

Intertidal Tidings

Quarterly E-Newsletter

University of Washington Friday Harbor Laboratories



About the Director

President of the Society for Integrative and Comparative Biology



Dr. Kenneth P. Sebens, Director of the University of Washington's Friday Harbor Laboratories and Professor in the Department of Biology And School of Aquatic and Fisheries Sciences was elected President of the Society for Integrative and Comparative Biology (SICB). See Page 3.

The Highest Funding Priorities

The good news is that we have a very large number of highly talented applicants for our 2011 courses. Unfortunately, with the large budget cuts from the State, the university has had to increase tuition substantially and that's why we have more students who require financial assistance to attend a course at FHL. Two ways can enable a student's attendance:



is also very much appreciated! [Continued on Page 4](#)

Can you Adopt-a-Student? The average cost is \$5,000 for a student's tuition and room and board, for a 5 week 9 credit course. If you can support a student for the full amount, your gift would be tremendously helpful. Support of a lesser amount

Friday Harbor Labs Science Outreach Program

Learn about seven K-12 programs being conducted under the FHL Science Outreach Program on [Page 8](#).

Friday Harbor High School students win ORCA Bowl for a second year. Read more on [Page 9](#).

Jane Lubchenco Ph.D., a marine ecologist, environmental scientist, Under-Secretary of Commerce for Oceans and Atmosphere and Administrator of NOAA, has been selected as Newsmaker of the Year by *Nature Magazine* and awarded a Alumna Summa Laude Dignata from UW this year! Jane worked at FHL while earning a MS in Zoology in 1971 under Bob Paine, the noted UW "Keystone" ecologist. She went on to receive a Ph.D. in Ecology from Harvard. Read more about Jane at <http://www.nature.com/news/2010/101215/full/4681024a.html> and at <http://www.washington.edu/news/articles/uw-awards-of-excellence-recipients-announced>



Stephen A. Stricker, Professor & Director of Electron Microscopy at the University of New Mexico, took a sabbatical at FHL where he worked as a first-year UW grad student in 1976. Read about a symposium he organized at FHL and other work in [My Fall Sabbatical at FHL](#) on Page 5.



Thomas Kleinteich is a post-doctoral researcher in the Comparative Biomechanics Lab at FHL. His research focuses on the evolution of feeding systems in amphibians, especially how amphibians deal with different functional constraints on the larval and adult life stage. Read more on page 6 [Amphibians Aren't Marine Animals, Are They?](#)

Ocean Acidification Workshop

On March 22-24, 2011 researchers from around the country gathered at the Woods Hole Oceanographic Institution to discuss the current state of ocean acidification science. Three FHL scientists represented different areas of this field. [Read more on Page 7](#)



Sefton Robert Wellings, M.D., Ph.D., died at age 83 on March 8, 2011. Sefton, a professor emeritus of UC Davis School of Medicine also had a Ph.D. in Zoology and studied tumors in flatfish. Sefton served on the FHL Board for many years. Please read about his remarkable life on [Page 7](#).

Highlighting: Dr. Paul Illg on Page 21 is the third in a series featuring major figures in the development and growth of FHL. Paul's colleagues honor him with wonderful memories and stories out of the past.



May 14th, FHL's Annual Open House [Page 9](#)

The whole family enjoys visiting the labs, boarding the Centennial research vessel, learning about diving and more!

June 22nd, Paul Illg Distinguished Lectureship [Page 9](#)

June 4th, Jazz at the Labs [Page 10](#)

Great Seattle jazz musicians give a dinner performance at FHL to raise funds for the FHL K-12 Science Outreach Program.



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Ken Sebens and Richard Satterlie
Photo by Trish Morse

Kenneth P. Sebens, President of SICB

Dr. Kenneth P. Sebens, Director of the University of Washington's Friday Harbor Laboratories and Professor in the Department of Biology And School of Aquatic and Fisheries Sciences was elected to the position of President of the Society for Integrative and Comparative Biology (SICB)

and begins his two year term January 2011. Dr. Richard Satterlie, a frequent FHL visiting researcher, served as President in 2009-2011.

SICB, with over 2500 members, is the foremost society for the study of organismal biology, a collection of related disciplines that focus on the organism and its interactions with the physical and biological environment. The Society's annual meeting draws over 1400 participants, and was held in Seattle in 2010, then in Salt Lake City in January 2011. The Society has an international membership, with many participants from Canada and Europe.

SICB Unites Wide Range of Biological Interests

Examples of the fields within SICB include animal behavior, ecology and evolution, biomechanics and biomaterials science, ecomechanics, systematics, evolution, developmental biology, comparative endocrinology, larval biology, thermal biology, neurobiology, invertebrate zoology, biodiversity, functional morphology, physiology, genetics, sensory biology, systems biology and others. In recent years there has been a strong focus on how changing environments affect organism function and distribution, providing data necessary to predict how biological communities will change and how to best conserve species, habitats and ecosystems.

SICB Dedicated to Education

Science education is a strong goal of the society, especially at high schools and universities, with many students attending the meetings. The Society is also dedicated to promoting the pursuit and public dissemination of important information relating to biology. Over the past two years, and for the near future, the society has also sponsored papers and workshops on Grand Challenges in Organismal Biology, an attempt to define important areas of future research and education in this broad field.

Billie Swalla, SICB President Elect

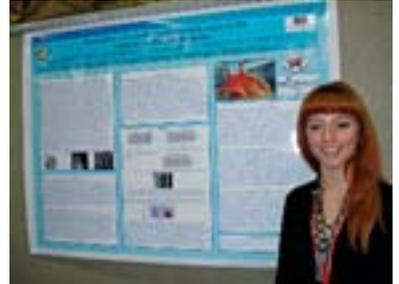
Dr. Billie Swalla, also Professor in the UW Department of Biology and a researcher at FHL, became President-Elect at the January meeting and will begin her term in 2013.

Seen at SCIB



Dylan Wainwright, grandson of Steve Wainwright, attended SICB. Dylan was a student in Adam's Fish course in 2010! Dylan's grandfather, Steve, was honored in the Spring 2010 FHL E-Newsletter.

Cara Gallagher, who presented a student paper at SICB has visited FHL. She did fantastic work in being the first person to systematically measure the function of a novel sensory organ (called the "ciliated groove" in the sea slug *Tritonia diomedea*. Cara is an undergraduate research assistant at CSU East Bay under Dr. Jim Murray.



Drs. Shaun Cain and Jim Murray spent many years at FHL in the laboratory of Dennis Willows. Both are professors at primarily undergraduate universities and have been active in supporting undergraduate research for many years. Both taught apprenticeships and graduate courses at FHL and helped students present their research at national and international meetings, as well as co-authored published research. Their research programs are focused on the neural control of locomotion and navigation in the giant orange sea slug *Tritonia diomedea*.

