, peas, and soybean. In addition to SBR and SBA, all foliar bacterial, fungal, and viral diseases and insect pests were monitored on these legumes throughout the growing season. Periodic field scouting combined with examination of leaf samples in the NPDN (National Plant Diagnostic Network) lab according to the national guidelines and protocols were used and information was uploaded on the national *ipm*-PIPE website for restricted access by specialists in 2007 (public access will be available in 2008). Also, more than 10 national and regional conference calls were held during the growing season to share results with other states in the USA and provinces in Canada.

197 Adaptation of Fall Sown Medic, Pea, Vetch, and Lentil to the 2007-08 Climate of the High Plains of Wyoming. CHRIS LOEHR, JERRY NACHTMAN, JACK CECIL, STEVE PAISLEY and JAMES KRALL (Sustainable Agricultural Research and Extension Center, University of Wyoming, Lingle, WY 82223)

Climate change within the High Plains of Wyoming was recently summarized by the EPA. The average temperature in Laramie, has increased 0.8° C over the last century. Projections made by the Intergovernmental Panel on Climate Change and results from United Kingdom Hadley Centre's climate model (HadCM2) show that by 2100 average temperature in Wyoming could increase by 2.2° C spring and fall, 2.8° C summer, and 3.3° C winter. The EPA projects that climate change could increase wheat yields by 35-48% and that corn yields could reduce by 13%. Regional climate change requires the assessment of plant materials for their suitability to the milder winters and hotter summers impacting the region. There's an ongoing annual legume winter survival assessment program at the University of Wyoming (SAREC) in the southeast. Objective is to identify new winter annual legume crop options. A potential 'ley' species 'Laramie' medic continues to show promise (95% winter survival) while *Medicago phrygia* (SA 32612) survived (98%) and broke dormancy earlier in a replicated trial in 2008. Large seeded legumes were compared to 'Laramie' *Medicago rigidula* in separate replicated trial during this period. In terms of winter survival, as measured on 3 April, 'Common' Austrian winter pea (39% survival) was comparable to 'Laramie' medic (37 % survival) in this trial. In the same trial mean survival was 48, 1, 0, 0, 0, and 11% respectively for 'Common' hairy, 'Namoi', 'Rasina', and 'Morava' vetches, 'Indianhead' and 'Toni' lentil. Forage performance from these trials will also be discussed.

198 Is Fallow Necessary in the Intermediate Precipitation Regions (300-400 mm) of the Pacific Northwest? STEPHEN MACHADO (PO Box 370, Oregon State University, Pendleton, OR 97801)

Conventional tillage winter wheat-fallow (CTF) rotation is widely used in the Pacific Northwest (PNW) where precipitation is below 300 mm and considered inadequate to produce a crop every year. Despite the decline in soil organic matter and sustainability under this system, most growers find this system reliable and continue to fallow even in regions receiving 400 mm of annual precipitation. To determine whether it was necessary to fallow in regions of the PNW receiving between 300 and 400 mm of annual precipitation, data from long-term experiments (LTEs) at the OSU CBARCs at Pendleton and Moro, with mean annual precipitation of 400 mm and 300 mm, respectively, were analyzed.

At Pendleton, yields of CTF in one experiment were compared to winter wheat yields in a separate winter wheat-spring pea rotation (WP) experiment in close proximity. A t-test was used to analyze results. The LTE at Moro was designed to evaluate fallow treatments including CTF and no-till (NT) annual cropping systems. Data at Moro were analyzed using SAS Proc Mixed Procedures. Results indicated that there were no significant differences in yield between CTF and WP at Pendleton in the last seven years (2000-2006) suggesting that fallowing was not necessary in the 400-mm precipitation zones. At Moro, results from three years (2005-2007) indicated that winter wheat following winter peas under NT produced between 31% and 41% less yield than winter wheat following both CT and NT fallow treatments, suggesting that fallowing may be necessary for high yields in the 300-mm precipitation zones.

