

Berkeley Optometry

magazine

NINETY YEARS OF VISION SCIENCE RESEARCH



dean's message

EXECUTIVE EDITOR

Lawrence Thal

MANAGING EDITOR

Kellie Rogers

EDITOR

LeeAnn Pickrell

ART DIRECTOR AND PROJECT MANAGER

Tom Sharp

WRITERS/CONTRIBUTORS

John Fiorillo, Karsten Gronert, Calista Ming, Monica Rodriguez, Michelle Wong

DESIGN

ContentWorks, Inc.

Published by Berkeley Optometry,
University of California, Berkeley,
Development and Alumni Relations
Phone: 510-642-2622, Fax: 510-643-6583

Send comments, letters, class notes
submissions, and change of address
or e-mail to:
optoalumni@berkeley.edu

Submit Berkeley Optometry gifts online
at: [givetocal.berkeley.edu/
makeagift/optometry](http://givetocal.berkeley.edu/makeagift/optometry)

or mail to:
University of California, Berkeley
Berkeley Optometry Fund
P.O. Box 774
Berkeley, CA 94701-0774
510-642-1877

Fall 2014

Volume 7, Number 1

© 2014 Regents of the University of
California

Berkeley Optometry is a trademark of
University of California, Berkeley,
Berkeley Optometry.

Front cover design by ContentWorks, Inc.
Back cover photo courtesy of Grad Images.

I arrived at the School of Optometry, University of California, Berkeley, nearly six months ago; and what a six months it has been. I am delighted to be here and delighted to have this opportunity to write my first message for the *Berkeley Optometry Magazine*. Although it would be premature to make any definitive announcements with regard to the direction I see us headed over the next ten years, it seems like a good time to share some of my observations so far.

I have been overwhelmed by the support that Berkeley Optometry enjoys from its alumni. Over the last month alone I have experienced a record-breaking alumni weekend with over 500 attendees at the Saturday evening event, hosted a raucous reception at the Academy meeting in Denver, and enjoyed a strident Optometry performance for the inaugural “Big Give”. I have been humbled by our students; their intelligence, humility, sense of humor and intuitive sense of responsibility. The profession has a great future in their hands. I have also been astonished by the talents and accomplishments of our faculty and staff; they run the busiest, biggest and best clinics, offer exceptional student services, attract extraordinary levels of research funding, and passionately teach to the highest possible standards.

I have discovered the joys of a summer concert at the Greek Theater, a peaceful walk through Memorial Glade and past the Wickson redwoods, the spectacle and emotion of college football, enjoyed the chimes of the Campanile, and have felt fortunate to have helped celebrate the 50th anniversary of the Free Speech Movement. There is certainly no shortage of culture and stimulus on this extraordinary campus.

It is well known that Berkeley Optometry historically has been, and remains today, the top optometry school in the world. No matter what metric you choose – qualifications of students, national board results, scholarships and awards, quality of faculty, quality of research, federal funding of vision research, or clinical experience of our students—Berkeley is at the top. No other school can boast the awards our faculty has achieved (e.g., 16 Prentice Medals). These are all reasons why our faculty and students chose to come here. These are some of the reasons that I am so proud to be here.

It took very little time to realize some of the challenges facing the School, problems we must overcome to maintain our position of leadership. As we embark on a renovation of the ground floor of Old Minor Hall, it should be noted that this will be the first substantial upgrade to this part of the School since we occupied the building in 1949. Our clinic is majestic in its scope, efficiency and accomplishments, but does so in what is now a wholly inadequate facility compared to its opening day. When you walk through our labs, offices, teaching rooms and clinics in New Minor Addition, you note that little has been upgraded since the building was completed in 1978. The elevators are unreliable, the ducting no longer circulates air, the student facilities are cramped, the décor is tired, and the University is without capital and unable to help. This is a significant challenge, but essential to address if we are to attract the next generation of top faculty, staff and students.

I have been lucky to know (or know of) many of the legends from our past (Meredith Morgan, Mer-ton Flom, Morton Sarver, Irving Fatt, Robert Mandell, Monroe Hirsch, Ian Bailey, Anthony Adams, Gerald Westheimer, Elwin Marg, Jay Enoch, Lawrence Stark, Russell and Karen DeValois, Clifton Schor, Ralph Freeman, Sir Colin Blakemore, Ken Polse, Arthur Jampolsky, the list goes on). Who are the future legends? How will we attract and recruit them to Berkeley? This is our challenge, but also the greatest of opportunities!

How we address these issues and maintain our standards of excellence, will be a substantial part of our strategic plan moving forward. I look forward to working with you to solve these problems, make the most of our opportunities, and to having Berkeley Optometry emerge as an even greater institution. This will be a truly collaborative effort. Please stay tuned as we develop our plans and strategies. I look forward to getting to know you, discovering your communities, hearing your stories and celebrating our future achievements with you.



JOHN G. FLANAGAN, OD, PhD, FAAO
Dean, School of Optometry
Professor of Optometry and
Vision Science

Berkeley Optometry

magazine

on-campus research

- 3 VISION SCIENCE AT BERKELEY**
By John Fiorillo and Karsten Gronert

humanitarian efforts

- 14 VOSH NICARAGUA**
By Monica Rodriguez and Calista Ming
- 16 LOCAL OUTREACH**
By Michelle Wong

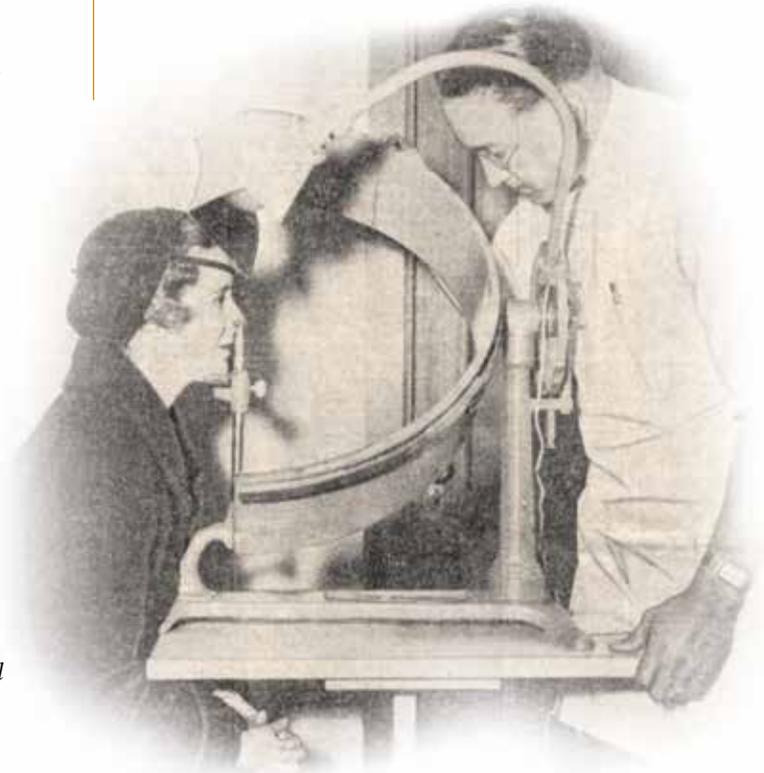
school support

- 18 CAMPAIGN SUMMARY**
- 19 CAMPAIGN FOR BERKELEY BY THE NUMBERS**
- 20 A FISCAL SNAPSHOT**
- 21 OPTOMETRY ASSOCIATES OF THE BENJAMIN IDE WHEELER SOCIETY**
- 22 THE MEREDITH W. MORGAN SOCIETY**
- 23 DONOR PROFILE:
DR. JOY OHARA AND KOK LOONG LYE**

stay connected

- 24 NEWS & NOTES**
- 26 AWARDS**
- 28 STUDENT SPOTLIGHT**
- 30 FACULTY FOCUS**
- 32 CLASS NOTES**
- 36 ALUMNI FOCUS**
- 38 HALL OF FAME**
- 42 STUDENT AFFAIRS**
- 43 CONTINUING EDUCATION**
- 45 CLINIC ADMINISTRATOR TEAM**

3 Albert Reinke, Oakland optometrist and university lecturer, in 1932 with his experimental perimeter as he tests peripheral vision.

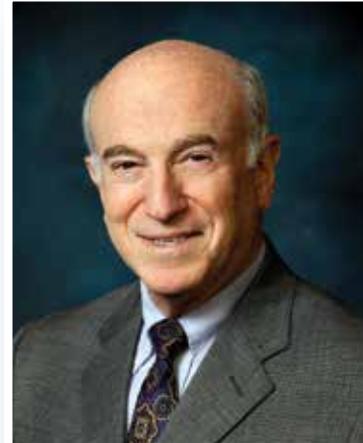


IT IS HARD TO BELIEVE that it has been nearly nine years since I retired from my private practice and was asked to join the Berkeley Optometry team, to lead the recently completed campaign for Berkeley Optometry. I had thought then that I would serve until Dean Levi retired after he completed 10 years as dean. As it happened, Dean Levi served 13 years; and my time as Assistant Dean also was extended. It is now time to begin my delayed retirement, but not without taking this opportunity to thank all of you for making this experience one of the most enjoyable and gratifying of my life. The time has flown, and my time in this position has been extraordinarily rewarding.

It has been a privilege to serve Berkeley Optometry in a number of positions since 1978: 1) as a clinical professor member of the adjunct faculty; 2) as a lecturer teaching in the practice management curriculum; and 3) as Assistant Dean for Development and External Relations. I am particularly grateful to the University for the once-in-a-lifetime opportunity to help lead, as part of the Campaign Management Team, the recently completed and enormously successful "Campaign for Berkeley." All the goals accomplished here over the duration of this campaign and the groundwork that is in place for future success are due to the outstanding efforts and dedication of our excellent staff and faculty, as well as the philanthropic support of our alumni, students and friends of the school. I am honored to have served with each of these groups.