Dr. Mary E. Rice, Research Zoologist, Emeritus at the Smithsonian Institute and Billy Swalla, SICB President Elect found time to chat at SICB. Mary, who received her Ph.D. from the University of Washington in 1966, is a vital part of the FHL history and dear friend and peer of some of FHL's iconic scientists. Billie continues to be a mainstay of the FHL faculty and research staff.



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Highest Funding Priorities

The good news is that we have a very large number of highly talented applicants for our 2011 courses. Unfortunately, with the large budget cuts from the State, the university has had to increase tuition substantially and that's why we have more students who require financial

assistance to attend a course at FHL. Two ways you can enable a student's attendance:

Can you Adopt-a-Student?

The average cost is \$5,000 for a student's tuition and room and board, for a 5 week 9 credit course. If you can support a student for the full amount, your gift would be tremendously helpful. Support of a lesser amount is also very much appreciated!

The Adopt-a-Student program addresses the highest FHL-funding need. Your gift makes it possible for a deserving young person to become part of a team that can change their life forever. It is an investment into tomorrow.

Along with the knowledge that your donation will help to match great instructors and the very best students, the Adopt-a-Student Program also offers you opportunities.

- Receive a letter describing your student(s), their interests and coursework.
- Meet your student(s) (Optional)
- Tour their laboratory at FHL and learn first-hand about research projects (Optional)
- Join the Adopt-a-Student sponsor alumni
- All contributions are tax deductible.

The Research Apprenticeship Program

This is an intensive research training experience for undergraduates and recent post-baccalaureates. Many qualified applicants need financial support to participate in this program.

This program offers undergraduate students the chance to access the natural laboratory of the San Juan Islands with intensive and inquiry-led mentoring that drives the students to grow and achieve as newly-developing scientists. It is exciting to witness the transformations taking place.

Give online at www.washington.edu/giving/make-a-gift. You will be connected to the University of Washington's secure server for private gifts. Enter the keyword "Adopt-a-Student" or "Apprenticeship".



Notes from Trish Morse, March 2011 Chair Advancement Board

The winter days are finally fading, although Friday Harbor is continuing to see lots of rain! With the longer days, we head to our FHL spring students arriving this next week.

This past week has brought Oceanography students from the University in for a retreat, and a large group of undergraduates from Whitman College here for lots of field work and experiments using living invertebrates associated with their "inland" invertebrate zoology course. All of these activities remind us how important it is for students to work with living organisms, slip and slide on mud flats and rocky shores and observe unusual organisms while dredging on the Centennial. These activities forever change the way students think about ocean life.



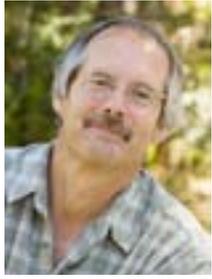
Meanwhile our Director and Associate Director continue to build new relationships with the College of the Environment Departments and Programs on the Seattle Campus. One exciting new area emerging is our center for studies on the effects of acidification of the oceans on organisms. This summer we will have the first course in this area, and a group of stars from this international emerging research area present to interact with the graduate students.



Those students are our future for research to help make good evidence-based environmental decisions. Ocean acidification research is interdisciplinary and includes biologists, chemists, and marine policy experts.

We continue to attract a full house for the summer months of research, courses, and scholars to spend time at the Whiteley Center. But we are constantly aware of the State's budget problems that sit heavily on the higher education budgets. It is your generous contributions that help us bridge some of these difficult times. We are reaching toward completing the Wendt Challenge to put the unique undergraduate Research Apprenticeship Program on a steady course, although we are still not quite there! And your support for the various student endowments and especially the annual "Adopt-a-Student" program helps us to attract the absolute best qualified summer students from the larger academic community. Thank you for all that you continue to do for FHL.

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My Fall 2010 Sabbatical at FHL

Steve Stricker Ph.D.

When I came to FHL as a first-year UW grad student in 1976, I certainly wasn't thinking that I might return in the Fall of 2010 to spend a sabbatical. That's because at the time I had no idea that

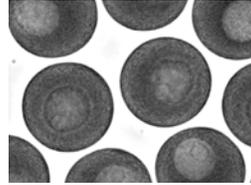
I would still be in the game nearly 35 years later or that the powers-to-be at FHL would even allow me to come back. Well, I am, and they did. So, I am delighted now to extend my normal summer's stay at the Labs for a few months to work on the following projects.

My sabbatical began by hosting a symposium at FHL on "Mechanisms of Egg Maturation and Fertilization: From Sea to Land". The meeting took place from September 10-12 and was organized with the help of Gary Wessel of Brown University and Takeo Kishimoto of the Tokyo Institute of Technology. While attending a similar conference in Kyoto two years ago, it struck me that FHL would be the ideal place for a follow-up meeting, and judging from the high acceptance rate that our invitations garnered, it looks like others felt the same way. We ended up having 55 participants, with about half coming from Japan, Europe, and Canada. After 3 full days of exciting talks, it was hard to see everyone go (literally, given that fog wreaked havoc with Monday morning departures—P.S. Many thanks again to Rachel and Teresa for working out all of those travel snafus). Nevertheless, although the meeting is sadly over, I am consoled by the fact that a third installment will occur in France two summers from now.

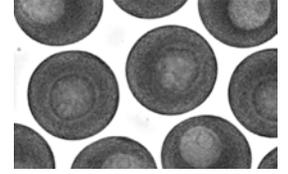
As an offshoot of the FHL symposium, there is now a push to put together a special issue in the journal *Molecular Reproduction and Development* on topics related to egg maturation and fertilization. Thus, I am collaborating with Ryusaku Deguchi of Miyagi University on "cAMP-induced egg maturation" to review our findings that unlike in such well studied paradigms as starfish, frogs, and mammals, the secondary messenger cAMP, actually triggers, rather than blocks, maturation in eggs of jellyfish and ribbon worms. Similarly, I am completing another review with a former student, Jose Escalona, on an immunoblotting method for analyzing phosphorylation changes in proteins extracted from eggs. Along with other contributions from many current and former FHLers, the protocol will constitute a chapter in an upcoming book on the "Developmental Biology of the Sea Urchin and Other Marine Invertebrates" that Dave Carroll of the Florida Institute of Technology and I are editing for Humana Press.

Finally, although writing reviews and editing can be fun at times, what I am particularly enjoying during my Fall here at FHL is the chance to think about experiments I conducted

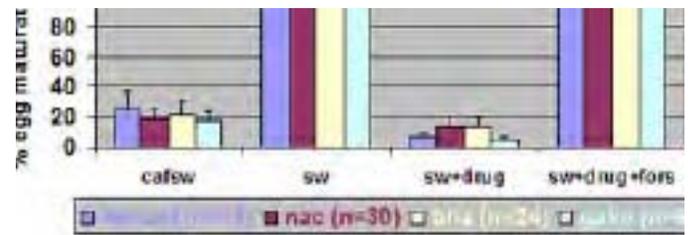
this summer without being interrupted by teaching and committee work back at the University of New Mexico. Results from the summer show that various antioxidants block seawater- but not cAMP-induced egg maturation in the ribbon worm *Cerebratulus* (Fig. 1), and currently, I am assessing the roles played by nitric oxide signaling to understand how these antioxidants can have variable effects on maturation, depending on whether the inducing stimulus is seawater or cAMP.



