Gliding Ants and Sichuan Bumblebees
Robert Dudley, Integrative Biology

2005 was a bumper year in insect flight research as we tossed ants from canopy trees in Panama and Peru, and flew high-altitude Chinese bumblebees in variable-pressure atmospheres ranging from 1200 meters to 8000 meters. The lab continued to investigate the behavioral and biomechanical underpinnings to directed aerial descent in canopy ants, working mostly on Barro Colorado Island and near Iquitos (Nature 433:624-626.), and also spent a month in Sichuan studying hovering flight of bumblebees at different elevations. Gliding ants exhibit a clear contrast in color preference for grey tree trunks relative to grey foliage, and remarkably can carry out directed aerial targeting absent either the abdomen or both hindlimbs. Bumblebees can hover over an air density range corresponding to a 9000 meter range in elevation, the equivalent of summiting Qomolongmafang (a.k.a. Mt. Everest), and do so in spite of both physical and aerobic

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system for the study of the evolution of defensive compounds and historical biogeography. Rosemary Gillespie and George Roderick received a grant, in collaboration with the Bishop Museum (Neal Evenhuis and Ron Englund), Cornell (James Liebherr) and the Smithsonian (Dan Polhemus), to study the arthropods of French Polynesia. A major emphasis of the grant is to harness a growing interest in (and concern about) the biological heritage of spiders, their comparative morphology, and patterns of biogeography and biodiversity. Much of his work has focused on ancient lineages in montane east Africa and Madagascar. David Kavanaugh's research is in the area of systematics, biogeography, and evolution, with particular emphasis on carabid beetles (Coleoptera: Carabidae) and other high-altitude, montane beetles. We also hope shortly to add a new faculty curator to the Essig Museum:

the islands among the people of French Polynesia. This growing local interest, coupled with the current cooperation between UC Berkeley's Gump South Pacific Research Station on Moorea and the Territorial Government of French Polynesia, present a timely opportunity to build an understanding of the arthropod biodiversity of these islands.

Finally, we also received a grant from the National Geographic Society for the study of spiders in the high islands of eastern Micronesia (Kosrae, Pohnpei, and Chuuk).

Ties with entomologists at the California Academy of Sciences were established with the approval of Brian Fisher, Charles Griswold, and David Kavanaugh as adjunct faculty members in the Department of Environmental Science, Policy, and Management. As adjunct faculty members, these scientists bring with them experience of an array of organisms that complement the expertise of arthropod biologists in the Essig Museum. Brian Fisher is interested in species-level patterns of diversity, distribution, and invasion of ants, and has focused much recent effort in poorly known areas of Africa and Madagascar. Brian's work has been the topic of a number of articles in the popular press, eg, San Jose Mercury News “Web site reveals ants' secret lives”, Oct 2005; and San Francisco Chronicle “Army ants airlifted in to rescue museum exhibit”, October 2004. Charles Griswold conducts research on the systematics and evolutionary biology of

Claire Kremen recently moved from Princeton to join UC Berkeley's Department of Environmental Science, Policy, and Management. Claire's research is focused, first, in Madagascar, where she leads a team of scientists to develop a status assessment for species and model species distributions for making decisions about siting new reserves. She is also working on the interaction between native bee pollinators and managed colonies of honey bees in California, using the value provided by the native bees as an argument for protecting and/or restoring natural habitat. Finally, we were saddened to lose one of our newest additions to the faculty associated with the Essig Museum: Eileen Hebets left the university to take a position at the University of Nebraska, together with her husband, Jay Storz. We wish her the best of luck in her new position.