I am leaving Berkeley Optometry with a much broader and more profound appreciation for all that Cal and Berkeley Optometry are and for all that they promise to be. I have developed a genuine appreciation and respect for the thousands of alumni, faculty, staff and students who contribute daily to our institution and who do so in many diverse ways. Change is good for any organization; Berkeley Optometry is no exception. While I certainly will miss seeing so many of you regularly and working daily with the outstanding staff we have assembled, as I told my patients when I retired from private practice, I look forward (finally) to spending more time traveling with family and friends. I am especially appreciative for the opportunity I have had, in some small way, to "pay back" for the opportunities afforded me as a result of that very fortunate day in 1971 when I received my acceptance letter to be part of the Class of 1975 of Berkeley Optometry!

Again, thank you all for helping to deepen my love and appreciation for this amazing institution. Our alumni and friends will play an ever-increasing role in the ongoing success of our school, and I am extremely proud to have played a small part in that effort. Esther and I will take away countless fond memories, and we are deeply indebted to those reading this message for enriching our lives.



LAWRENCE THAL, OD, MBA, FFAO

**Assistant Dean,
Development & Alumni Relations
School of Optometry
larrythal@berkeley.edu**

Vision Science at Berkeley

By John Fiorillo and Karsten Gronert

FOR NINETY YEARS after the founding of Berkeley Optometry in 1923, faculty, scientists and alumni have been conducting groundbreaking clinical and basic vision science research. Their studies have ranged from the early days of optical instrument design and pioneering contact lens research to the complex multidisciplinary investigations that characterize the modern era. Today's vision scientists work in such diverse fields of basic science as visual neuroscience and perception, spatial navigation, psychophysics,

computational vision, molecular and cell biology, neurophysiology, bioengineering, robotics, biochemistry, contact lenses, refractive development, ocular surface biochemistry, ocular infection, ocular diseases and immunology. An important goal for many research groups in the Vision Science Program is the application of basic science discoveries to the development of studies and clinical trials in humans. These “translational research” efforts are an essential pipeline for developing new clinical diagnoses and treatments.

Early Years of Clinical Research

Instrument design was a key component of early research in optometry. In 1928 Frederick Mason (clinical faculty) made one of the first haploscopes in the U.S. for the study of binocular vision, and in the 1930s he refined its functionality by introducing a “synchrohaploscope” to treat strabismus. Albert Reinke ('26), lecturer in optometry, designed a perimeter in 1932 to test visual fields and to obtain data for assessing general health through ocular manifestations of systemic diseases.

Early contact lens design was advanced by Dr. Edward Goodlaw's ('34) research confirming that contact lenses were barriers to anterior oxygen supply (1946). He and Dr. Solon Braff ('37) also helped design the first corneal contact lens (patented by Kevin Tuohy in 1948).

In 1959, Professor Elwin Marg (OD '40, PhD '50), the first to graduate from Berkeley Optometry's Physiological Optics Graduate Program (now called the Vision Science Program),

designed the Mackay-Marg Tonometer (with R. Stuart Mackay, electrical engineer, UC Berkeley). The instrument enabled optometrists to measure intraocular pressure without topical anesthetics (legally off-limits to optometrists at the time), initiating a significant advance for the optometry profession by broadening its scope of practice.

Research During the Middle Years

VISUAL ANATOMY

Professor Gordon Walls, PhD, was the first vision scientist without an OD degree appointed to the tenured Optometry faculty (1947–62). He was a great synthesizer of scientific knowledge—his *The Vertebrate Eye & Its Adaptive Radiation* (1942) remains a classic text. Dr. Walls helped excite interest in vision science and advance the Physiological Optics Graduate Program by publishing papers on subjects such as the fundamentals of vision, color vision, ocular dominance and physiological optics. He was also a legendary lecturer and ambassador for vision

science through his courses in Morphology/Physiology of the Eye, Physiological Optics, Evolution of the Visual System and Color Vision.

EARLY NEUROSCIENCE

In the 1960s, neuroscience research developed into an increasingly significant area of study at Berkeley. Two heralded professors had brief but influential appointments at Berkeley Optometry. Gerald Westheimer (Optometry, 1960–67), the only optometrist ever elected as a Fellow of the Royal Society, London (1985), conducted research in, among other things, linear systems analysis of saccadic and smooth-pursuit eye movements. Horace Barlow (Optometry, 1962–67), a great grandson of Charles Darwin, made important contributions to sensory physiology, including studies of visual inhibition and direction selectivity as the basis of motion perception. Their leadership in vision science research, which continued after their relocation to Anatomy-Physiology in 1967, helped set the standards for future generations.

Professor Russell De Valois (Psychology and Vision Science) pioneered recording from individual neurons in the

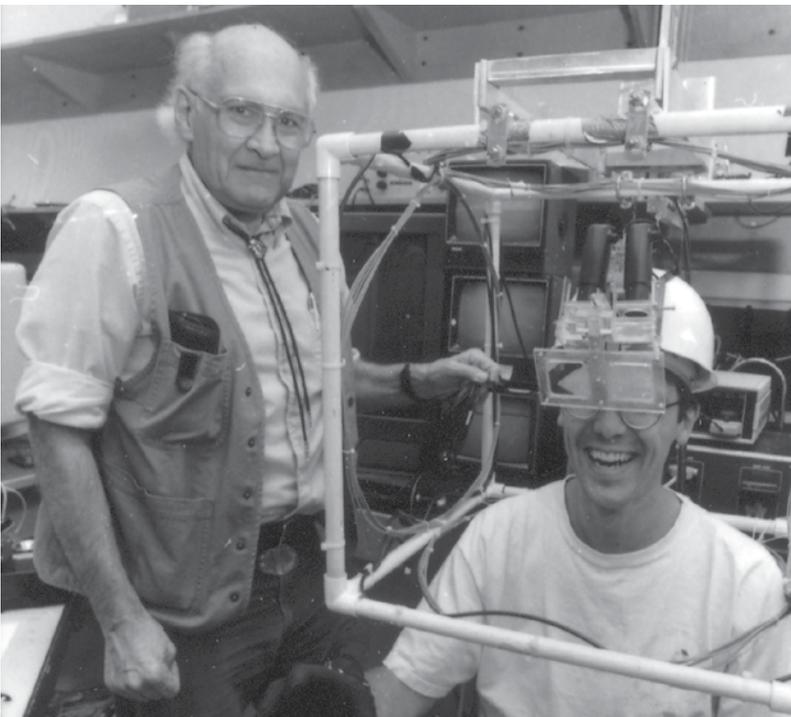
primate subcortical brain, developing methods now widely used or adapted in laboratories worldwide. He showed that transformation of the color signal was derived from three types of broadly selective cone photoreceptors into an opponent color organization, so that certain neurons might be activated by the light of one color but inhibited by a different color. His research validated a theory supporting the perception of four unique hues by a fundamentally trichromatic system, which had been debated for a century. Often in collaboration with Professor Karen De Valois (Psychology and Vision Science), he also focused on early stages of spatial vision, in particular how perception varies with the resolution of perceived objects. They discovered that cortical cells were tuned to specific limited bands of spatial frequency and orientation. Their influential book *Spatial Vision* (1988) summarized more than two decades of research.

In the 1970s–90s Professor Lawrence Stark conducted seminal research in applying engineering principles to biological systems, especially control theory and the way a pupil reacts to light with respect to linear control. Dr. Stark was among the first to do this, and his research had applications in understanding how pilots control airplanes and why people suffer from motion sickness. His research on control of eye movements (“scan-path” theory) provided clues about how images are generated by the brain. He applied his bioengineering skills to investigations of robotic vision and virtual reality, using computers for experimental control and simulation, and for the development of a pattern-recognition program modeled on human brain function.

ANIMAL MODELS OF DISEASE

Researchers in the laboratory of Professor Richard Van Sluyters demonstrated in the 1980s that the overall organization of the convoluted cat visual cortex could be examined in a two-dimensional array, much the same way as work in non-human primates was progressing. They validated continued use of the cat as a model for human vision and provided support for a general model of the way in which the world is mapped onto the primary visual cortex by the two eyes.

While on the faculty of Berkeley Optometry (1976–2002), Professor Sheldon Miller focused on understanding the regulation and function of epithelial layers throughout the body, and developing



Lawrence Stark (left) in his laboratory, 1994

animal models of retinal disease to help establish therapeutic interventions. At the National Eye Institute (NIH) since 2002, Dr. Miller has continued and expanded his research from Berkeley, investigating plasma membrane proteins and intracellular signaling pathways that mediate human retinal pigment epithelial (RPE) cell physiology and its interactions with retinal photoreceptors. His work has led to further pre-clinical animal models of disease, including retinal re-attachment and choroidal neovascularization in age-related macular degeneration. His lab identified micro RNAs enriched in human RPE, compared to adjacent retina and choroid, showing how they help maintain tight junction integrity, RPE immune responses and epithelial phenotype. Miller's lab also identified 154 genes that distinguish native human RPE from practically all other cells.

CONTACT LENSES

The heyday of contact lens research took place in the 1960s–80s, when Berkeley Optometry was virtually the center of the contact lens universe. Professor Irving Fatt (Engineering and Optometry), a research chemist and petroleum engineer, began collaborating with Optometry faculty in 1963 when he applied his expertise in fluid flow through porous media to seminal investigations regarding oxygen supply to the cornea (oxygen transmissibility). Professor Fatt and Professor Richard Hill were the first to quantify oxygen uptake in living human cornea (1963), the genesis for decades of related cornea and contact lens research, including the first corneal deswelling studies in humans (Fatt and Professor Emeritus Robert Mandell) and the research of Professor Emeritus Kenneth Polse on quantitative markers for corneal function. Professor Fatt also invented an oxygen sensor (1976) for measuring oxygen permeability/transmissibility of contact lenses. Professor Polse, in collaboration with Professor Joseph Bonanno, later developed a technique to measure *in vivo* corneal pH, which led to pioneering work for a safe and accurate measurement (fluorometry), confirming that corneal pH (corneal acidosis) increased during contact lens wear and thereby altered corneal endothelial morphology. Professor Polse's experiments were among the earliest clinical patient-based trials in translational vision research.

LOW VISION AND VISION WITH AGING

In the 1960s–70s, clinical faculty Edwin Mehr ('41) and Allan Freid ('52) advanced understanding and training in low vision at Berkeley and published their influential book *Low Vision Care* (1975). Professor Emeritus Ian Bailey joined the faculty in 1976, a year after creating the famed Bailey-Lovie LogMAR chart for

testing visual acuity (VA), the gold standard for scoring VA in clinical research. A seminal paper in 1982 showed that visual acuity was a poor predictor of mobility performance and that contrast sensitivity and visual fields were far more important. More recently, in 2012, Professor Bailey and colleagues introduced the Berkeley Rudimentary Vision Test for clinical assessment of ultra low vision.