199 Forage Availability Using Agricultural Conservation in North Central Mexico. MIGUELA. MARTINEZ (CE San Luis, INIFAP, Taboada 427, San Luis Potosi, 78387, Mexico)

Conservation tillage has not successfully adopted by farmers in the north-central region of Mexico as in other Latin American Countries because of the use of crop residues to feed animals. As an alternative to this problem, a corn-oat rotation was established with the following objectives: i) to increase the quantity of forage available for animals and ii) to reduce production cost. Corn was sowed during the spring-summer growing season and oat during the fall. Seven tillage methods were evaluated: traditional plow and disk (B+R), with and without disturbing the upper 0-10 cm layer, and zero tillage with 0, 33, 66, and 100% soil cover with crop residues (CR). A randomized block design with two replicates was used. Corn stubble yield with zero tillage + 66% CR was increased 3.431 ton ha⁻¹ compared to B+R, and oat for forage yield was statistical equal among all treatments. Adding corn stubble and oat forage yields, the total availability of forage per year was increased 25% with conservation tillage methods compared to conventional tillage. Conservation tillage reduced soil preparation costs by 50%. Conclusion of this study was that corn-oat for forage rotation system increased total forage availability, allowing farmers to keep at least 2 t ha⁻¹ as soil cover.

200 Yield and Yield Components Response of Wheat to Zinc Grown in Saline Soil. MOHSEN SEILSEPOUR¹ and ABED FOROUZESH² (¹Department of Soil and Water, Varamin Agricultural Research Center, Varamin, Iran, ²Department of Agronomy, University of Tehran, Pakdasht, Iran)

Saline soils represent over 30% of arable lands in Iran. Whereas Zn is an essential micronutrient, which is deficient in many regions worldwide, such as in the salt-affected soils of central Iran. A field

study was conducted to determine the effect of applied Zn on wheat (*Triticum aestivum* L. cv. Kavir) grown on saline soil at research farm of Varamin Agriculture Research Center. The experimental design was a randomized complete block with four rates of Zn (0, 50, 100, and 150% of recommended rates of soil test) and three replications. Grain yield, straw yield, kernel number per spike, and spike length averages were increased by the addition of Zn rates. There was no significant difference between 150% Zn rate than 100% Zn rate for grain yield, 1000-kernel weight, and spike length. Grain yield, 1000-kernel weight, and spike length were significantly higher in 100% Zn rate than the control. 150% Zn rate increased grain yield, straw yield, kernel number per spike, 1000-kernel weight, and spike length, by 23.93%, 17.9%, 8.87%, 12.42%, and 11.29%, while spike number per square meter reduced, by 6.33% than the control.

201 Comparison of 'Forager' USDA Miscellaneous Class Dry Pea to 'Carnival' Yellow Pea in Terms of Feed Quality and Livestock Feed Performance, JACK CECIL, JAMES KRALL, BRET HESS, VENERAND NAYIGIHUGU and JERRY NACHTMAN (Sustainable Agricultural Research and Extension Center, University of Wyoming, Lingle, WY 82223)

'Forager' pea is a variety with good forage production. Dry matter forage yield surpassed 'Arvicka' and 'Poneka' forage pea by 820 and 930 kg ha⁻¹ across 15 trials between 1995-2000, respectively. 'Forager' shows good grain production potential, with a mean dry grain yield of 2020 Kg ha⁻¹ equal to 'Early Dun' and out yielded 'Alma' and 'Wirrega' 5% and 'Miranda' and 'Melrose' by approximately 25% across 20 trials from 1995-1999. The challenge for 'Forager' as a grain pea is its classification as a miscellaneous dry pea under the USDA Market Standards. Its value as grain is down graded in the market place. We hypothesize that this classification is not necessarily based on 'Forager's' livestock feed value. The objective was to compare 'Forager' pea to 'Carnival' pea, a USDA Yellow Market Class. We compared feed grain analysis and feeding trials using beef heifers, lambs, and finishing hogs. 'Forager' was comparable to 'Carnival' pea in crude protein (22.4 to 26.0 vs. 25.1 to 25.9%), ADF 9.5 to 9.9 vs 5.4 to 9.9%), and IVDMD (76.7 to 82.9 vs 85.3 to 92.3%). As a protein source replacing soybean meal in diets of finishing hogs or beef heifers consuming forage-based diets, our results indicate either class could be fed at 16% without affecting animal performance. Feeding either class of pea at 33% of the diet did not influence feedlot lambs. Results from pig and lamb performance studies indicate the 'Forager' pea may not be a substitute on an equal basis. Feed-to-gain ratio was greater for hogs and lambs fed 'Forager' compared with feeding 'Carnival' pea. Thus, the USDA miscellaneous classification of 'Forager' pea is appropriate. 'Forager' pea seems to have less energy than the yellow market class pea, 'Carnival.' Comparing feed value of 'Forager' pea grain with other classes and varieties warrants further investigation.