We are currently in the process of databasing and georeferencing the Essig Museum collection, with the simultaneous goal of providing a database for the insects of California. (see http://elib, cs.berkeley.edu/eme/). It is widely acknowledged that natural history collections are an underutilized source of biodiversity information. Moreover, the historical specimen-based information contained within museums has great potential for the study and understanding of biological invasions and changes in distribution of species associated with development, climate change, etc. However, this
information is usually not organized in a way that is accessible to invasion biologists, let alone to managers, government agencies, or the general public, where the information is actually critical in dictating policies and addressing concerns. In building the database, we are adopting a cooperative approach and clearly prioritizing economically and ecologically important major groups. With the help of Gordon Nishida, we have now entered data for 25% of the aphids in the museum (see http://bnhm.berkeley.museum/query/index.php). This group serves to highlight the value of a fully databased collection in terms of understanding distributions, and how these have changed over space and time.

Working with John Deck from the Berkeley Natural History Museums, we are using the Distributed Generic Information Retrieval (DiGIR) protocol to query different museum databases simultaneously. In addition, we have been working with Ginger Ogle and Joyce Gross from the UC Berkeley Digital Library Project to develop the “Exploring California Biodiversity Database” (http://elib.cs.berkeley.edu/gk12/) which serves the students from the GK12 project specifically, and allows them to enter the data and query the database by family, locality, school, or collector.

There has been considerable progress towards moving the Essig Museum into space adjacent to the other Berkeley Natural History Museums in the Valley Life Sciences Building. We now have plans and designs for the new space, all the price quotes in, and we are ready to purchase the materials for compacterization. It will be very exciting (and a relief!) to get the move underway.

The Essig Museum continues to be intensely involved in a grant across the Berkeley Natural History Museums to encourage graduate students associated with the museums to work together with local schools to make collections and take observations in the field and to develop their own specimen exhibits at the schools. By sharing information across museum databases, the schools have access to a broad range of interpretive tools, including the ability to explore species distributions and species counts within particular habitats. These tools are used to understand patterns of biodiversity in the Bay Area. We have been working with 5 schools in the area: Pittsburg High School, Richmond High School, El Cerrito High School, Adams Middle School, and Berkeley High School. The graduate students gain tremendously from

Examples of results from search on Cotton melon aphid, *Aphis gossypii*, specimens in the Essig Museum. Results are displayed using BerkeleyMapper, which can also use information from distributed sources using the DiGIR protocol and is adaptable for mapping any collection of points.
the program and gain an appreciation for the responsibility that scientists have to the public. Moreover, as one student said, “Working with the GK-12 has made me think about my research in different ways. When you’re trying to sell your ideas to someone else you end up selling it to yourself too.” For K-12 students, positive outcomes are reflected in the increased attendance at the end-of-year student symposium (has almost tripled!), higher attendance rates in those classes in which Fellows worked (one increased from approx. 30% to ~ 100%), student interest in school increased, and enrollment in science classes increased. As one of the teachers said, “there is no down side to this program.” Given the state’s budget shortfall, this program offers the one opportunity for teachers to conduct outside activities with their classes.

In 2004 we established a graduate student curatorial assistantship for the Essig Museum. This year the assistantship was offered to Ainsley Seago. Ainsley’s research focuses on phylogenetic relationships of basal Leiodidae (round fungus beetles), beginning with the camarine tribe Agyroctoplus and its type genus Agyroctopus. This tribe has a marked “Gondwanan” distribution, occurring in southeastern Australia, Tasmania, New Zealand, Southern Chile, and Argentina. Her work promises new insights for future faunal surveys in these areas, and the potential for these beetles to serve as bioindicators.

As in the last few years, the budget of the Essig Museum has endured further cuts this fiscal year because of the State budget crises. However, we have more than made up for our losses with the success we have had in obtaining extramural funds. We expect that next year will provide additional and interesting avenues for program development.

I look forward to talking with you during the next year. Please contact me at anytime by email (gillespi@nature.berkeley.edu) or phone (510-642-3345).

“Gliding Ants”—continued from page 1

demands on flight performance. Experimental manipulations involved removal of hindwings, thereby compromising performance, and a decoupling of oxygen availability from air density. We anticipate future alpine adventures in the western hinterlands of the People’s Republic of China.