In the 1980s Professor Gunilla Haegerström-Portnoy conducted research on visual function with age-related maculopathy, and by 1992 she focused much of her research on vision and aging, an area in need of expanded investigation at a time when virtually the only well-researched information about people over 70 years of age was visual acuity. She explored aging in relation to visual and physical functional ability (including reading, mobility and vehicular driving ability), development of refractive errors, low-contrast vision function and face recognition in the elderly.

New Era of Vision Science Research

Contemporary multidisciplinary vision science research has focused on two broad categories: the exploration of neural functioning and development of the visual system; and the discovery of mechanisms, diagnostics and new treatments for ocular diseases, as well as defining how ocular surface health is maintained, employing experimental models and clinical research. Integration of these two areas and interactions with the UCB School of Optometry Clinical Research Center provides a unique framework for translational research. Researchers in the Vision Science Program are composed of faculty in Optometry and affiliated faculty in other schools and departments on the UC Berkeley campus. These include Bioengineering, Molecular & Cell Biology, Psychology, Public Health and Computer Science, as well as vision science researchers affiliated with the Helen Wills Neuroscience Institute, which integrates multi-disciplinary neuroscience faculty across the University, including some Optometry faculty.

VISUAL PERCEPTION AND COMPUTER DESIGN AND MODELING

Professor Theodore Cohn conducted innovative research in signal detection theory and its real-world applications during the 1990s and 2000s. He was intrigued by the brain's ability to detect weak signals from noisy environments and was among the first to apply the principle of signal detection to

physiological systems. Professor Cohn succeeded in quantifying observations, showing that information transmission and its reliability depended not only on the strength of the electrical response but also on the reproducibility of the response.

Visual input often arrives in a noisy and discontinuous stream, owing to head and eye movements, occlusion, lighting changes and other factors. Yet the physical world is generally stable; objects and physical characteristics rarely change spontaneously. How does the human visual system capitalize on continuity in the physical environment over time? The laboratory of Professor David Whitney (Psychology) has found that visual perception in humans is serially dependent, using both prior and present input to inform perception at the present moment. In effect, there is a “visual smoothing” whereby our perception of things is influenced by what we saw up to 15 seconds before, resulting in a time-averaged composite. Using an orientation judgment task, researchers found that even when visual input changed randomly over time, perceived orientation was strongly and systematically biased toward recently seen stimuli. Furthermore, the strength of this bias was modulated by attention and tuned to the spatial and temporal proximity of successive stimuli. These results reveal a serial dependence in perception characterized by a spatiotemporally tuned, orientation-selective operator—which the Whitney laboratory calls a “continuity field”—that may promote visual stability over time.

How do humans see in three dimensions and what sort of technological adaptations can we apply to enhance this

ability? Even though retinal images are two dimensional, we perceive the three-dimensional structure of our environment. Vision accomplishes this by using a set of depth cues and prior expectations about the environment. An important cue is stereopsis, the perception of depth from differences in images from the two eyes. Researchers in the laboratory of Professor Martin Banks have investigated perceptual distortions and visual discomfort that occur when people view stereoscopic displays, discovering that those problems can be minimized by using different display and graphics technologies.

The laboratory of Professor Maneesh Agrawala (Electrical Engineering and Computer Science) has investigated how cognitive design principles can be used to improve the effectiveness of visual displays, with the goal of discovering design models for both interactive and automated design tools for human-computer interactions.

Computer-aided geometric design and modeling has been a main interest of Professor Brian Barsky (Computer Science). Display devices such as mobile phones, tablets, laptops and computer monitors can be difficult to see for those with vision problems. Professor Barsky and his students and colleagues are developing displays that correct vision and enable viewing of displays. The system relies on either the patient’s spectacle prescription, in simple cases, or measurements of the patient’s optical aberrations, in more complex cases. The content on the display device is digitally modified so that when it is viewed, it will appear in sharp focus to the particular user. In addition

to correcting common optical problems such as near-sightedness, far-sightedness and astigmatism, Professor Barsky’s current research is also investigating more challenging vision deficiencies, or “higher order aberrations,” which are impossible to correct with eyeglasses. This research could potentially give patients with such challenging vision disabilities the ability to see these displays for the first time.

Neurons in the visual cortex are selective to local shape features such as orientation and spatial frequency. Until recently it was not understood how or if these feature-selective properties could be quantitatively explained by a theory of information processing. The aforementioned Horace Barlow hypothesized that neurons try to encode sensory information by exploiting redundancies or statistical dependencies arising from the



Photographs taken in the Banks Laboratory show how changes in lens focal length affect interpretation of the same 3D scene.

natural environment. One form of this hypothesis proposes that neurons attempt to form a “sparse code” in which only a small fraction of neurons are active at any given moment. Researchers in the laboratory of Professor Bruno Olshausen are simulating model neural circuits that adapt to natural image statistics to form a sparse representation of visual input. The results make predictions about the types of receptive fields that may be found in the highly over-complete populations of neurons in layer 4 of the primary visual cortex. Such representations are now widely employed in branches of engineering for image processing and object-recognition applications.

FUNCTIONAL MAGNETIC RESONANCE IMAGING (fMRI)

Understanding how the brain works and decoding its structure and the function of the visual system is a primary interest of Professor Jack Gallant (Psychology). Predictive models of brain activity are critical for the long-term advancement of neuroscience and medicine. The research program in the Gallant laboratory integrates three distinct approaches: neuroscience experiments involving both classical electrophysiology and noninvasive functional magnetic resonance imaging (fMRI); statistical analysis using methods adapted from nonlinear system identification and nonlinear regression; and theoretical modeling. Computational encoding models that can predict brain activity have many potential practical applications in medicine and beyond. These models might also provide a new tool for neurological evaluation and diagnosis, and they can be inverted to decode brain activity, providing a direct and principled way to do “brain reading” and to build brain-machine interfaces and neural prosthetics.

The laboratory of Professor Ralph Freeman has explored behavioral and neurophysiological studies of basic visual function, neural organization of binocular vision and neurometabolic coupling in relation to fMRI. In its extended research on the physiological organization of binocular vision, Freeman’s lab first developed an original stimulation approach of binocular presentation, using phase-varying gratings to yield a detailed and quantitative assessment of binocular interaction. They identified specific linear and nonlinear elements of

binocular organization for the two major cell classes in the visual cortex. Using binocular interaction patterns, they investigated mechanisms of visual deprivation, demonstrating that binocular tests are required to show the full range of visual function in a deprived system, whereas effects are not evident during monocular tests. Freeman’s lab also developed an important and wide-ranging theory of stereoscopic depth discrimination based on a version of the energy model, used previously to describe other visual functions. Experimental tests confirmed that predictions from the model were nearly entirely consistent with the collected data. In other research an innovative technique was used to obtain detailed temporal and spatial analysis of receptive field organization in the central visual pathway. In more recent work, Professor Freeman has studied the basis of noninvasive neural imaging by use of a combined sensor that provides simultaneous co-localized measurements of oxygen and neural activity in a specific region of the cerebral cortex. Studies in this area have led to an increased understanding of signals generated in fMRI.

Noninvasive fMRI technology localizes many aspects of perception to small regions of the brain, but a major limitation is its reliance on blood flow, with a temporal resolution on the order of seconds. Researchers in the laboratory of Professor Stanley Klein combined fMRI with electroencephalography (EEG), bringing temporal resolution down to milliseconds,



An observer in the Klein laboratory views a satellite image scene while looking for specific targets (photo 2008)

along with a new approach to EEG localization that for some stimuli matches the spatial resolution of fMRI. Klein's laboratory tracked the mechanisms responsible for eye movements plus the flow of brain activity in response to detecting a target. The pattern of EEG responses, together with eye movement plus pupil responses, detected substantially more targets than using only the observer's button press, with only a minor increase in false-alarm rate that could be eliminated with a double pass method while maintaining a higher hit rate and speeding up the detection process.

Directing spatial attention to a specific location facilitates the perception of objects and patterns at that location, but the brain mechanisms of this phenomenon are unknown. In the early 2000s, researchers in the laboratory of Professor Michael Silver began using fMRI to measure differences in brain activity when a visual stimulus is attended versus when attention is directed away from the stimulus. They found that attending to the stimulus not only increases the strength of the brain's response to that stimulus, but also reduces the strength of slow internally generated fluctuations in brain activity. Surprisingly, they discovered that the enhancement of perception by attention is not correlated with effects of attention on the brain's response to the stimulus. Rather, it is the suppression of internally generated fluctuations in brain activity that is associated with improved perception by attention. A better understanding of the brain mechanisms for attentional facilitation of perception

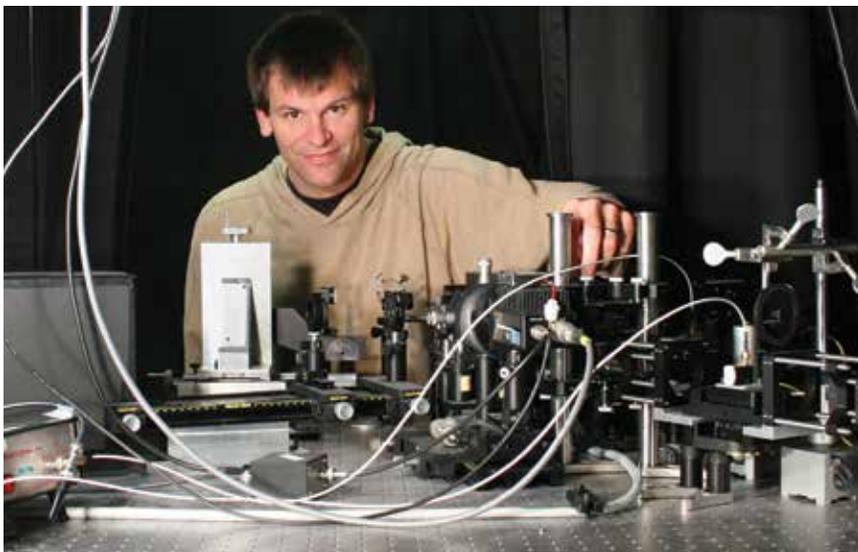
will be useful for improving visual-attention training paradigms and for developing clinical treatments for attention disorders.