AGRICULTURE and HORTICULTURAL SCIENCE

202 The James C. Hageman Sustainable Agriculture Research and Extension Center, JACK T. CECIL, JAMES M. KRALL, STEVE PAISLEY, and KELLY T. GREENWALD (UW SAREC Center, 2753 State Hwy 157, Lingle, Wyo. 82223; jtcecil@uwyo.edu)

The University of Wyoming was in a unique position at the

turn of the century to improve the Agricultural Experiment Station system in Wyoming. A review team of farmers, ranchers, agribusiness representatives, a county commissioner, a former legislator and faculty members recommended the University build a Sustainable Agriculture Research and Extension Center (SAREC) to replace existing experiment stations; the Archer and Torrington centers both located in Southeast Wyoming. This new center would complement research and extension centers (R&E) centers in the Northwest and North Central locations of the state.

Review team recommendations approved by the UW Board of Trustees included: Focus on integrated research for Wyoming, Sustainability as a key, consolidation of centers, 300-400 acres of irrigated crop land, 500 acres of non-irrigated crop land, rangeland for cattle and sheep, feedlot, highway access, excellent water for irrigation and stock, and staff recommendations. The UW Trustees approved the purchase of the TH Ranch and some surrounding property with the proceeds from the sale of the Archer and Torrington facilities. The new facility was dedicated in the autumn of 2007 with a new office building, livestock research facilities, shop, hazardous materials component and feedlot.

SAREC is unique because of its primary focus on integrated agricultural systems. It offers amenities for faculty and staff members interested in sustainable agriculture as well as those who may have interest in any component of sustainability. It is a site where faculty and staff from many disciplines can work together to investigate issues and solve problems in a holistic manner

203 Evaluation of Molecular Detection Methods for *Ralstonia solanacearum* in Hawaiian Soils. ANDREW READ¹, THEODORE WILSON² and MICHAEL SHINTAKU¹ (¹College of Agriculture, Forestry and Natural Resources Management, University of Hawaii at Hilo, Hilo, HI 96720; ²University of Colorado Health Sciences Center, Denver, CO 80011; shintaku@hawaii.edu)

The bacterial plant pathogen *Ralstonia solanacearum* causes considerable crop losses on ginger, tomato and other crops in East Hawaii. This is a soil-borne pathogen and infested fields are avoided. We evaluated tagged-RFLP, real-time PCR and endpoint PCR as methods for the quantitative detection of this pathogen in soil. Using DNA extracted from soil, we constructed a clone library (approximately 250 clones) of bacterial 16S rDNAs. The sequences of the cloned rDNAs indicate a diverse bacterial community, with *Burkholderia* the most represented genus (6 clones). Preliminary evidence with tagged, or T-RFLP, however, indicates that *Fibrobacter* may be the predominant bacteria in our soil samples. T-RFLP analysis of soil from the rhizosphere of inoculated plants (which succumbed to the pathogen) indicates the pathogen does not, during pathogenesis, become a dominant member of the rhizosphere community, as the T-RFLP signal from the pathogen failed to rise significantly above the background signals from other bacteria. Endpoint PCR readily detects the pathogen in these samples. Our previous attempts with real time, or RT-PCR, resulted in lower sensitivity than endpoint PCR. We are evaluating weeds and soil, using the above methods, from a field that experienced almost complete bacterial wilt-induced ginger crop failure approximately one year ago. That field is now planted to sweet corn (*Zea mays*) and awa (*Piper methysticum*).