Gliding ants (Cephalotes atratus) forage on a tree trunk
CHILEAN BEETLE NEWS  
Dr. Elizabeth Arias

We are pleased to announce that Professor Kipling Will and I were awarded a grant from the National Science Foundation’s Biotic Survey and Inventory Program to study “Terrestrial Arthropoda of Chilean Valdivian Temperate Forests.”

We also conducted an off-season expedition last March thanks to the grant support of the Schlinger Foundation. Dr. Michael Irwin went along with us, and collected several theridid larvae, but no adults. Dr. Fred Andrews and I continued with the canopy fogging. We visited Oncol Park and Punta Curiñanco with professionals from CODEFF (Chilean National Corporation of Flora and Fauna Protection). Erica Benavides, Cristian Muñoz, Lucas Vitek and Sergio Ocares helped with the collecting. Material collected was sorted by Chilean high school student Gabriela Urrutia.

We are starting the process of databasing the first bulk of identified beetles from these expeditions. Please let us know if any if you would like to borrow any of these specimens for your research. We thank Mario Elgueta MNNC and Gerardo Arriagada for their help in sorting and identifying the material which will be deposited at the EMEC. During this process, they also separated vouchers for the Chilean Collection.

AUCHENORRHYNCHA CONGRESS

The 12th International Auchenorrhyncha Congress (and 6th International Workshop on Leaffoppers and Planthoppers of Economic Significance) convened this August at UC Berkeley’s Clark Kerr campus. George Roderick and Sandy Purcell organized the conference, which attracted 74 homopteran specialists from around the world, representing 21 nations and 15 US states. The keynote address and symposia addressed a variety of topics in Auchenorrhyncha evolution, including early plant-feeding adaptations, co-evolution of bacterial symbionts, acoustical behavior, and phylogenetic studies. The Essig Museum entertained 36 visitors, many of whom provided invaluable curatorial assistance.

NEW FACES: REBECCA AIGNER

Rebecca Aigner, who hails from “Down Under,” has just joined our paid museum staff. According to Rebecca, the Essig Museum is “one of the four places in the world that I wanted to work at.” She had been volunteering 2-3 days a week since May as an alternative to “going baty sitting at home” while her husband is setting up an office in San Francisco for his Australian company. She began her training at the tender age of 14 volunteering at the Australian National Insect Collection at CSIRO, working with Tom Weir and John Lawrence on Coleoptera, Ted Edward and Michael Braby on Lepidoptera, and David Rentz on Orthoptera, later graduating to employment as an Electron Microscopist. After moving to Queensland, Rebecca was employed by the Dept. of Primary Industries, first on crop IPM and recently in forestry research on the biological control of hardwood plantation pests, from which she is currently on leave. Besides being a diligent worker, Rebecca has livened up the museum atmosphere with her Aussie-style of humor, and we very much hope that her husband takes his time with the new office so that we can keep her around awhile.
Spiders of Fiji
Dr. Rosemary Gillespie

In June 2005 I embarked on a collecting trip to Fiji, as part of the project to survey the arthropods of Fiji (PI Neal Evenhuis, Bishop Museum Honolulu, funded by the National Science Foundation and the Schlinger Foundation; see http://hbs.bishopmuseum.org/fiji/). There were six of us: Me, Andy Bennett (Canadian National Collection), Eli Sarnat and Julia Schreiber (UC Davis), and Moala Tokora'a and Akiniisi Cagi Tokora'a (both part of the Fiji sorting staff). We collected in the fantastically beautiful islands of Taveuni, Koro, and Viti Levu, and met some of the most delightful, warm and generous people I have ever encountered. Daylight hours were spent in the field, hiking to upper elevation sites and collecting. We would generally collect well into darkness before returning for an evening of kava and camaraderie.
I am responsible for the spiders of Fiji, determining species identities and affinities to mainland (or other island) biotas. The spiders on these islands are very poorly known. The only major group that has received recent attention is the Salticidae (jumping spiders), where the numbers of known species have jumped from 7 to 26 as a result of the work of Jim Berry, Joe Beatry, and Jerzy Prószyński. Undoubtedly many species remain to be described. Look for updates on the diversity of spiders in the Fijian islands in future issues of the newsletter!