THE RETINA

Professor Marla Feller (Neurobiology/Molecular & Cellular Biology) has investigated the mechanisms that guide the assembly of visual circuits during development of the visual system. Her laboratory has studied how immature retinal circuits generate retinal waves—highly patterned spontaneous activity in the immature retina—and what role this activity plays in the development of the visual system. They have been using a variety of physiologic imaging and modeling approaches to elucidate how the synaptic mechanisms for generating spontaneously correlated signals evolve as the retina reaches its mature wiring state. They have also investigated maturation of circuits in the retina that detect motion in the visual field. These direction-selective circuits are intact at the onset of vision, indicating that the precise retinal circuitry mediating direction selectivity is “wired-up” prior to normal visual experience.

Professor Austin Roorda has developed advanced ophthalmoscopes for clinical and basic science. The primary tool in his research laboratory is the adaptive optics scanning laser ophthalmoscope (AOSLO), a system that can provide views of the retina in a living human eye on a microscopic scale, and which Roorda has had a hand in inventing. On the clinical side, he uses the AOSLO to better understand eye disease. He is involved in clinical trials to evaluate new treatments for retinal degeneration. On the basic science side, Roorda uses the AOSLO and other tools to visualize, track and target light stimulation to individual cone photoreceptors in an effort to answer long-standing questions about human spatial and color vision.

Researchers in the laboratory of Professor Emeritus Anthony Adams have discovered that tiny delays in retinal nerve transmission may indicate future diabetic retinopathy. Using multifocal electroretinogram (mfERG), they can predict future location-specific retinopathy along with healthy patches of retina. In 2011 they showed for the first time that these neuroretinal delay measures are predictive of the onset of retinopathy in eyes that had no prior retinopathy. These early neural changes in the retina caused by diabetes have significant implications for patient care and management of eye complications. Ophthalmologists and optometrists, able

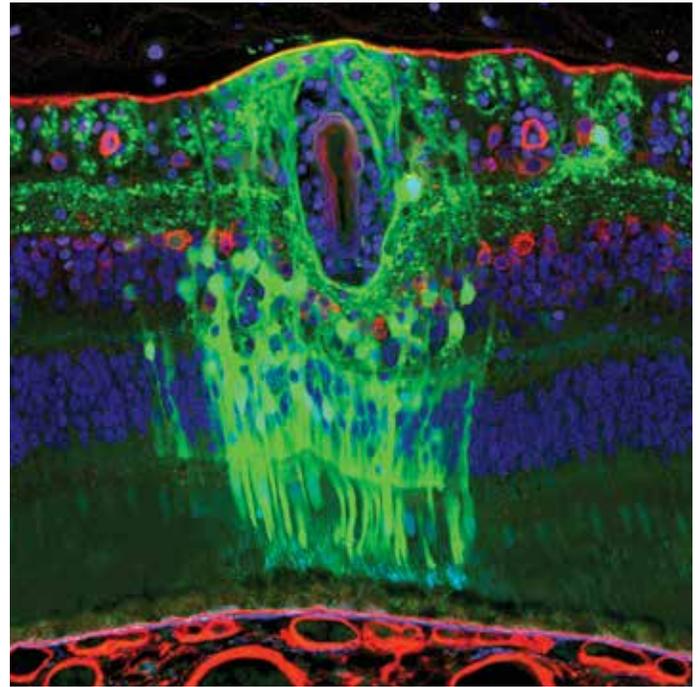


Professor Roorda aligning the optics in an adaptive optics scanning laser ophthalmoscope, a system he and his lab designed and built for recording microscopic images of the living human retina (photo 2008)

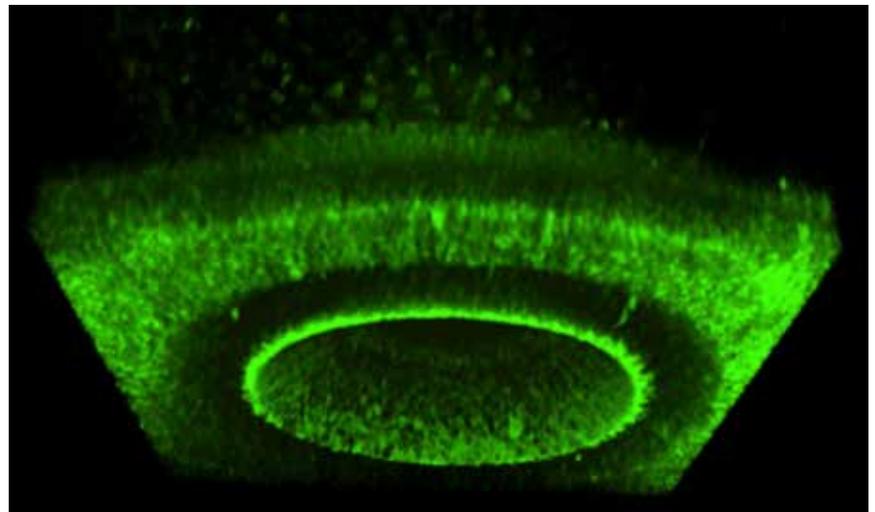
to gauge both the severity of neural dysfunction and the likelihood of future site-specific local retinopathy, might use this information to stage appropriate and timely interventions.

A holy grail in vision science is the restoration of visual function to the blind. The laboratory of Professor Richard Kramer (Neurobiology/Molecular & Cellular Biology) is pursuing a simple drug treatment for bestowing light-sensitivity onto blind retinas, without requiring genetic modification. Retinitis pigmentosa (RP) and age-related macular degeneration (AMD) are degenerative blinding diseases caused by the death of rods and cones, leaving the remainder of the retina intact but unable to respond to light. The Kramer lab has discovered a class of photo-switch molecules that confer light-sensitivity on ion channels in “downstream” retinal neurons, allowing remote control of action potential firing with light. Studies on blind mice afflicted with RP show that photo-switches can restore both electrophysiological and behavioral responses to ordinary daylight. Pupillary constriction and visual learning can be brought back, indicating reconstitution of light-triggered signaling through brain circuits. Ongoing studies are aimed at identifying the optimal photo-switch that provides safe, effective and long-lasting vision restoration.

Gene therapies may one day offer great breakthrough treatments for certain human eye diseases involving the retina. In 2012 researchers in the laboratory of Professor John Flannery helped engineer a virus to carry healthy genes through the vitreous humor to reach photoreceptor cells in the retina, thus avoiding a riskier procedure that delivers therapeutic viruses by way of a needle piercing the retina. The researchers sifted through hundreds of millions of newly engineered viruses to identify one they called a 7M8, which had the right properties to penetrate the cells of the retina. When tested in a healthy primate, 7M8 delivered genes to the retina and the fovea—a hard-to-penetrate region of the retina responsible for fine-scale vision. The ultimate aim is to cure two types of hereditary blindness: X-linked retinoschisis (which only affects boys) and Leber’s congenital amaurosis. The accompanying picture illustrates this process—the green is glowing proof that the virus successfully delivered its genetic cargo into the photoreceptor cells of the retina. Although early, this step is significant in the development of new therapies that will restore sight to people with both inherited and age-related forms of blindness.



Cross section from retina of non-human primate shows GFP expression in all layers, including photoreceptors in outer retina, after intravitreal injection of 7M8. Cell nuclei are labeled in blue and laminin is labeled in red (Flannery Lab).



Synaptic terminals of rods and cones in the fovea of lizard retina. Fluorescent chemicals are used to measure the release of neurotransmitters from the terminals as cells respond to light. The Kramer lab uses chemical agents as probes, both to measure and manipulate activity in the retina.

AUTOIMMUNE DISEASE, INFECTION, INFLAMMATION AND DRY EYE

Research into the effects of infection and inflammation at the systemic or cellular level has also been an active area of vision science investigation. Complex regulation of healthy inflammation (a self-resolving response to disease and bodily injury) involves control of inflammation by classes of lipid signals (specialized pro-resolving mediators, SPM) that remove spent leukocytes, balance pro-inflammatory circuits and control immune function. Dysregulated inflammatory circuits cause tissue damage and chronic inflammation and initiate autoimmune responses that are key features of many ocular diseases. To develop new treatments for disease-causing inflammation, the laboratory of Professor Karsten Gronert employs mass-spectrometry-based lipid mediator bio-informatics to define molecular mechanisms and regulation of SPM and identify novel therapeutic targets that are essential for executing healthy immune responses. The long-term goal is to develop “resolution pharmacology” to counterbalance essential pro-inflammatory circuits, resolve tissue leukocytes, drive healing and nerve regeneration, and control immune system activation.

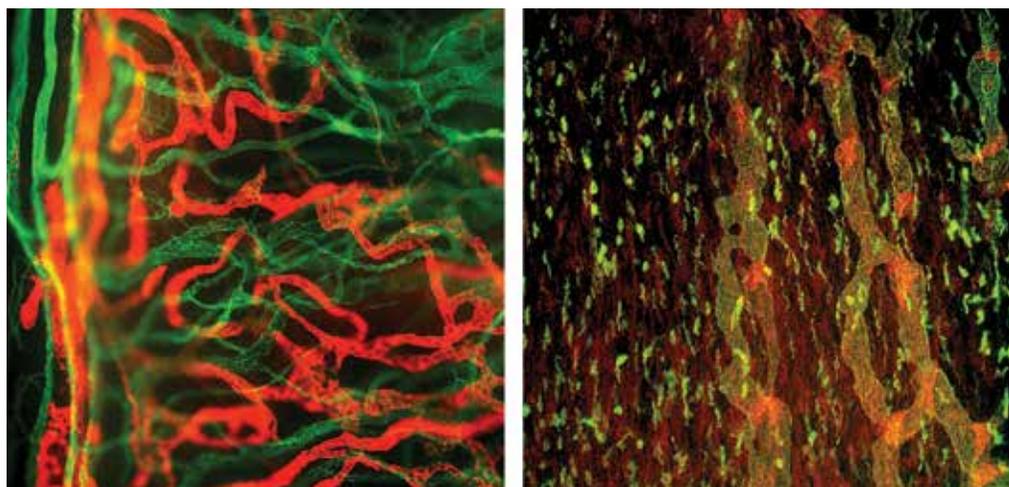
Many physical disorders are associated with lymphatic dysfunction, including inflammatory and immune diseases, transplant (tissue or organ) rejection and cancer metastasis. Lymphatic and blood vessels are not normally present in avascular structures like the cornea, but they are induced under disease conditions, after inflammatory, infectious, immunogenic, traumatic, chemical or toxic insult. Lymphatic vessels can enhance high-volume delivery of antigens and immune cells, and accelerate

disease progression and transplant rejection, with rates as high as 50–90 percent, irrespective of treatment modalities. Researchers in the laboratory of Professor Lu Chen have demonstrated that a number of factors play critical roles in corneal lymphatic growth and maturation. Molecular blockade of these factors reduces corneal inflammation and promotes transplant survival, holding the promise of developing new pharmaceutical strategies for lymphatic-related disorders, both inside and outside the eye.