Immature eggs in SW+BHA



Mature eggs in SW+BHA+ forskolin



1 Antioxidants block seawater (SW), but not cAMP-induced egg maturation. A) Immature eggs in SW+BHA; B) Mature eggs in SW+BHA+ forskolin (fors), a cAMP elevator; C) Summary of results for 4 antioxidants: ipol, NAC, BHA, and gallotannin; calfw=calcium-free seawater, w/

As the sabbatical winds down, I am constantly reminded of what a special place FHL is and how privileged I have been to study various amazing marine invertebrates here on San Juan Island. And just like back in 1976, it remains a mystery to me where I will be 30+ years from now, although I suppose it can't hurt to be optimistic about still being above ground at that point down the road. In any case, what is crystal clear is that it has been a real treat for me to spend so much time, including this sabbatical, at FHL.

Editor's Note: Steve Stricker is Professor and Director of Electron Microscopy at the University of New Mexico. He received his Ph.D. in Zoology from the University of Washington in 1983. His research interests are cell and developmental biology; calcium dynamics during oocyte maturation, fertilization, and early development; structure and function of the nucleolus. Email sstr@unm.edu.

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Amphibians Aren't Marine Animals, Are They?

Thomas Kleinteich Ph.D.

No, they are not. Amphibians (Fig. 1) can be found in habitats everywhere between tundra and a desert and although many amphibians spend extensive amounts of their lifetime in water, none of the 6,755 species is tolerant to salt water. This might explain why only three species of amphibians made it to San Juan Island, while the Washington Herp Atlas lists 27 species in Washington State. So, why come all the way from Germany to study amphibians at a marine biology lab?

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Figure 1: The three groups of extant amphibians. Upper row: caecilians (*Gymnophiona*) – *Grandisonia sechellensis*; lower left: salamanders (*Caudata*) – *Ichthyosaura alpestris*; lower right: frogs (*Anura*) – *Hyla arborea*

I am interested in how amphibian heads can handle the different functional demands that they encounter when they transform from an aquatic larval stage to a terrestrial adult during metamorphosis. Tadpoles often use filter feeding, pretty much like sea squirts, while as adult frogs they can become tongue feeders that fire their tongues with an amazingly high precision towards insects, just like chameleons do. Still, the muscles and the bones that are used during feeding in the tadpole and in the frog are connected throughout development. I often find single muscles that change their orientation or skeletal attachment during metamorphosis, which results in a totally different function. I am also interested in the evolution of head muscles in amphibians in general, so that I compare different species to figure out how the muscles correspond to each other and how they changed over evolutionary time (Fig. 2). Another research interest of mine is the evolution of caecilian heads. Caecilians are a group of legless amphibians (Fig. 1) that are highly specialized to dig through the soil in tropical rain forests. Their heads show many fascinating specializations

for digging, like a unique jaw mechanism that allows them to bite very hard, even though their jaw muscles are restricted by bone to make the skull more solid.

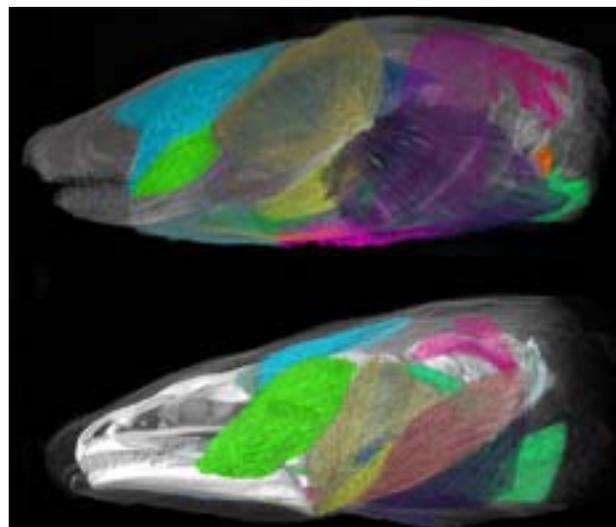


Figure 2: μ CT images of the larval heads of a caecilian *Ichthyophis cf. kohtaoensis* (upper image) and a salamander *Dicamptodon ensatus* (lower image). The head muscles are shown in color; the same colors in the two species represent hypothesis for the homologies, i.e. that they have the same evolutionary roots, between the muscles in the two species.

To answer questions on amphibian head evolution and function, I try to integrate descriptive, quantitative, and functional approaches. Most of my projects are based on precise three-dimensional datasets of amphibian anatomy. In a recent project on caecilian skulls, I changed their original 3D shape by virtually cutting holes in them and then I simulated their performance during digging with finite elements analysis (Fig. 3); an engineering approach to figure out how objects act under load.

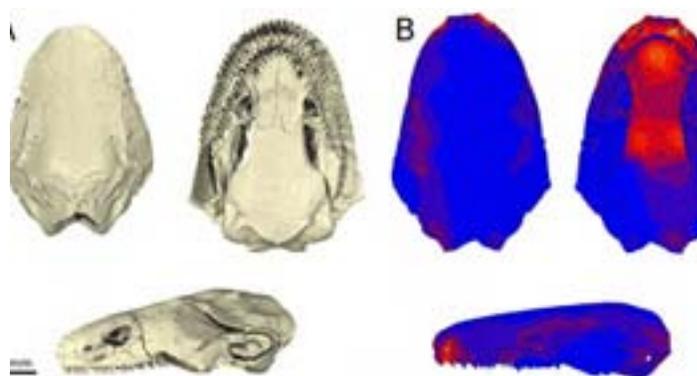


Figure 3: A: μ CT images of the skull of the caecilian *Ichthyophis cf. kohtaoensis* in top (upper left), bottom (upper right), and side views. B: The finite element analysis (FEA) of the skull shows how the strain is distributed over the skull while the animal digs through the substrate, i.e. when a force acts on the frontal face of the skull; the scale goes from blue for no strain to yellow for the highest strains.

Continued on Page 7.

Engineering actually is the key word, and it is why my wife and I moved to Friday Harbor so that I can work as a post-doc in the lab of Adam Summers. Besides being the “fish-guy”, Adam published a model on the jaw closing mechanics in caecilians and I adapted his model for a chapter of my PhD thesis. To learn more about Adams approach, I decided in 2007 to spend some time at his lab in Irvine, California. My time in Irvine was crazy. I encountered my first brush fires, minor earthquakes, and less than twenty four hours after my arrival, Adam told me that he had to leave for the East Coast for several weeks and then would be in Taiwan for another two weeks or so. Besides all that chaos, I absolutely enjoyed playing around with Adam’s lab equipment, especially with his 3D printer, which allowed me to print oversized models of all my 3D datasets that I gathered from amphibian anatomy. After two months in Irvine, I decided that I will come back to Adam’s lab as a post-doc to broaden my research focus towards engineering approaches, like material testing and finite elements analysis. Before I had my PhD finished, Adam became the resident associate director at FHL and he moved his lab from Irvine to Friday Harbor. And although there are not too many amphibians around the labs, I really enjoy living and working here. One could say, I feel like a tadpole in water.