EARTH SCIENCE

204 *A New Species of Cryptantha Found on Pre-Bull Lake Alluvial Fan Deposits from the Big Lost River Valley, Idaho*, **ERIC R. BERGEY¹, RON B. KELLEY², CARLI M. MORRIS¹, RYAN PANGELINAN², JAY VAN TASSELL¹, and SHELBY WARREN²** (¹Department of Geology, Eastern Oregon University, One University Blvd., La Grande, OR 97850; morriscm@eou.edu; ²Department of Chemistry, Eastern Oregon University, La Grande, OR 97850)

A new species of perennial *Cryptantha* was discovered in the Big Lost River Valley northeast of Mackay, Idaho. *Cryptantha higginsii*, discovered by R. B. Kelley, is not related to other perennial *Cryptantha* species from Idaho, but rather appears to be most closely related to *C. breviflora* from northern Utah. *Cryptantha higginsii* can be distinguished by its robust, perennial habit, puberulent flat spatulate basal leaves, and large corollas. The plant is restricted to areas of limestone caliche that capped the eroded alluvial fan ridge tops, with an elevation range of 1880-1951 meters. The alluvial deposits are pre-Bull Lake (late Pliocene – early Pleistocene) in age. The formation outcrops within a 51.8 km² area located northeast of Mackay Reservoir. Surveys along the ridges of the alluvial fan deposits show that *Cryptantha higginsii* has adapted to a harsh environment with high winds and little water where there is less competition from other vegetation. It appears to prefer areas of low sediment accumulation. The plants tend to grow on or near the caliche on the ridge tops. In some cases, the plants grow under hollowed-out areas of the caliche. The plants here were more robust and numerous possibly due to shade and more water accumulation.

205 *The Geology and Geomorphology of the late Miocene Maggie's Vent, a Basanite Fissure Volcano, Mount Fanny Quadrangle, Northeastern Oregon*, **ERIC R. BERGEY, CARLI MORRIS, and JAY VAN TASSELL** (Department of Geology, Eastern Oregon University, One University Blvd., La Grande, OR 97850; ebergey@gmail.com)

Maggie's Vent is a basanite volcano yielding a ⁴⁰Ar/³⁹Ar age of 10.8 ± 0.19 Ma. The vent is located at UTM 11T 0450054 N 5004955 E on the Mount Fanny Quadrangle, Eastern Oregon, at an elevation ranging between 2046-2097 m. above sea level. The entire outcrop comprises an area of .011 km². The rock unit was named "Bell-Tone Basanite" by Oregon Department of Geology and Mineral Industries geologist Vickie McConnell because of the way the ultramafic rock rings when struck with a hammer. Field surveys in the summer of 2007 revealed that the vent is marked by a N-S trending linear band of volcanic breccia, indicating that the lava erupted from a fissure. The rest of the outcrop area consists of lava flows marked by eroding columns that have been tilted to the east. This portion of the vent exhibits flow banding, xenoliths, and jointing. The xenoliths are of granitic and dioritic composition; no mafic xenoliths were found. The occurrence of basanite, a very rare igneous rock, at Maggie's Vent and other sites in Northeast Oregon has important implications for understanding the petrogenesis of the Columbia River Basalts and other volcanic sequences in the area. Maggie's Vent was shaped into a tor by periglacial frost action. Nivation hollows and rock glaciers on the tor may have formed during the Pleistocene when the upper Catherine Creek Valley east of the vent was covered by glaciers.

ANTHROPOLOGY and ARCHAEOLOGY

206 *SES Differences Explain Ethnic Disparities in Body Mass, Total Cholesterol and Glucose Levels in Native Hawaiian and Non-Hawaiian School Children in East Hawaii*, **LENARD ALLEN¹, AKOLEA IOANE², ALEXIA COMSTOCK², DANIEL E. BROWN¹ and LINCOLN GOTSHALK²** (¹Department of Anthropology, University of Hawaii at Hilo, 200 W. Kawili Street, Hilo, Hawaii 96720-4091; ²Department of Kinesiology, University of Hawaii at Hilo, 200 W. Kawili Street, Hilo, Hawaii 96720-4091; lenarda@hawaii.edu)