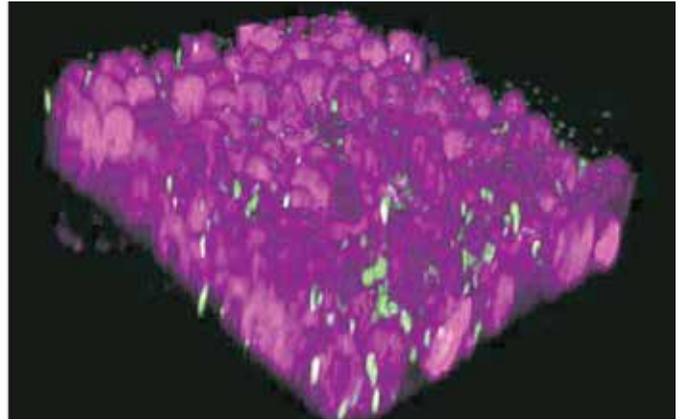
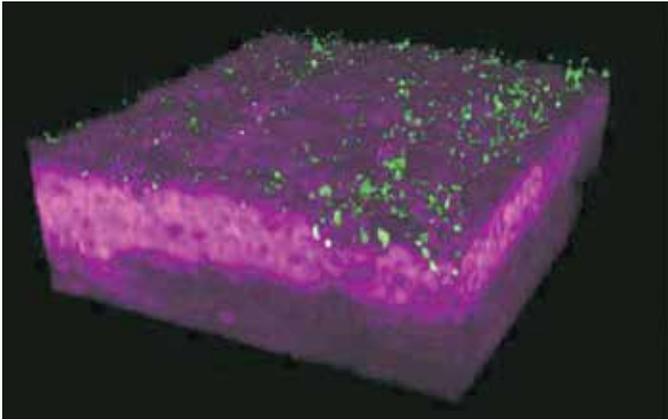
Why does contact lens wear raise the risk of corneal infection? Researchers in the laboratory of Professor Suzanne Fleiszig have shown that tear fluid acts on corneal cells to trigger defenses against bacterial adhesion and penetration. Anti-microbial activity also involves keratin-derived antimicrobial peptides (KDAMPs), small fragments from structural proteins, such as cytokeratin 6A, that protect against bacteria, including virulent *Pseudomonas aeruginosa*. If contact lens wear interrupts tear fluid flow, it may suppress the production of bactericidal proteins, thereby promoting bacterial adaptation to host defenses. Such discoveries could lead to new antibiotics or methods in preventing some ocular as well as non-ocular infections.

Dry eye disease is a common (5–10% of the U.S. population) debilitating disorder characterized by ocular irritation, light sensitivity and fluctuating vision. Despite important insights in defining the pathologic features associated with dry eye, the underlying mechanisms that cause and perpetuate the disease are not well defined. Dry eye has no cure, and the most effective current therapy is topical steroids, which have significant side effects limiting long-term use. Research led by Professor Nancy McNamara has revealed several key steps in the immunopathogenesis of dry eye

disease that have led to the discovery of novel and targeted approaches to treat the disorder. Her group described the functional role of pro-inflammatory cytokine, interleukin-1 (IL-1), in provoking ocular surface damage in dry eye disease. In follow-up studies, they demonstrated the beneficial therapeutic effects of the IL-1 receptor antagonist, Anakinra, for dry eye when applied directly to the eye. Interestingly, Anakinra is an FDA-approved medication for the treatment of rheumatoid



(L) Lymphatic (red) and blood vessels (green) in inflamed cornea. (R) Lymphatic vessels with lymphatic valves (red) in conjunctiva (Chen Lab).



Two-photon microscopy of mouse corneal epithelium shows *Pseudomonas aeruginosa* adhesion (left) and traversal (right) (glowing green areas) at 4 hrs and 8 hrs, respectively, after inoculation with bacteria. A normal cornea would not show adhesion or traversal (Fleiszig Lab).

arthritis that is now undergoing clinical studies as a dry eye therapy. More recently, Dr. McNamara's group collaborated on research that demonstrated the therapeutic benefits of tear replacement therapy using lacritin, a naturally occurring pro-secretory and mitogenic glycoprotein in tears. This collection of mechanism-based studies has led to a better understanding of the molecular patterns that contribute to pathological alteration of the chronically inflamed eye and, through further clinical translation, may provide relief to millions of Americans who suffer from the debilitating symptoms of dry eye disease.

CATARACTS, GENETICS AND EYE DEVELOPMENT

A majority of people will develop age-related cataracts (lens opacities) as the crystallin proteins in the lenses of their eyes aggregate, leading to clouded vision. From the early 2000s, genetic and developmental research in the laboratory of Professor Xiaohua Gong has revealed novel molecular and cellular components that play critical roles in lens development, homeostasis and transparency, as well as in the formation of cataracts. A more complete understanding of the mechanistic functions of these newly discovered genes, proteins and metabolites will not only improve our knowledge of lens biology, but also potentially help to delay or even avoid age-related cataract formation and thereby provide a better quality of life.

AMBLYOPIA, MYOPIA, OPTICAL ABERRATIONS AND VISUAL SYSTEM PLASTICITY

While amblyopia in children can be treated successfully through occlusion therapy—putting a patch over the “good eye” to force

the brain to use the weaker “lazy eye”—few options have been available for adults. Previously, if the disorder was not corrected in childhood (a critical window of development in the visual cortex), damage was thought to be irreversible after approximately age eight. In 2011 researchers in the laboratory of Professor Dennis Levi discovered that playing video games could help improve the vision of adults with amblyopia. They used an action video game requiring subjects to shoot at targets, plus a non-action game requiring users to construct something while they wore patches over their good eyes. Participants showed a marked improvement in visual acuity and 3D depth perception after spending just 40 hours playing off-the-shelf video games. This study was the first to demonstrate that practicing visual tasks through video game play is useful for improving blurred vision in adults with amblyopia.

Myopia, with its associated risk of sight-threatening pathologies such as retinal detachment, aculopathies, glaucoma and cataracts, now represents a major public health problem worldwide. The Berkeley Myopia Research Group, headed by Professor Christine Wildsoet, has been researching why some individuals are more susceptible to myopia than others, which aspects of visual experience derail eye growth and what role illumination plays, which molecular signals and genes are involved in regulating eye growth and outer sclera, and which patients are most likely to benefit from novel contact lens therapies to control myopia (such as orthokeratology). The research group has applied advanced electronic and bioengineering technologies, including wearable light sensors and biopolymers, toward developing new optical, pharmacological and bioengineered treatments for myopia control.



Stereoscopic view with less contrast in R-eye view to reduce suppression of dominant eye, checked at intervals by having the patient shoot at a grating patch (seen in L-eye view) whenever the lines appeared vertical (Levi Lab)

Before joining the Berkeley Optometry faculty in 2011, Professor Maria Liu collaborated with Professor Wildsoet in myopia research. Since then, Dr. Liu has continued to investigate optical contributions to myopia development and their application for clinical myopia control. More specifically, her research emphasizes understanding the mechanisms by which complex optical environments affect emmetropization and ocular growth. Clinically, this research has led to the application of novel contact lens designs such as multifocal contact lenses and orthokeratology lenses as anti-myopia treatments for children and adolescents.

In keratoconus, corneal irregularity causes increased lower- and higher-order optical aberrations (LOAs and HOAs) that are different between the two eyes. HOAs, unlike LOAs, are not correctable with eyeglasses (spectacles, SP), but are only correctable using contact lenses (CL). The irregular optics can cause difficulty with binocular vision and impaired depth perception. Since 2011, researchers in the laboratory of Professor Emeritus Clifton Schor have investigated the influence of irregular corneal optics on the extent/nature of potential impairment by comparing stereo depth performance between SP and CL wear. Their goal is to develop clinical/optical strategies that can account for the potentially greater effects of HOAs on binocular, rather than on monocular, visual outcomes.

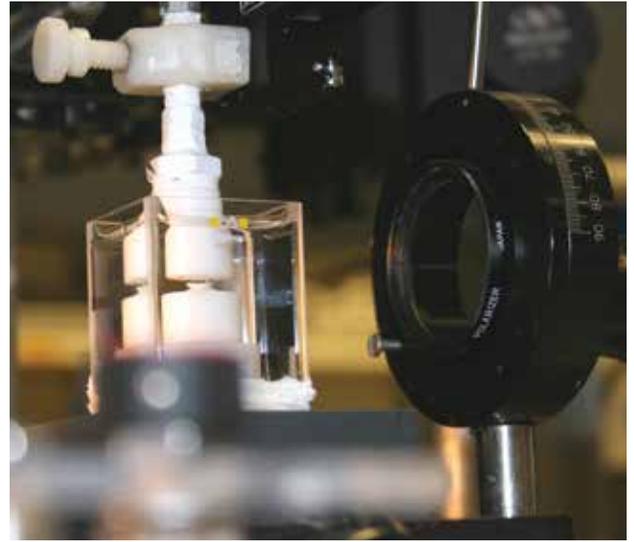
Contrary to the long-held assumption that many visual functions become stabilized after the critical period of visual development ends (during the first few years of life), researchers in Professor Susana Chung's laboratory discovered in 2011 that experience-dependent plasticity is present in the visual system even in the seventh or eighth decade of life. Thus visual functions can be modified in response to experiences throughout life. Specifically, people who develop bilateral central vision loss (whose leading cause is age-related macular degeneration) can develop a retinal location outside their dysfunctional macular area to serve as their "new fovea" and thereby use it as a reference locus for oculomotor and visual tasks. The presence of this experience-dependent plasticity offers exciting opportunities to adopt perceptual learning as a rehabilitative strategy for improving visual functions for patients who suffer from central vision loss.