Editor’s Note: *Thomas Kleinteich is a Volkswagen Post-doctoral fellow in the Comparative Biomechanics Lab at the Friday Harbor Laboratories. Thomas is affiliated with the University of Hamburg.*

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Ocean Acidification Workshop



Emily Carrington Ph.D.

On March 22-24, 2011 researchers from around the country gathered at the Woods Hole Oceanographic Institution to discuss the current state of ocean acidification science. Three FHL scientists represented different areas of this field. Emily Carrington, newly funded from NSF’s very first call for OA proposals showcased her work on biomaterials (see previous newsletter). Jim Murray (from UW’s School of Oceanography) discussed the new mesocosm system being installed on the FHL docks. Moose O’Donnell talked about the ocean acidification graduate course that he and Terrie Klinger are leading this summer.

The workshop provided a great opportunity for investigators from many different agencies, including



Jim Murray Ph.D.

NOAA, NMFS, USGS and others to gain understanding of research happening outside their normal research communities. Many government labs, including NWFSC and PMBL in Seattle are doing a broad array of acidification projects. This meeting strengthened ties between FHL scientists and nearby government labs. Research on ocean acidification is growing rapidly as many scientists discover how future ocean chemistry will affect their own study systems. An important focus, that is only now gaining attention, is understanding the impacts to human societies from these alterations. A special breakout session, chaired by UW’s Ed Miles, helped organize ideas to link experimental scientists with social scientists to model impacts of ocean acidification.



Moose O’Donnell Ph.D.

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In Memory of Sefton Robert Wellings, M.D., Ph.D.

Sefton Robert Wellings, passed away peacefully on March 8, 2011, in Palm Desert, California, at the age of 83.

Sefton was born on October 2, 1927 in Tacoma, Washington. He received his education at the University of Washington and the University of California, Berkeley. He completed his residency at the University of California, San Francisco Medical Center. With his Ph.D. in Zoology, he specialized in marine biology and studied tumors in flatfish.

Sefton joined the University of Oregon Medical School in Portland, Oregon, in 1963 and the University of California, Davis Medical School, in 1970. He served as Pathology Department Chairman at both schools, and became Professor Emeritus in 1987. He was Board-certified in surgical, anatomic and forensic pathology and is credited with discovering the earliest form of pre-cancerous breast cancer cells, allowing for earlier treatment of this deadly disease.

In his personal life, he most enjoyed reading, drawing, painting, hiking and bird-watching. He was preceded in death by his first wife and former Davis resident Marjorie. He is survived by his wife of 35 years, Carol, his five children, three stepchildren, two grandchildren and beloved dog, Paco. In recent years, Sefton and Carol divided their time between Palm Desert and Friday Harbor, Washington. Sefton served on the FHL Advancement Board for many years.

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Winter Update Friday Harbor Labs Science Outreach Program Jenny Roberts and Margo Thorp

Watersheds & Salmon Release

In preparation for releasing their juvenile salmon, 4th graders from FHES were introduced to the importance of healthy watersheds. Through a lab observing goldfish subjected to different water temperatures, students learned how temperature affects fish's metabolic rate and dissolved oxygen (DO) levels in water. Students released their salmon into False Bay Creek after DO, pH and temperature measurements indicated conditions were favorable to salmon health.



Water Quality Sampling in Friday Harbor Marina

5th grade students from FHES resumed the water quality monitoring of the Friday Harbor Marina. Testing was conducted three times this fall for fecal coliform levels, temperature, salinity and direction of flow. Results will be reported to Port officials in the spring.

DNA Cheek Cell Extraction Lab

7th grade students from Friday Harbor Middle School and Spring Street International School extracted DNA from their own cheek cells to visualize this illusive cell compound and get a better understanding of its properties and structure.



Gray Whale Project

FHMS seventh graders participated in the SJI Whale Museum's Gray Whale Project to enhance their study of the human body. After successfully assembling the gray whale skeleton students discussed the function of the skeleton and the probable cause of death of this gray whale.



Electrophoresis Exploration

Chemistry students from Friday Harbor High School were introduced to the process and equipment needed for electrophoresis. Through a series

of labs the students learned how to use micropipettes, make agarose gels and use the electrophoresis chambers to separate small molecules by charge, size and shape.

Invasive Mussel Project

FHHS students were involved in the assessment of the spread of an exotic species of mussel, *Mytilus galloprovincialis*. They used sophisticated electrophoresis techniques to identify the mussel from its DNA fingerprint, which is the only way of separating this cryptic species from native species of the San Juan Islands.



Griffin Bay High School "Watershed" Course

This course focuses on stream ecology and watershed health. Students collect water samples at 5 local watershed sampling sites and students then analyze their samples and compile data for the purpose of sharing such data with an identified and approved audience. Students also research other watershed systems and compare and contrast those with the San Juan Island watershed. Through a series of projects, fieldwork and lab work, students gain a strong understanding of watershed health.



Photos by Jenny Roberts and Margo Thorp

My Love of Science

Ellen Goudie, As a 9th Grade Student

Ever since I was young, I have always had a passion for science. I have especially enjoyed exploring science labs outside of the everyday classroom. I always look forward to the Friday Harbor Labs Science Outreach Program for K-12 San Juan Island students.

The most recent lab was the invasive mussel project, which I thought was definitely the most interesting one yet. This lab used sophisticated electrophoresis techniques to identify the DNA fingerprint of various mussels to see if there are any exotic mussels in our local waters. I loved that there was so much hands-on time; using the micropipettes and all the other instruments. We really got to learn from our own mistakes and the mistakes of our classmates. It's exciting to be part of an experiment where our own research can actually help marine biologists in the field. I feel honored to be part of this wonderful program as a high school student and lucky to work with all the wonderful people who are eager to teach us.

Editor's Note; Ellen is in the 10th grade this school year.

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Friday Harbor Wins Orca Bowl Again!



Friday Harbor High School, Team A, Orca Bowl 2011 top competitors. Left to right: Nikki LeBaron, Elle Guard, Audrey Olshefsky, Nick Roberts, and Gavin Guard. The team's coach was Nick Frazee (pictured) and the assistant coach was Marc Vermeire, both Friday Harbor HS teachers. Katie Hart was the Interpretation Supervisor.

After ten rounds of competition on Saturday, February 26, Friday Harbor, Team A and Ocean Research College Academy (ORCA), Team A faced-off in the final round. A close eleventh round match ended with Friday Harbor, Team A winning the regional event that was held in the University of Washington Fisheries Sciences Building. The Friday Harbor team is now slated to compete in the National Ocean Sciences Bowl for a second year. This year's national finals are scheduled for April 29 to May 1 in Galveston at Texas A&M. Each member of the winning Orca Bowl team now qualifies for a UW Oceanography Undergraduate Tuition Scholarship, one academic quarter per year per student majoring in oceanography.