An investigation of the effect of socioeconomic status (SES) on childhood obesity rates, total cholesterol and glucose levels has been undertaken in Hawaii. There are ethnic differences regarding morbidity rates related to obesity among children in Hawaii, with Native Hawaiians having significantly higher prevalence rates of type 2 diabetes compared with other ethnic groups in Hawaii. A multiethnic sample of children in Kindergarten and third grades from schools in East Hawaii underwent an anthropometric battery, provided finger stick blood samples for cholesterol and glucose analyses, and answered questionnaires regarding ethnicity, parents' education and income, with a measure of SES derived from the latter two variables. Native Hawaiians have significantly lower SES than non-Hawaiians in the sample (t=3.0, p < .01). Analyses of variance (ANOVA) demonstrated direct effects of grade level and ethnicity (whether Native Hawaiian or not) on body mass index (grade: F=13.9, p < .001; ethnicity: F=2.9, p=.09), blood glucose (grade: F=7.7, p < .01; ethnicity: F=5.7, p < .05), and total cholesterol (grade: F=4.5, p < .05; ethnicity: F=3.8, p = .05) levels. When analyses were repeated using SES as a covariate, ethnicity was no longer a significant main effect for BMI (F=2.3, ns), blood glucose (F=1.3, ns) or total cholesterol (F=0.4, ns) level. Thus, the significant ethnic disparities in BMI, glucose and cholesterol are explained by the SES differences between Hawaiian and non-Hawaiian children. SES may be an important factor in the high levels of diabetes found among Native Hawaiians. This research supported by NIH grant #P20MD001125.

207 *Young School Children in East Hawaii Are Heavier Than U.S. Agemates: The Effect of Ethnicity*, **DANIEL E. BROWN¹, MALEA JOEL², LINCOLN GOTSHALK², BRITTANY DOCK² and HAROLD A.T. TEFFT¹** (¹Department of Anthropology, University of Hawaii at Hilo, 200 W. Kawili Street, Hilo, Hawaii 96720-4091; ²Department of Kinesiology and Exercise Science, University of Hawaii at Hilo, 200 W. Kawili Street, Hilo, Hawaii 96720-4091; dbrown@hawaii.edu)

Childhood obesity rates have dramatically increased in developed countries, fueling a rise in prevalence of type 2 diabetes. There are regional and ethnic differences in childhood obesity rates. A multiethnic sample of children in Kindergarten and third grades from schools in East Hawaii underwent an anthropometric battery and answered questionnaires, including a genealogical investigation of ancestry from various ethnic groups. In this study, children with any ancestry from Native Hawaiian or Pacific Islander (HawPac) ethnicity were compared with other children; preliminary results from 105 children are presented. The average stature of children in the study was approximately at the fiftieth percentile for the nation (CDC standards). For Kindergarteners, mean weight of HawPac boys was above the national 75th percentile, while other boys averaged approximately at the 50th percentile; mean weight of HawPac and other girls was near the 50th percentile. For third

graders, mean weight of HawPac boys was above the 95th national percentile, while other boys averaged weight above the 75th percentile; for third grade girls, mean weight of both HawPac and others was above the 75th percentile. Results from computed body mass index were similar to that for weight. When compared with a study carried out in the same schools from 1984-1988, the children are significantly heavier but of similar stature. These results suggest that there has been a sharp increase in adiposity in children living in East Hawaii in the past generation, with Hawaiians and Pacific Islanders particularly affected.

This research supported by NIH grant #P20MD001125.

208 Ethnic Comparison of Objective and Subjective Hot Flashes in an Ambulatory and Laboratory Setting: The Hilo Women's Health Study, AMBER N. GOODLOE¹, DANIEL E. BROWN¹, PHOEBE S. MILLS¹, LYNN A. MORRISON¹, JENNIFER DUTRA¹ and LYNNETTE L. SIEVERT² (¹Department of Anthropology, University of Hawaii at Hilo, 200 W. Kawili Street, Hilo, Hawaii 96720-4091; ²Department of Anthropology, University of Massachusetts, 240 Hicks Way, Amherst, Massachusetts 01003; goodloe@hawaii.edu)