CLINICAL RESEARCH AND HUMAN TEAR FILM

Healthy human tear film is a highly complex, multilayered biological colloid system that is delicately balanced and regulated by tear glands to maintain optimal function and stability during blink cycles. Dry eye, a common ocular ailment, is most frequently associated with unstable tear film. In 2010 Professor Meng C. Lin and colleagues introduced a novel technique to examine the biophysical properties of human tear lipids and identify

mechanisms in tear film stability and breakup. By using a sessile captive-bubble apparatus to create thick lipid films with an ultra-small amount ($< 1 \mu\text{g}$) of human tear lipids extracted from whole tear samples, they identified dynamic and equilibrium interfacial properties of thick lipid films deposited at the air-water interface under conditions closely mimicking in vivo human-eye conditions. Professor Lin and Dr. Tatyana Svitova (research chemist, UC Berkeley) found that interfacial rheological and dynamic properties of human tear lipids vary between racial/ethnic groups. These variations correspond to clinically observable differences in tear film stability between the groups. This technique also helps to explain how contact-lens-care solutions affect the biophysics of human tear lipids and provides insight into possible etiologies of contact-lens-induced dry eye.

The laboratory of Professor Clayton Radke (Chemical Engineering) uses surface and colloid science technology to apply modern spectroscopic tools, along with molecular theory and simulation, and continuum transport and reaction engineering, for the development of quantitative descriptions of interfacial behavior important to technology development. Included among the areas of research is the study of the dynamics and stability of thin films, such as human tear film, which has a bearing on contact lens coating and design. ■



Sessile captive-bubble apparatus in Professor Lin's laboratory, used to create thick lipid films from extracts of human tear lipids (photo 2010)

THE UC BERKELEY VISION SCIENCE GRADUATE PROGRAM

The goal of the multidisciplinary graduate program in Vision Science is to train graduates in the subfields that constitute Vision Science. These fields include visual neuroscience and perception, spatial navigation, psychophysics, computational vision, molecular and cell biology, neurophysiology, bioengineering, robotics, biochemistry, contact lenses, refractive development, ocular surface biochemistry, ocular infection, ocular disease and immunology. Forty-six Vision Science faculty members originate from eleven different schools and departments on the UC Berkeley campus (Optometry, Psychology, Public Health, Molecular & Cell Biology, Neurobiology, Neuroscience, Infectious Disease and Immunology, Bioengineering, Computer Science, Electrical Engineering and Chemical Engineering).

The interdisciplinary program in Vision Science has been in existence for 68 years. There are currently 39 pre-doctoral students engaged in studies leading to the PhD in Vision Science as well as five post-OD/MD students working toward a PhD. In addition, there are 55 postdoctoral fellows training in the laboratories of

faculty in Vision Science. Primary funding for the graduate program comes from the National Institutes of Health (NIH) and National Eye Institute (NEI). State-of-the-art, cutting-edge research in the program is supported by over \$11 million annually in individual faculty research support funds, which includes 40 grants from the NIH, plus a shared NEI Core Research Grant that has been awarded to the Vision Science Program for the last 32 years. PhD Graduate student training, stipends and fees are supported primarily by the individual investigator NIH research grants and an NEI Training Grant that has been awarded to the program for the last 37 years.

Our mission is to attract outstanding trainees who will develop independent, productive and notable vision research careers. Of the more than 211 trainees who have received research degree training in Vision Science (almost all PhDs), as of 2013, the vast majority established highly successful careers as vision researchers — many as faculty with independent funding in prestigious colleges and universities, or as researchers in private-sector institutions worldwide.

humanitarian efforts

VOSH NICARAGUA

From January 3 through 10, twenty-one students from Berkeley Optometry's Volunteer Optometric Services to Humanity (VOSH) program and one Berkeley undergraduate student joined eight optometrists from VOSH Connecticut and traveled to San Juan del Sur, Nicaragua, to provide eye care services to those in need.

**By Monica Rodriguez '16
and Calista Ming '16**

THE BERKELEY GROUP consisted of 1 third-year, 17 second-year and 3 first-year optometry students. Although several students were part of last year's mission to Nicaragua, for most students, this was their first time participating in a VOSH clinic. The mission leaders were Calista Ming '16 and Monica Rodriguez-Bayes '16, who worked closely with the director of VOSH Connecticut to make the trip a success for all involved. This was VOSH Connecticut's sixteenth year of service to San Juan del Sur, Nicaragua, and along with Berkeley VOSH's help, this team was the largest ever.

Over the clinic's four days of operation, the group saw 3,129 patients and dispensed over 1,800 prescription eyeglasses, including single vision, multifocal and readers, most of which were donated by VOSH



Jill Lobinger ('16) assesses the health of the patient's eyes under the supervision of Dr. Michelle Ming. (Photo courtesy of Sheena Songpiriyakij.)



Team of volunteer optometrists, opticians, nurses and students from VOSH Connecticut and Berkeley Optometry (Photo courtesy of Sheena Songpiriyakij.)

Connecticut. Every patient also received a pair of sunglasses, and donated pharmaceuticals were used to treat patients with glaucoma, blepharitis, dry eye and conjunctivitis. The yearly clinic provides continuous care to the Southern Nicaraguan population and remains their main source of eye care. Most of the patients seen in the clinic were bused in from surrounding rural areas, and many of these patients waited up to five hours to see a doctor or student clinician.

The clinic was located at a local elementary school, which consisted of six exam rooms that had one to two optometrists, two to four optometry students and several translators. The students performed an entire exam, including retinoscopy, trial frame refraction, and direct and indirect ophthalmoscopy. A large percentage of the patient population was presbyopic, and many had pingueculas, pterygium and dry eye. The students had an opportunity not only to improve their optometric skills but also to see pathologies not common in the United States such as coloboma, advanced cataracts and toxoplasmosis.

The trip was a huge success and several students are already planning to go on next year's trip! This mission provides Berkeley Optometry students with an invaluable learning experience as well as the communities of Southern Nicaragua with much needed services. Berkeley Optometry continues to have a strong relationship with VOSH Connecticut and looks forward to working with them next year!



Each morning, hundreds of patients lined up outside of the clinics waiting to be seen. (Photo courtesy of Britney Kitamata-Wong.)



Anna Harding ('16) takes the case history for a young girl prior to her exam. (Photo courtesy of Anna Harding.)



Berkeley Optometry students pose with the final count—number of patients seen: 3,129! (Photo courtesy of Shreya Malli.)

LOCAL OUTREACH

Berkeley Optometry faculty and students are frequently involved in local community outreach events. Students routinely participate in vision screenings, which include assessment of visual functions and ocular health under the supervision of a licensed optometrist.

By Michelle Wong '16

MANY OF THESE events are organized by community leaders—politicians, churches and local doctors—and serve to increase access to healthcare and meet the visual needs of low-income and underserved populations.

Berkeley Optometry students are also involved in educational outreach. Volunteers visit elementary schools to teach students about ocular anatomy and binocular vision. Kids take a look inside the eye as optometry students deconstruct a model eye and discuss the functions of each part of the eye.

Students learn about eye dominance and the breadth of visual fields and observe some optical illusions. Optometry students also address common eye diseases such as diabetic retinopathy, cataracts, macular degeneration and glaucoma, and attempt to demonstrate these conditions with glasses manipulated to simulate visual changes associated with each condition.

If you're interested in volunteering as an optometrist, or would like to request student volunteers for your event, please contact ucosa.philanthropy@gmail.com.



Shannon Lee ('16) (front) and Yangdi Chen ('16) (back) assessing confrontational visual fields at the Diabetes Health Event at John Muir Hospital.



Christina Belter ('16) and Erica Perlman-Hensen ('16) demonstrate pupillary responses to elementary school students.



Berkeley Optometry students participate in a vision screening under the supervision of Dr. Darlene Fong ('88). Pictured from left to right: (back row) Monica Chernoguz ('16), Narges Kalantarian ('17), Emmeline Cruz ('17), Tu-Anh Nguyen ('16), Alina Pechko ('17), Dr. Darlene Fong ('88), Craig Wong, (front row) Rebecca Lee ('16), Carol Chang ('16), Tara Pahlevan ('16).



Berkeley Optometry students, Foresight Pre-optometry students, and Dr. Kathleen Low ('84) participate in Oakland Chinatown Lions Club Health Fair. Pictured from left to right: (back row) Andrew Ta ('15), Alice Han*, Armaeiti Chami*, Salena Thong*, Peter Tien ('16), Tracy Wang ('16), Britney Kitamata-Wong ('16), (front row) Jennifer Truong ('15), Jennifer Ding ('17), Cindy Lam*, Peter Wu ('16), Michelle Wong ('16), Dr. Kathleen Low ('84), Emily Mann. (*Foresight Pre-optometry Club)



Berkeley Optometry students visit Washington Elementary School and teach fifth graders about the eye. Pictured from left to right: (back row) Alex Chow ('16), Annie Lee ('17), Timoteo Flores ('17), Ashley Kadakian ('17), Carol Chang ('16), Britney Kitamata-Wong ('16), Arie Wong ('16), (front row) Michelle Wong ('16), Sandra Harpster ('17).

“Our students walked away with lots of knowledge about eyes and ocular disease! Each student has a different concept that they learned and each was excited about learning from you experts! Thank you so much for inspiring our students!”

—WASHINGTON ELEMENTARY SCHOOL SCIENCE TEACHER

“[Thanks to] your group from UC Berkeley for spending an entire day doing vision screening for the Oakland community at our Health Fair. You are setting a great example for our youth that community humanitarian services can greatly benefit the city at large. Thank you again.”