Nick Frazee who coaches the students, is currently a teacher involved in the FHL GK-12 Program in which a teacher is paired up with a FHL graduate research associate student who assists in science curriculum. The assistant coach, Marc Vermeire, was a GK-12 Program for two years also. The students prepare with a practice bowl in which they compete against scientists from FHL. These students have been involved in the Friday Harbor Science Outreach Program, including outings on the R/V Centennial. Jenny Roberts is Program Director of FHL SOP.

We send our congratulations to all of the participants for their dedication to studying the ocean sciences, coming to the Orca Bowl and putting their knowledge to the test! We are proud of you.

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Coming Events

FHL's Annual Open House, May 14th, 11am to 4pm

The public is enthusiastically invited to participate in the 2011 FHL Open House. This event offers a splendid opportunity to meet scientists and students at the Labs and check out the research and teaching facilities. From 11 a.m. to 4 p.m., the Labs will be open for self-guided tours. Scientists and students will showcase their marine science research, answer questions and provide demonstrations. There will be posters, marine plants and animals, microscopes, plankton sampling and observations and activities for visitors of all ages. Kids are particularly encouraged to attend.



The public is invited to learn more about the equipment used by scientists to learn more about marine zoology, botany, fisheries and oceanography. There will be several



lectures given by FHL scientists. There will also be a demonstration of SCUBA equipment and a SCUBA dive from the FHL dock. Sturdy shoes are recommended because the tour route includes rough dock planks, gravel paths and trails.

We will serve free popcorn in the tradition of Friday Harbor Laboratories' Open Houses, and light refreshments will be available on the Dining Hall deck for a small fee.

Paul Illg Distinguished Lectureship:

Dr. Sheila Patek will give a public lecture at the San Juan Community Theater. Tuesday, June 22. 7:00 p.m. and a Scientific talk: at The FHL Commons. Thursday, June 24. 7:00 p.m.



Dr. Sheila Patek received her A.B. with honors in Biology from Harvard University followed by a Ph.D. in Biology from Duke University. She was then awarded a Miller Postdoctoral Fellowship at UC Berkeley. She is currently an Assistant Professor in the Department of Biology at the University of Massachusetts Amherst. .

FHL in the 4th of July Parade



Look for the FHL Director, Ken Sebens in an open car surrounded by FHL students, staff and researchers clad in marine organism costumes.

**Jazz at the Labs, June 4th
Supporting SJI's K-12 Programs through its Science
Outreach Program**

On Saturday night, June 4, 2011, Friday Harbor Laboratories will hold its 11th annual Jazz at the Labs, an evening of food, fun, an “almost silent” auction and great music at Friday Harbor Labs. As in the past, proceeds from Jazz at the Labs will benefit the Friday Harbor Laboratories K-12 Science Outreach Program in the San Juan Island Elementary, Middle and High Schools and the Spring Street International School.

This year's program will begin with dinner from 6:00 – 7:00 P.M. During dinner, music will be provided by Dennis Willows and the San Juan Jazz Quintet, with vocals by Jill Urbach. SJJQ has entertained audiences since 1990, playing standards, swing, bebop, originals and latin jazz, every week in local restaurants in Friday Harbor.



San Juan Jazz Quintet.
Photo: Trish Morse.

Starting at 7:00 p.m., Chris Amemiya and Jazz Coalescence, the outstanding jazz band from Seattle, will perform, featuring jazz standards with their own special edge. These guys can play! That's what people said about last year's Jazz at the Labs. And they were right about both the San Juan Jazz Quintet and Seattle's Jazz Coalescence, two groups featuring some of the Pacific Northwest's most prominent jazz musicians. They play terrific jazz. And they're back again!

Dick Stein will serve as emcee for the evening. Dick hosts the NPR Radio morning jazz show from KPLU as well as cohosts and produces the Food for Thought feature with the Seattle Times' Nancy Lason.



Chris Amemiya and
Jazz Quintessence
Photo: Trish Morse

Best of all, Jazz at the Labs raises money to support a great cause; the Friday Harbor Laboratories K-12 Science Outreach Program which partners students with scientists and offers hands-on encounters with science. In the current school year, the Science Outreach Program involves more than 900 students and will log more than 5,000 science/student contact hours.

Make reservations early because we sold out last year!

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Remembering Paul Illg



The Paul L. Illg Distinguished Lectureship Endowment was established in 1998. The purpose of the fund is to bring specialists to present lectures on invertebrate biology and to meet FHL students and researchers. Various colleagues, students and friends remember Paul in the articles that follow.



Illg Beach, 1969 Party
Photo by A. Kohn

ALAN KOHN – UNIVERSITY OF WASHINGTON

Paul Illg joined the then Department of Zoology faculty in 1952; he had been Associate Curator of Crustacea at the U.S. National Museum of Natural History for the previous 5 years. His Ph.D. advisor at Berkeley, S.F. Light, had died while Paul was a graduate student, and the USNM position provided the opportunity to complete his degree.

When I arrived at UW in 1961, Paul was teaching both quarters of an intensive senior-level invertebrate zoology course. We shared teaching this course from then until he retired in 1985. I had previously taught a 1-semester course at Florida State University, my first teaching position, for the prior three years. Paul had a lot to teach me about invertebrates and teaching, and he did. He was very welcoming, and for several years we each taught one of the two quarters, dividing the animal phyla between us. This worked well as long as we had 50 or fewer students. They got three lectures and two afternoons of lab work a week, and the two lab sections met simultaneously in neighboring rooms in Johnson Hall. As anyone who has taught invertebrate biology knows, student labs are too complex to be run effectively by one teaching assistant, so the instructor would split his time between the two labs on Mondays and Wednesdays. During summers at FHL, Paul taught mainly the graduate course, “Advanced Invertebrate Biology,” whose topic varied widely from year to year, usually according to the strengths and interests of European colleagues whom Paul invited to co-teach with

him. Many were important early contributors to what was beginning to develop as integrative and comparative biology, including Bob Clark and Maurice Yonge from England, Bertil Swedmark from Sweden, and Gunnar Thorson from Denmark.

And of course Paul and Ruth were always integral and generous leaders of Friday Harbor social activities, highlighted by the annual 4th of July blast at the Illg beach, perhaps still the finest from both recreational and biological perspectives on the island. The photo shows the 1969 party, the year Paul and Maurice Yonge (1) taught the advanced invertebrates course at FHL. Others I can still identify (I think) are: 2, Ruth Illg; 3, Mary Griffiths; 4, Gene Kozloff; 5, Arthur Whiteley; 6, Paul (Pole); 7, Bob Fernald; 8, Helen Whiteley.