Hot flash (HF) symptom experience commonly associated with menopause varies widely across populations. Studies done outside Hawaii have shown lower rates of HF reporting among Japanese and Japanese-American women in comparison to other ethnic populations. A multiethnic sample of 184 women aged 45-55 years from Hawaii was recruited to participate in ambulatory and laboratory-based studies, with conditions in the latter designed to induce HFs in susceptible women. Women wore skin conductance monitors, which recorded objective HFs, and noted when they felt a (subjective) HF. In women who experienced HFs, there was a significant level of concordance between the incidence of HFs in ambulatory and laboratory settings ($\chi^2=6.2$, $p < .01$). In a current symptoms list questionnaire, Japanese were significantly less likely to report having a HF within the previous two weeks ($\chi^2=2.2$, $p < .001$). However, there was no significant difference among Japanese and others in reporting a subjective HF in the laboratory setting ($\chi^2=2.5$, ns). Japanese women were just as likely to have an objective HF as any other ethnic group both in the laboratory setting ($F = .68$, ns) and the ambulatory setting ($F=.13$, ns). The noted difference in reported subjective HFs between Japanese in comparison to other ethnic women may reflect a culturally-based tendency among Japanese to report fewer hot flashes and health complaints in general. Our findings suggest that Japanese women are just as likely to have an objective HF as women in any other ethnic group. This research is supported by NIH grant #S06-GM08073.

209 Plasma Lipid Patterns in Women at Mid-life in a Multiethnic Population: The Hilo Women's Health Study, NICHOLE J. RAHBERG¹, DANIEL E. BROWN¹, PHOEBE S. MILLS¹, LYNN A. MORRISON¹, KRISTINA McCRACKEN¹ and LYNNETTE L. SIEVERT². (¹Department of Anthropology, University of Hawaii at Hilo, 200 W. Kawili Street, Hilo, Hawaii 96720-4091; ²Department of Anthropology, University of Massachusetts, 240 Hicks Way, Amherst, Massachusetts 01003; nrhberg@hawaii.edu)

A woman's risk for cardiovascular disease increases markedly after menopause. An important component of this increased risk is a less favorable plasma lipid profile. As part of a larger study on women's health, a multiethnic sample of 189 women from Hawaii, aged 45-55, provided blood samples for lipid analyses and answered

questions regarding their ethnicity, age, and menopausal status. Menopausal status was significantly related to total cholesterol (ANOVA, $F=11.9$, $p < .001$) and LDL cholesterol levels ($F=5.5$, $p < .01$), with post-menopausal women having higher values than pre- or peri-menopausal women (Bonferroni post-hoc comparisons). When age was included as a covariate in analyses, total cholesterol ($F=5.6$, $p < .01$), but not LDL cholesterol ($F=1.8$, ns), remained significantly related to menopausal status. Ethnicity had a significant effect on triglycerides ($F=2.7$, $p < .05$) and HDL cholesterol levels ($F=5.7$, $p < .001$), with Hawaiian/Pacific Islander women having both significantly higher triglyceride levels than Euro-Americans, and lower HDL cholesterol levels than Asian-American and Filipino-American women. These relationships persisted when menopausal status was included in analyses, but there was a significant interaction between menopausal status and ethnicity for HDL cholesterol. HDL levels decreased from pre- to post-menopausal status in Euro-American and Hawaiian/Pacific Islanders, but actually increased in Asian-Americans and Filipino-Americans. These results suggest that the change in plasma lipid profiles after menopause may be quite variable both between individuals and in trends between ethnic groups.

This research is supported by NIH grant #S06-GM08073.