—OAKLAND CHINATOWN LIONS CLUB

Berkeley Optometry Concludes \$20M Fundraising Campaign

BERKELEY OPTOMETRY HAS completed its portion of the “Campaign for Berkeley,” which had as its goal \$3.1B and which was met in December 2013. The School of Optometry started its portion of this campaign, a \$20M campaign, two years after the campus began. However, Berkeley Optometry has completed its goal, as well, simultaneously with the campus campaign. Some highlights of this campaign include raising 1) \$2M for an endowed chair, 2) nearly \$10M for research, 3) \$2M for graduate fellowships, and 4) over \$3M for program support. During the campaign, more than \$1M also was contributed to the annual fund.

But perhaps the gift that most signified this campaign was a gift from students. The Berkeley Optometry Student Association donated \$250,000, which the University Chancellor was delighted to match. That \$500,000 endowment provides tuition assistance to nearly every student enrolled in the program at some point during the four-year curriculum. The UC Optometric Student Association (UCOSA) donation holds the record as the largest-ever contribution by current students to the Berkeley campus. (This has been followed more recently with an additional \$40,000 gift from current students!)

For decades, the UCOSA had been tucking away proceeds from student dues, bake and clothing sales. Britta Hansen, former president of UCOSA, explains, “We wanted ... it to go to the greater good of the University rather than sitting in our account.” “Getting a gift like that from current students just blew me away,” said Dennis Levi, Dean of Optometry at the time.

Largely as the result of the generosity of faculty and students, the School of Optometry now has 70 endowments for student support.

The completion of this campaign is truly a significant chapter in the school’s history. This is the first campaign for the school where there truly was equal participation from alums, friends, students, faculty and staff. Despite the worries from some that the goals for this campaign were much too lofty, it is tremendously gratifying to see how all of our constituents came together to reach this \$20M milestone. Ninety-two cents from every dollar raised directly supports the school or our students. Quantifying development costs expended shows that each dollar contributed to the Berkeley Optometry campaign cost only 8 cents! (If one excludes research gifts, that return on investment changes to 15 cents for every dollar donated.) For a more in-depth summary, see “Campaign by the Numbers” on the next page.



Third- and fourth-year students celebrate with donors the awards for tuition assistance provided by endowments created by faculty, staff, students, friends and alums.

BERKELEY OPTOMETRY—A FISCAL SNAPSHOT

OF THE SCHOOL'S nearly \$32 million annual revenue and campus support funding, only \$5 million comes from the state of California. This has changed dramatically from earlier days, when nearly the entire cost of education at the University of California was supported by the state.

Research funding includes funds from private industry, federal government agencies such as the National Institutes of Health (NIH), Department of Defense (DOD), National Science Foundation (NSF), the state, the University of California and various non-profit organizations.

Other sources include continuing education revenue, contract and grant overhead funds, short-term investment pool (STIP) income and endowments, and other miscellaneous funds.

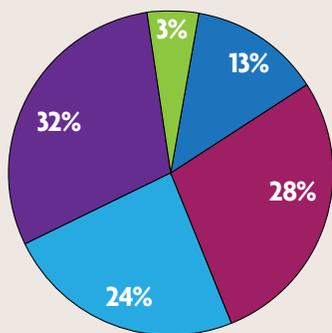
Professional degree supplemental fees (PDST) are paid by students and are designated by University policy to be allocated as two-thirds for the support of the school and one-third for student awards. Note that no tuition comes directly to Berkeley Optometry, as tuition goes to the Berkeley Graduate Division and the University.

General funds are funds provided by the state. Berkeley Optometry receives state funds only for salaries paid to ladder-rank faculty.

Student support includes funds provided to students in the form of departmental student aid and fellowships, awards from training grants and paid positions (research, teaching and federal work-study).

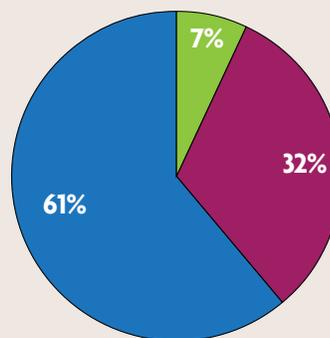
Faculty and staff compensation (salaries and benefits) include payments for academic, research and clinical faculty and staff.

**Berekeley Optometry Revenue Sources
Fiscal Year 2013–2014**



- Optometry Student Fees (13%)
- Contracts and Grants (28%)
- Campus Support Funding (24%)
- Clinic and CE Revenue (32%)
- Private Gifts for Current Use (3%)

**Berekeley Optometry Expenditures
Fiscal Year 2013–2014**



- Student Aid and Fellowships (7%)
- Supplies, Materials, Equipment and Other Operating Expenses (32%)
- Faculty and Staff Compensation (61%)

OPTOMETRY ASSOCIATES OF THE BENJAMIN IDE WHEELER SOCIETY

MANY PEOPLE MAKE THEIR FINAL GIFT to Berkeley Optometry their most significant, by including Berkeley Optometry in their estate planning.

The Optometry Associates of the Benjamin Ide Wheeler Society recognizes individuals who have developed an estate plan which will benefit Berkeley Optometry. Planned gifts provide philanthropic support that is essential in enabling the School of Optometry to remain a leader in optometric education and research.

Anthony and Elna Adams *

Adi D. Adins '68

Otto Anderson '39 †

Norma and John Austin '52 †

Charles Bailey '82

Ian and Valerie Bailey

Robert Benn '54 †

Roy Black '52 †

Karen Walker-Brandreth, '68
and Roy Brandreth '53 †

Charles Brown '47 * †

Bettina Bruckman †

Maxine † and
William Burlington '40 †

Lily and Collin Chu '71

Doris Sze and Stephen Chun '74

Jeanette and Robert Cibull '57

Allen Coe '50 †

Jack Cohen '52

Barbara and Theodore Cohn †

Charles Conrad '40 †

Lawrence Creasey '58

Henry Leibee and

Bonne Curtis-Leibee '69

John Daly '52

Scott Daly '83

Herbert Elefant '39

Dianna Ellerbeck

Roselyn and Weylin Eng '65 *

Steven Ngin †

Charmaine Eng-Ngin '63

Jay and Rebekah Enoch

Joseph Farrington '51 * †

Bernard Feldman '52

Pamela P. Fong '77

Allan Freid '52

Marcia and Lee Goldstein '66

Edward I. Goodlaw '34 †

Michael Harris '65 *

Frank Johnson, Jr. '51 * †

Barbara and Marshall Kamena '65

Suga † and Henry Kawahara '46 * †

Roderick J. Keener '71

Cynthia and Jeffrey Ko '73

Aman I. Kumar

David Leibel '48 †

Dennis and Marilyn Levi

Joyce and A. Saul Levine '52

Jeffrey Lieberman '89

Aloha T. † and Edward R. Ligon '48 †

Henry Linker '48

Warren LoPresti '51

Jimmy Low '52

Edwin Mehr '41 †

Meredith Morgan, Jr. '34 * †

Thomas Nagy '49

Lillian † and
Benjamin Nerenberg '41 * †

Maurice Newman '52

Winston Nielsen '49 †

Joy Ohara '10 and Kok Loong Lye

Leonard Osias '48

Paul Peng '86

Herman Popiul '52

Jeanette and Edward Revelli '77

Donald Sarver '71

Dorothy Bates Searles †

Charles Seger '48 †

Elliott Shane †

Leonard Shenkan '44 * †

Sylvia † and Irvin Silberstein '42 †

Curtis Simmons '82

Bette and Mervyn Simon '37 * †

Richard Simsarian '54

Branna and Irving Sisenwein

Roberta Smith †

Harry Springer '42 †

Lawrence Stern '62

Eleanor Sweigert †

Jenny and Ernest Takahashi '68

Betty and Bernhardt Thal '48 * †

Esther and Lawrence Thal '75

Charlotte Tlachac '78

Bryan Vanesian '89

Lesley Walls '68 and
Mary Ann Keverline-Walls '67

Sheldon Wechsler '52 †

Simon P. Williams '51 †

William Wong '73

* Founding member
† Deceased

THE MEREDITH W. MORGAN SOCIETY

Berkeley Optometry Annual Fund Donors \$250+ (July 1, 2013 to June 30, 2014)

Dean's Circle (\$1,000 and up)

Anonymous
Alcon Laboratories, Inc.
Thomas A. Aller '83
Barton Eye Associates
Bay Area Optometric Council (BAOC)
Berkeley On-Line Lectures and Demonstrations (BOLD)
Jeffrey A. Calmere '88 and Linda K. Hur-Calmere '90
Tony Chahine '95
Gerald D. Chan '75 and Lisa E. Moon '76
Collin S. Chu '71 and Lily F. Chu Warren V. De Haan '66
Davida J. Dong-Leong '78 and Richard G. Leong '78
Eyexam of California
Genentech, Inc.
Johnson & Johnson
Akio Kanai
Paul A. Kiyan '75 and Beverly N. Kiyan
Stanley A. Klein
Warren I. LoPresti '51
Edward Low '74
Seymour C. Marcuse, Jr. Trust
Stephen A. Marcuse
Howard Pflug '47
Edward J. Revelli '77 and Jeanette Revelli
Samsung Electronics America, Inc.
Ernest K. Takahashi '69 and Jenny M. Takahashi
Lawrence S. Thal '75 and Esther G. Thal
Corina Van de Pol '90 PhD '99
Vision One Credit Union
Vision Service Plan (VSP)
Vision West, Inc. (VWI)
Mark E. Winston '82
Shinichi Yamade
Randall W. Yumori '80

Benefactor (\$500–\$999)

Melinda A. Cano-Howes '99 and Ronald G. Howes
Joan D. Costello
Edward O. France, Jr. '76
Lee A. Goldstein '66
Tem R. Gronquist '97 and Joanne Gronquist
Monroe J. Hirsch Trust
Richard C. Hom '75
Shawn Hooper
Nadine I. Howell '82 and Steven L. Howell '82
Brian Levy '76
Donald E. Louie '65 and Midori U. Louie
Ricoh Innovations, Inc.
Nicolette J. Sacco-Brown '87
Donald D. Schmidt '66 and Georgenia M. Schmidt
Steven H. Schwartz '79
Lois M. Shiozawa '81
Betty Thal
Tina P. Tsai '99
Louise Vogelsberg '56 and Frederick E. Vogelsberg
Gregory J. Ward
Nora Weissman
Letitia Y. Yee '97
Wayne W. Zimmerman '73 and Susan L. Zimmerman