Back in Seattle, student enrollment was burgeoning in the later '60's and '70's, and the invertebrate biology course grew to four sections. We now had Monday+Wednesday and Tuesday+Thursday labs, and that is when we switched to each teaching half of one quarter. We still taught labs 4 days a week for a total of one quarter, but somehow it felt like a bit less effort when spread out over two. This also meant much higher degree of coordination between us. So we attended each other's lectures, occasionally with humorous or tart interjections from the non-lecturer. One that comes most readily to mind occurred in one my lectures on gastropods, when I said that "sluggish" was the only molluscan word in common English usage. Without hesitation, Paul piped up from the back of the room, "That's a pearl of wisdom."



Photo by Trish Morse

MICHAEL HADFIELD – UNIVERSITY OF HAWAII

There is no way to "pay tribute to Paul Illg" in only a few words, so these will be only a 'contribution' to such a tribute. From the 1950s well into the 1980s, Paul was a pillar of training, both in the lecture hall and labs at FHL and around the campfire, for many of us fortunate to be UW graduate students then. Paul's knowledge of invertebrates was monumental, due in great part to his phenomenal memory and the incredible breadth of reading he did. In addition, he loved marine invertebrates, a reality that came out in the

very way he talked about them and in his obvious delight when he would rediscover some particularly rare beast in a dredge haul or under an intertidal rock. His infectious enthusiasm grabbed all of us who took Invertebrate Zoology from him in Seattle or Advanced Invertebrate Zoology from him and his invited colleagues at FHL. Although I was aware of Prof. Illg as a friendly and chatty patron of the Science Library at UW, where I worked during my undergraduate years, it wasn't until my first summer at FHL that I had the opportunity to know him well. I was hired to assist his former Ph.D. student and co-researcher Pat Dudley and thus got to share the big room in Lab 6 with Paul, Ruth Illg and Pat. What a great time we had, with invertebrates and almost every other aspect of life the lively topics of conversations and a lot of laughter. After that summer, Paul became my advisor for my masters degree and my life-long friend. Being part of the Illg family is one of the richest treasures of my life, one shared by so many fellow students who were welcomed into that great home.

MEGAN DETHIER – UNIVERSITY OF WASHINGTON

Memories of Paul Illg: I knew Paul first as a teacher, then as a not-exactly-colleague – because I was always in awe of him, even when I became a grownup! My first image of him is the daily walks he'd take at lunchtime from Kincaid, for his health – setting off with Dr. Gorbman, I think, for their walk-and-chat. I had him as a teacher in the summer Inverts course at FHL, with Gene Kozloff – wow, what a pair of professors. Paul, of course, covered the crustaceans – he could almost make you love those masses of legs and taxonomy! But my strongest memory is of my very first teaching experience after getting my PhD, when Dennis asked if I would teach the summer Inverts course WITH Paul, rather than under him as a student or a TA. This was, of course, quite intimidating – how could someone with my rudimentary knowledge hope to teach alongside someone like Paul? But what was so typical of Paul is that he handled this really well... never correcting me in front of the students, being encouraging, treating me like an equal even if I didn't feel like one. It was a tremendous experience, increasing my confidence and setting me on a long and lovely path of teaching inverts at least once each year at FHL. At some point I became 'Muggins' (to rhyme with Duggins), always greeted with a smile. I miss him.



Photo by Trish Morse

SALLY WOODIN – UNIVERSITY OF SOUTH CAROLINA

Paul was assigned as my advisor, I suspect because no one, including myself, really knew what it was that I was going to do. Paul and I met when I arrived and he listened very patiently and then quickly designed a rotation program among the physiologists that he thought would answer the advisor question. It did, I moved into ecology and joined Alan Kohn's lab. During this process Paul acted as a sounding board, listening, being amused I suspect now at my attempts to resolve my future, and always making time to find the intellectual thread and help me to explore it. Later, Paul and his wife Ruth made time for me and seemingly most of the FHL world at their home on the west side. Evenings there helped many of us forge relationships with older members of our chosen profession as well as providing an often needed break from the cafeteria. Mostly the evenings were about good food, drink and music and love of the seashore but the science discussed was frequently important to making one think again about an experiment.

Paul Illg and Alan Kohn both represent a wonderful aspect of my graduate career, smart men willing to make time to listen, criticize, and send you back to the drawing board to think again. They never tired of pushing you to the next step or engaging with your excitement about a result or asking whether the data you had was sufficient. I was very lucky to have them both.

MARY RICE – US NATIONAL MUSEUM – FORT PIERCE MARINE LABORATORY

Dr. Illg was, for me, a special mentor, teacher, and friend who could always be depended on for wise counsel, support, understanding, and compassion. As a student, I was challenged by his high standards of scholarship, inspired by his enthusiasms, delighted by his witticisms, and encouraged by his support.



Picture of Paul Illg
From the Collection of Shigeko Ooishi.

He was known nationally and internationally for his scholarship in invertebrate zoology, as well as for his research on parasitic copepods. It was through his teaching and his devoted students, now spread throughout the world, that he has had an enormous impact on the field of invertebrate zoology. From the 1950's to the 1980's he taught a whole generation of marine biologists who passed through the Friday Harbor Laboratories and the Department of Zoology

at the University. Those of us who were his students were especially privileged. Whether in the classroom or on his beloved beach on the "west side" of San Juan Island, he was always the teacher – discussing with colleagues and sharing his wealth of information with admiring students. The Illgs warmly took their students into their family. Whereas we lovingly referred to Professor Illg as "Papa Illg", we knew his supportive wife, Ruth, as "Mother Illg". The picnics and barbecues on the Illg Beach are fondly remembered by students and colleagues from around the world, not only for the great food and songs around the campfire, but also for the camaraderie and long-lasting friendships that were generated.

On a personal note - It was in the winter of 1961 that I arrived at the University of Washington to begin graduate studies in invertebrate zoology/embryology, and it was Dr. Illg who was the first to welcome me to the Department of Zoology. After giving up a secure job of 10 years and driving alone across the country from the East Coast, I was somewhat apprehensive in this new environment and about the new path ahead. But it was Dr. Illg's smile of warm welcome that dispelled my fears, and I never looked back. But I will forever remember that smile.

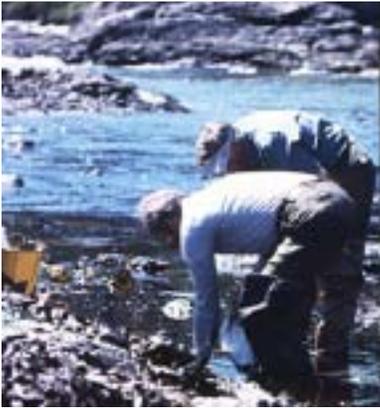
As is true for so many of his students, Paul Illg had an extraordinary influence on both my graduate studies and my later professional career. As a Professor of Invertebrate Zoology, he introduced me to sipunculan worms, which were to become the focus of my future research; as a mentor, he guided me toward the position at the Smithsonian's National Museum of Natural History which I held until my retirement; as a friend, he was my confidant, advisor and supporter during my career at the Smithsonian and during the development of a Smithsonian marine station in Florida.