SOCIAL, ECONOMIC and POLITICAL SCIENCES

210 Domestic Violence Offenders' Use of Illicit Drugs and Alcohol as a Risk Factor for Arrest, STEPHEN J. MOREWITZ (Research Division, Stephen J. Morewitz, Ph.D., & Associates, IL & CA, Litigation Consultants, 695 Noe St., Ste. 1, San Francisco, CA 94114; morewitz@earthlink.net)

Researchers and policy makers are evaluating why certain individuals who commit domestic violence offenses are more likely to be arrested by the police than others who engage in these types of offenses. Domestic violence offenders who use alcohol and certain illicit drugs may be at increased risk of committing major types of violence because of impaired judgment and reduced inhibitions, thus increasing their chances of being arrested. The present investigation evaluates the degree to which domestic violence offenders who use illicit drugs and alcohol are more likely to be arrested than domestic violence offenders who do not take illicit drugs and alcohol. A random sample of 519 newly filed domestic orders of protection was drawn from newly published domestic court case listings in two cities (Midwest and West regions) between 1997 and 1999. A domestic stalking and violence protocol was constructed to code self-report data obtained from a content analysis of the newly filed domestic orders of protection. Chi-Square and logistic regression analyses were used to test the null hypothesis that after adjusting for other predictor variables including the offenders' age, race, gender, and socioeconomic status, there are no differences among domestic violence offenders' illicit drug and alcohol use and their likelihood of being arrested. The null hypothesis will be rejected if there are statistical differences at the .05 level of significance. The null hypothesis is rejected based on the statistical results. Domestic violence offenders' use of illicit drugs and alcohol was correlated with the offenders being arrested (Chi-Square=6.46, $df=1$, $p<.011$). These statistical associations remained significant after controlling for possible predictor variables. In addition, the domestic violence offenders' race predicted whether they were arrested (O.R.=1.52, 95% C.I.=1.04, 2.21, $p<.03$).

211 *Domestic Violence Suspects' Use of Alcohol and Illicit Drug Use and Rape and Sexual Assault in Dating, Intimate Partner, and Acquaintance Relationships*, **STEPHEN J. MOREWITZ, TIM DUTRA and VIKAS MENGHANI** (California State University, East Bay, Department of Public Affairs & Administration & Student Health Services, & Stephen J. Morewitz, Ph.D., & Associates, IL & CA, 695 Noe St., Ste. 1, San Francisco, CA 94114; morewitz@earthlink.net)

Alcohol and illicit drug use has been associated with an increased risk of different types of violence. However, more data are needed to assess the possible link between individuals' use of alcohol and illicit drugs and their increased risk of committing rape and sexual assault in dating, intimate partner, and acquaintance relationships. On university campuses, use of alcohol and illicit drugs may precipitate sexual violence. Knowledge about the impact of alcohol and drugs on sexual violence in these different relationships can be incorporated into university campus-based alcohol and drug prevention programs and strategies. The present investigation evaluates the degree to which alcohol and illicit drug use is correlated with rape and sexual assault against individuals in dating, intimate partner, and acquaintance relationships. A random sample of 519 newly filed domestic orders of protection was drawn from newly published domestic court case listings in two cities (Midwest and West regions) between 1997 and 1999. A domestic stalking and violence protocol was constructed to code self-report data obtained from a content analysis of the newly filed orders of protection in domestic court. Chi-Square and logistic regression analyses were used to test the null hypothesis that domestic violence suspects' alcohol and illicit drug use was not correlated with their increased risk for committing rape and sexual assault against their partners, dates, or acquaintances, after adjusting for possible predictor variables. The null hypothesis will be rejected if there are statistical differences at the .05 level of significance. The null hypothesis is partly rejected based on the statistical results. Domestic violence suspects' alcohol and illicit drug use was associated with an increased risk of committing rape and sexual assault in dating, intimate partner, and acquaintance relationships (Chi-Square= 3.880, df=1, $p<.049$). Logistical regression analysis revealed that other predictor variables, including suspect gender ($p<.024$) and suspect race/ethnicity ($p<.023$), increased the odds of committing rape and sexual assault against individuals in dating, intimate partner, and acquaintance relationships. However, the addition of these predictor variables in the logistic regression model resulted in a non-significant statistical relationship between suspects' use of alcohol and illicit drugs and rape and sexual assault. These results may be due to the sample size and the prevalence of rape and sexual assault reported in this sample. The California State University, East Bay, Alcohol, Tobacco, and Other Drugs Committee is planning to use these results to develop university campus-based alcohol and drug prevention programs that emphasize the impact of alcohol and drugs on sexual violence among persons in dating, intimate partner, and acquaintance relationships.

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