Collecting Trip 2005

The Essig Museum's 2005 collecting trip took museum staff and students south to the Mojave Desert; the UC Burns Píñon Ridge Reserve provided accommodations. From the reserve, collecting expeditions visited Johnson Valley, Deadman's Lake, and the San Gorgonio Wilderness; habitats from the wet to dry and lowland to montane were represented.
Aside from the simple pleasures of the field and collecting, we took the opportunity to do some observation and a little experimentation during the trip. Kip Will has been collaborating with Dan Levitis, a student in Integrative Biology, regarding possible defensive compounds in Californian softwinged flower beetles (Melyridae). The spring trip was a great chance to get a handsome supply of various Collops species and potential predators like the spider Misumenops (or Misumenops). In a simple field bioassay the beetle and spider were placed together and the spider would strike and reject the beetle every time, while eagerly consuming flies. The study of the behavioral and chemical aspects of this system are now well underway, in a series of feeding experiments conducted by Dan.
RECENT GIFTS AND DONATIONS

2004-2005 FRIENDS OF THE ESSIG MUSEUM

Monetary Gifts:
Grand Benefactor - Virginia Ingham (Michelbacher Fund)
Benefactor - Anonymous
Sponsor - Bill Shepard
Patrons - Maurice & Catherine Tauber, Claire Englander

Specimen Donations:

Other Donations (Books):
Janet Dahlsten, Scott Meredith

Volunteer Curators:
Coleoptera - Charles O'Brien, Doug Post, Bill Shepard
Diptera - Jose Manuel Ayala
Lepidoptera - John DeBenedictis, Marc Epstein, Sangmi Lee
Odonata - Tim Manolis, Douglas Vaughn
Neuroptera - Norman Penny
Hymenoptera - John Ascher
general - Rebecca Aigner

THE DAHLSTEN RESEARCH COLLECTION

The museum received the late Professor Don Dahlsten’s large research collection this summer and the pinned component has been counted and is currently being curated. The 17,000 pinned specimens, consisting mostly of Hymenoptera (11,600), Coleoptera (3,300) and Diptera (1,200), were derived from several projects including: 1) Neodipriion pine sawflies and their natural enemies, 2) the Douglas fir tussock moth (Hemerocampa pseudosuga) and natural enemies, 3) various bark beetles (mostly Dendroctonus brevicomis, but also Scolytus ventralis and Ips confusis) and their natural enemies, 4) the predators, primary and secondary parasitoids of various urban shade tree aphids, 5) Protocalliphora, the flies parasitic on birds, 6) natural enemies of the elm leaf beetle, Xanthogaleruca [=Pyrhalta] luteola, 7) natural enemies of the lodgepole needle miner (Recurtaria milleri), and 8) natural enemies collected from drop cloth studies during Medfly spraying project. In addition, a large number of specimens on microscope slides and in alcohol are awaiting curation.

BECOME A FRIEND OF THE ESSIG MUSEUM

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Please make checks payable to UC Regents, with an annotation, "For the Essig Museum." Mail your check and this form to:
Essig Museum of Entomology, 201 Wellman Hall, Berkeley CA 94720-3112.
All membership fees and donations are tax-deductible to the amount allowed by law.
ESSIG MUSEUM OF ENTOMOLOGY

Director: Rosemary Gillespie
Associate Director: Kipling Will
Database Manager: Gordon Nishida
Collection Manager: Cheryl Barr
Bulletin Editor: Ainsley Seago

For more information and events, check out the Essig Museum website at http://essig.berkeley.edu

UPCOMING EVENTS

FEBRUARY 12, 2006
Darwin Day celebration:
museum open house, tours, drinks and cake

APRIL 22, 2006
Cal Day (Bug Day):
Activities and crafts for children,
museum open house, tours, general tomfoolery