It is indeed fitting that his contributions are recognized and remembered in this Friday Harbor Newsletter, as well as in the annual Paul Illg Lectureship that has been established in his memory.

ARTHUR WHITELEY – UNIVERSITY OF WASHINGTON
(Arthur asked to combine his thoughts about Paul Illg and Bob Fernald in his comments.)

The day in 1939 that I arrived in Berkeley to continue my graduate training, the first person I met getting off the train was Frank Pitelka. We had arrived from the east on the same train to start graduate work at Cal. We took a cab together to the Life Sciences Building (LSB), made our way upstairs to the 4th floor where, in the hallway outside of the Zoology office, were four young men in white lab coats, ties on, clean shaven, chatting among themselves - Bob Fernald and three others. Years later the ever-observant Bob told me what necktie I was wearing. Bob

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Bob Fernald and Paul Illg
Collecting
Photo by Trish Morse

had started at Cal the year before. Sometime later I met Paul who was a year ahead of Bob. In my "class" with Frank were Dick Paulson and Charles Benton. Already in the grad student cadre were Frank Richardson and Aubrey Gorbman. In the next year George Piternick, Leonie Katzenellenbogen who later married George, and Dorothy Rigg, who later married

Frank Pitelka, joined us. In the Department of Physiology was Mary Griffiths, and Dick Walker was in Botany, both in LSB. Gordon Orians came later.

When the war came, we all went separate ways— Bob into the Navy, George into the Pacific Theater, Paul to George Washington University, and I to Princeton for war related research. After war's end Bob, Paul, Frank Richardson, George, Leonie, Mary, Aubrey, Dick and I all ended up here at UW. Very importantly, we brought Ruth Illg and Helen. Helen had been an undergraduate at Cal, triple majoring in Zoology, Microbiology and Chemistry, and then ran the PHS lab in Flagstaff. And of course Dorothy and Frank have been frequent colleagues here at FHL.

My closest contact with Paul involved serving with him as TAs in a summer school course taught, as I recall, by Dick Eakin. The excellent system for TA-ships at Berkeley involved having a senior TA serve as the head, and the junior ones being guided by him/her. Paul was the boss and I the helper in this course, and we had a really great time doing our job. I became well aware of the immensity of the man. Later, during the war – I returned from Princeton to San Francisco, for only a few wartime days, where Helen and I were married at Helen's home, in a modified Orthodox marriage. Paul, who had not yet left for George Washington, was my best man and I was pleased that Dick Eakin attended. After the war Helen and I got to Seattle before Paul, who at that time was a curator of Invertebrates at the Smithsonian. We were delighted to get him to join us in the Dept. of Zoology and at FHL. It is history that here he became the backbone of an impressive, growing cadre of invertebrate biologists.

With war's end, Bob mustered out of the Navy and in 1945 or 1946 joined the Zoology Department here. The post-war Department was chaired by Arthur Svihla and included Mel Hatch, Frederick Ferguson, Trevor Kincaid (Emeritus), Dixy Lee Ray, and of course Bob. Art Martin had moved out of the department into the Department of Physiology

in the just-formed Med School, though later we got him to come back as our chairman. I had finished my doctorate at Princeton and was serving a 6-month post-doc at Galveston at the Univ. of Texas Med School preparing to go to Cal Tech for a year's post doc with Albert Tyler. Helen was earning a Master's in the Department of Dermatology and Microbiology. One day the phone rang, with Bob at the other end. The Zoo Department here was hiring a cell biologist. Was I interested? Presently I was hired as a cell biologist at UW. With Bob's help I negotiated to arrive here in 1947 after completing my post-doc year at Cal Tech.

Paul and Bob? Yes indeed they were cornerstones in my career - as in so many other instances.

JOANN OTTO – WESTERN WASHINGTON UNIVERSITY



Photo by Trish Morse

I met Paul Illg in the summer of 1971 when I was a student in the Invertebrate Zoology course he taught with Bill Gladfelter. His enthusiasm for all invertebrates was infectious, and he encouraged us to explore all the animals, especially the ones that are rarely observed. The entire class got caught up in the amazing diversity and oddities of the animals we studied. He seemed to know everything about invertebrates

and could tell us about any of them at length, which he clearly relished doing!

When I returned to FHL in subsequent years, I got to know Paul even better when I was a frequent guest and 'guest worker' at his and Ruth's beautiful place on the west side of San Juan Island. He loved living there in the summer and watching the activities of birds, river otters, and other animals. There were frequent parties! Paul enjoyed entertaining people with stories of his friends and acquaintances, the trips that he and Ruth took, the history of Friday Harbor Labs, and the biology of local animals. When a pod of orcas cruised through the channel, the talking stopped as we cheered their activities. Paul considered the orcas to be part of the entertainment he provided.

As I've mentioned, Paul loved invertebrates. He even had some unusual ones as pets. He transplanted several giant green anemones (*Anthoplura xanthogrammica*) from the outer coast to his intertidal (this must have happened in the 1960's). They had names! When he could no longer venture into his intertidal, he would sit up on the big rock and tell me where to look for them. He was very happy when I found that they were still alive and in place!!

TRISH MORSE – FRIDAY HARBOR LABORATORIES

Remembering the picnics on the Illg beach brings back so many rich memories. I was sitting on a log next to a well-

Support Friday Harbor Laboratories and Change a Student's Life



Each year FHL attracts more than 300 scientists and more than 200 of the world's most promising students.

Distinguished scientists work side by side with students on problems in marine biology, ecology, bio-medical models, and many other fields. Interdisciplinary research

has fostered important new lines of inquiry that are now pursued around the world for example, photoproteins from jellyfish are used in muscle and heart research and in an effort to eliminate malaria, a disease that kills a child every 30 seconds.

Students at Friday Harbor Laboratories evolve! Most notice a sudden transition to treatment as peers by faculty, graduate students and technical people. They perceive FHL as a bridge, from undergraduate to graduate status. Numerous FHL discoveries have contributed significantly to our scientific knowledge, but in the end, FHL's most important "products" are the people, the best and the brightest who develop their potential as students, teachers and researchers.

Friday Harbor Laboratories provides a life changing experience for many students each year. Along with these life-changing experiences, there will certainly be important scientific discoveries and new knowledge emerging from these students.

I hope that you will choose to make Friday Harbor Laboratories a life changing experience, by making your gift now. I assure you, gifts of any size to FHL make a difference.

Thank you,

A.O. Dennis Willows
Professor of Zoology and Director Emeritus FHL

P.S. Take a moment to think back and recall those people who have helped you along your way. And then remember that there were those who helped you who you didn't even know.

Make a gift online

Click on this link: www.washington.edu/giving/make-a-gift and enter keyword "Friday Harbor Labs". For more information about supporting FHL, contact Rachel Anderson in our Advancement Office at 206-616-0760 or 360-378-2165 (ext. 2) or rachelea@u.washington.edu

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known invertebrate physiologist, Ernst Florey; he asked, what are you working on? My answer was "how clams pee!" He was so excited about my findings in regard to ultrafiltration, I raced back to FHLabs, found my graduate student, Edgar Meyhofer, and told him we were up for a "show and tell" at 8 am tomorrow morning! That is one terrific way to do science! An excitement and passion, often shared on that beach among colleagues from all over the world! And Paul brought so many wonderful people from other countries! And we shared amazing food – recall the sushi from Shigeko, the potato salad with beautiful borage blue flowers from Claudia, fish perfectly cooked by Paul – green spaghetti by Ruth, blackberry crisp by Bob, and it went on. And the singing with daughter Liz on the guitar was spectacular as we froze our backs and scorched our fronts around the blazing beach fire.

Paul was an expert in so many areas. Zoology, botany, collecting seeds, collecting native American baskets, music and it went on. Being a part of the extended Illg family, sharing collecting trips to France, Canada, and the east and west coasts, being introduced to interstitial animals, being encouraged to share science in the classroom and in the field were so important to me and it is with continued pleasure that I recall his tremendous influence on so many of us. Ruth and Paul Illg created warm and rich memories that each year we revisit at the time of the Illg Lectureship and share the passion of science with the next generations.



Photo by Trish Morse

Editor's Note: Special thanks to Mike Hadfield, Joann Otto and Trish Morse for bringing these contributions together.

If you wish to honor the memory of Paul Illg with a contribution to **The Paul L. Illg Distinguished Lectureship Endowment**, click on this link: www.washington.edu/giving/make-a-gift. Enter the keywords "Illg Distinguished Lectureship".

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FHL Scholarships, Funds and Endowments

ADOPT-A-STUDENT PROGRAM FUND

Support FHL students with tuition, housing, food and travel costs.

ALAN J. KOHN ENDOWED FELLOWSHIP FUND

Supports graduate student of invertebrate biology through research or course work at Friday Harbor Laboratories.

ANNE HOF BLINKS FELLOWSHIP IN MARINE BIOLOGY

Supports students, including those of diverse under-represented backgrounds, at the beginning of their graduate studies in Marine Ecology at Friday Harbor Laboratories. Provides stipends and supports research at FHL.

BROOKS AND SUZANNE RAGEN FRIDAY HARBOR LABORATORIES ENDOWED SCHOLARSHIP

Provide financial assistance to graduate and undergraduate students who are at Friday Harbor Laboratories to conduct field or laboratory research or to be enrolled for a class or workshop in marine sciences.

CARRINGTON TRAVEL ENDOWMENT

Provide financial support to students at Friday Harbor Labs for expenses related to travel.

CHRISTOPHER G. REED ENDOWED FUND

Offers scholarships to undergraduates for study of marine sciences at Friday Harbor Laboratories.

DENNIS WILLOWS DIRECTOR'S ENDOWED PROFESSORSHIP

To enhance the University's ability to attract and retain a distinguished director at the Friday Harbor Laboratories.

ELLIE DORSEY MEMORIAL FUND

To generate funds for an annual gift to a scholarly student in memory of Ellie Dorsey.

ELLIS PRESERVE FUND

Supports activities in research and education connected to the Ellis Preserve on Shaw Island in honor of Marilyn and Frederick Ellis.

ELLIS B. RIDGWAY FELLOWSHIP FUND

Provide current-use support for graduate students at Friday Harbor Laboratories.

FRIDAY HARBOR LABS DISCRETIONARY FUND

Gifts are used at the discretion of the Director to catalyze life-changing experiences for students through direct financial aid, and to encourage diverse initiatives that benefit Friday Harbor Laboratories.

FRIDAY HARBOR LABORATORIES RESEARCH FELLOWSHIP ENDOWMENT

Provides graduate student support to students and post-docs involved in marine science studies and research at Friday Harbor Laboratories.

FRIDAY HARBOR LABORATORIES RESEARCH APPRENTICESHIP PROGRAM ENDOWMENT

This endowment supports the exceptional Research Apprenticeship Program, which pairs undergraduate researchers with faculty mentors for unparalleled, intensive learning about the nature of research.

FRIDAY HARBOR LABORATORIES RESEARCH APPRENTICESHIP PROGRAM FUND

This fund supports Friday Harbor Labs students in the Research Apprenticeship Program with tuition, housing, food and travel costs.

FRIDAY HARBOR LABS SCIENCE OUTREACH PROGRAM

To support staff, equipment, supplies and research vessel Centennial use cost, connected with educational outreach for local (K-12) school partners.

KAREL F. LIEM FISH BIOLOGY ENDOWMENT

Provide support for the research and teaching mission at Friday Harbor Laboratories.

LARRY MCEWARD MEMORIAL FUND

Provides annual support for a graduate student in memory of Larry McEdward.

MARINE FIELD EQUIPMENT ENDOWMENT

To support Marine Field Equipment at Friday Harbor Laboratories.

MARINE LIFE ENDOWMENT

Provide support for the Friday Harbor Laboratories fundamental courses in organismal and broader comparative marine biology: Marine Invertebrate Zoology, Marine Algae/Botany, Comparative Invertebrate Embryology and Marine Fish Biology.

MARINE SCIENCE FUND

To support the training of people entering the Marine Science field through programs at Friday Harbor Laboratories.

MELLON MENTORS ENDOWMENT

To enhance UW's ability to attract, retain, and provide opportunities for professional development for faculty in marine sciences at Friday Harbor Laboratories. These faculty will attract and mentor underrepresented minority students.

PATRICIA L. DUDLEY ENDOWMENT FOR FRIDAY HARBOR LABORATORIES

To the Friday Harbor Laboratories for research and scholarships for the study of systematics and structure of organisms and marine ecology.

PAUL L. ILLG DISTINGUISHED LECTURESHIP

Brings to Friday Harbor Laboratories a distinguished invertebrate zoologist to present lectures and to meet students and researchers.

RICHARD AND MEGUMI STRATHMANN ENDOWED FELLOWSHIP

To support graduate students' studies of the organisms, physical environment, or geology of the San Juan Archipelago and adjacent regions in the NE Pacific Ocean.

ROBERT L. FERNALD ENDOWED SCHOLARSHIP

Provides support for graduate students of comparative invertebrate embryology. A Friday Harbor Laboratories fund.

SEAGRASS CONSERVATION PROJECT

To support ongoing seagrass conservation studies in aquatic areas by Sandy Wyllie-Echeverria, Ph.D.

SEBENS STUDENT ENDOWMENT

Provide financial support to students at Friday Harbor Labs.

STEPHEN AND RUTH WAINWRIGHT ENDOWED FELLOWSHIP

Fellowships to Friday Harbor Laboratories for graduate students studying form and function of organisms.

Contact Information

Your support is appreciated!

With decreased state funding and increased tuition, now more than ever, we could use your help. If you are able to send a donation, or make a gift on-line, we would be very grateful. If you like more information about supporting FHL, please don't hesitate to contact us.

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