Partner (\$250–\$499)

Adair Optometry
Todd M. Adair '92 and Felecia Adair
Jeffrey L. Azus '86 and Alice Ng Azus '87
Eric Bass
Christopher R. Cabrera '75
Shao-Pin Chen and Li-Li Chen
Distinctive Eyes Optometry

William Kent Dorrance Trust
Sherri M. Egashira '92
L. Edward Elliott '65 and Terry E. Elliott
Charmaine M. Eng '63
Thomas H. Eves '54 and Diane K. Eves
Craig K. Hisaka '72
Jane M. Kadoya '80
Dennis M. Levi and Marilyn Levi
Marin Community Foundation
Jeffrey S. McFeely '85 and Eeva Maria K. McFeely
John J. McNally '79 and Heike McNally
Gabriela McTyler '04
Thomas H. Murphy '78
Thomas R. Nagy '49 and Vicie M. Nagy
Melvin O'Neal
Optometry Care Santa Barbara
Power Integrations, Inc.
Marina L. Rocchi '11
John G. Rosten '77 and Susan J. Rosten
Donna Simonian '07
Marvin L. Smotrich '62 and Mehrey D. Smotrich
Pamela Theriot '01
Tri Valley Optometry
Mann D. Trinh '07
Ana P. Vargas '06
Betty Wang '12
Thomas W. Wing '74
Andrew B. Wong '06 and Karen G. Wong '06
Joseph D. Wong '74 and Catherine Wong
Jean A. Wrightnour '88

Class year denotes year of OD degree.

DONOR PROFILE



Dr. Joy Ohara '10 and **Kok Loong Lye** have had a longstanding connection to UC Berkeley. Lye met Joy while she was finishing her Chemistry BS in 2005 and they soon fell in love. They then moved on to study Public Policy and Optometry, respectively—both at Berkeley. In 2008, in the middle of their graduate studies, Lye's mother Ming Pow Low passed away from breast cancer.

MING POW WAS diagnosed with retinitis pigmentosa at an early age and was legally blind by her mid-20s. Without formal low vision optometric care in Malaysia, Ming Pow learned to adapt to her vision loss without the aid of any electronic aids or magnifiers. She developed remarkable memory and sensory ability—among other handy skills, she would be able to “smell” who was in the room and memorize numerous telephone numbers.

Despite her vision loss, Ming Pow had a successful career of more than 30 years as one of the first female stockbrokers in Malaysia. She was actively engaged in the community and supported a number

of Buddhist foundations throughout her life. Drawing inspiration from Ming Pow's ability to overcome her vision loss, Joy attended Berkeley Optometry from 2006–2010 and after graduation was a resident at the low vision program at the University of Houston College of Optometry.

Lye and his father have seen the value of being community-minded through Ming Pow and know first-hand the challenges of adjusting to living with an individual with visual impairment. With the encouragement of Joy, they established the Ming Pow Low Fund in 2010, which aims to aid graduating optometry students who are inspired to study and specialize in low vision.

NEWS & NOTES

UC Berkeley, Vision Science alumni, Sir Colin Blakemore has been granted an honorary title of knighthood. At the age of 70, Dr. Blakemore “has been recognized for his research and for communicating the importance of often controversial science.” Dr. Blakemore’s research has focused on many aspects of vision, development, plasticity of the brain and neurodegenerative disease. He has sought to define the developmental errors that underlie cognitive disorders, such as autism, dyslexia and schizophrenia. Dr. Blakemore also championed the communication of science and engagement with the public on controversial and challenging aspects. In 1976, at the age of 32, he was the youngest person to give the BBC Reith Lectures for which he presented a series of six talks entitled *Mechanics of the Mind*, and has subsequently presented or contributed to hundreds of radio and television broadcasts. He has been an outspoken defender of animal research and an advocate for many other issues including classification of drugs and genetically modified foods.

Sir Colin Blakemore PhD '68, was knighted.



David Kirschen OD '72, PhD '77, is the first Berkeley Optometry alum to be awarded a World Series ring! As team optometrist for the Boston Red Sox, he received his 2013 World Series ring in recognition of the critical role that exceptional vision plays in sports performance at the professional level. He has worked with the Red Sox since 2004, during which time they have won three World Series championships. Prior to 2004 the team had gone 86 years without a championship. As a major pioneer in sports vision, Dr. Kirschen’s innovative approach and techniques have made a key impact in improving the performance of athletes such as Stephen Drew whose post-season batting average was .080 prior to seeing Dr. Kirschen and his partner Dr. Daniel Laby; afterward he finished the series batting two for four, including a home run! Dr. Kirschen is winner of the American Optometric Association’s 2009 Sports Vision Optometrist of the Year award and has worked with other professional teams such as the Los Angeles Dodgers, Los Angeles Kings, Boston Celtics, Chicago Cubs, Cleveland Indians, Houston Astros, New York Mets and St. Louis Cardinals for over 20 years. He is currently Chief of Binocular Vision and Orthoptic Services at the Jules Stein Eye Institute at the UCLA David Geffen School of Medicine. He also serves as Professor Emeritus at the Southern California College of Optometry and has been in private practice in Brea, California, for 42 years.

David Kirschen OD '72, PhD '77, received a World Series Ring!



AUSTIN ROORDA—GUGGENHEIM FELLOWSHIP

Austin Roorda, Chair, Vision Science Graduate Group and Professor of Optometry and Vision Science, is one of eight UC Berkeley faculty who have been awarded 2014 John Simon Guggenheim Memorial Foundation Fellowships. Guggenheim Fellowships are awarded for “impressive achievement in the past and exceptional promise for future accomplishments” and provide funding to further the recipient’s work in fields ranging from the natural sciences to the creative arts.



NOA MEETING

Berkeley Optometry hosted the annual Board Meeting of the National Optometric Association (NOA) in October. The NOA has been a leader in the cause of improving the quality and accessibility of eye care in minority and other historically underserved communities. Increasing the number of minority eye care practitioners, through student recruitment and career placement, has been the NOA’s historical focus. Those attending the meetings and dinner, hosted by Dean John Flanagan, were honored to hear first-hand the history of the NOA from co-founder Dr. C. Clayton Powell. Originally from Atlanta, Georgia, Dr. Powell served as the NOA’s first president from 1969 to 1974. The timing for Berkeley Optometry to host the NOA Board Meeting could not have been better as current optometry students have also reestablished the school’s relationship with the National Optometric Student Association (NOSA) and are excited to help execute the mission of the organization.



Shown above right are students Maria Cardenas '17 and Angel Barajas '17 with NOA co-founder Dr. C. Clayton Powell.



Shown at left with Dean John Flanagan are members of the NOA Board of Directors and members of the Berkeley Optometry faculty and staff who helped host the NOA for their annual meeting at Berkeley Optometry.

BERKELEY OPTOMETRY STUDENTS MAKE \$40K GIFT

On July 3 current and former Berkeley Optometry students presented a \$40,000 gift to Berkeley Optometry’s new dean, John G. Flanagan. With matching funds made available by the Chancellor, the total impact of the University of California Optometric Student Association gift is \$80,000 toward the renovation of Minor Hall. The check presentation ceremony highlighted the important partnership between the school’s students—past and present—and its leadership. Dean Flanagan commended the students for their contributions, both academic and financial, and emphasized their role in defining the future of Berkeley Optometry.



AWARDS

The Michael G. Harris Family Award for Excellence in Optometric Education—Edward J. Revelli '77

This award is presented by the American Optometric Foundation (AOF) to an optometric educator who has demonstrated ongoing and consistent excellence in the education of optometry students and/or the advancement of optometric education. Ed has been a tireless educator who has been dedicated to providing the best instruction and training to optometry students for many years. Along the way he has also enhanced the clinical skills and expertise of faculty in new and expanding areas of the profession. He has received great respect from not only his students, but also his peers.

2014 Ezell Club Fellowship to honor Anthony “Tony” Adams

The American Optometric Foundation honored former Ezell Fellow Dr. Anthony “Tony” Adams with a named William C. Ezell Fellowship at its recent meeting in Denver, Colorado. A long-time supporter of the foundation, Dr. Adams is the Editor-in-Chief of *Optometry & Vision Science*, former Berkeley Optometry dean and past president of both the American Academy of Optometry and the American Optometric Foundation.

The flagship program of the American Optometric Foundation (AOF), Ezell Fellowships have been awarded for over 60 years. These fellowships support graduate students enrolled in a full-time program of study and training in vision-related research that leads to a master’s or PhD degree.

Foundation Fighting Blindness Grants

Foundation Fighting Blindness Research grants have been awarded to Austin Roorda, John Flannery and Richard Kramer, all vision scientists at UC Berkeley. These awards recognize the investigators’ outstanding progress in research that advances sight-saving treatments and cures.

Dr. Roorda’s project is titled “AOSLO: Detecting Retinal Degeneration Before Vision is Lost.” The adaptive optics laser scanning ophthalmoscope (AOSLO) is similar to a powerful microscope that enables retinal researchers to see structural changes in the retina well before vision is lost from a retinal disease. That power can enable researchers to more quickly determine if a treatment is working in a clinical trial. Dr. Roorda is performing studies of AOSLO to correlate changes in the retina (e.g., loss of photoreceptors) with changes in vision.

Optogenetics is a relatively new field of research, which involves the delivery of genes or chemicals to restore light sensitivity to a highly degenerated retina. In essence, this type of treatment holds promise for

restoring vision in people with advanced disease and may do so regardless of the genetic defect causing the disease. Dr. Flannery is developing an optogenetic gene therapy for bipolar cells in the retina, which survive for many people with significant retinal degeneration. Given these cells’ adjacency to photoreceptors, he believes bipolar cells have the potential to provide meaningful vision when treated with an optogenetic therapy. He will test the effectiveness of four gene therapies, each delivering a different light-sensing protein to bipolar cells.

Dr. Kramer will study variations of a synthetic compound called AAQ as an optogenetic treatment in ganglion cells. Previous studies showed that injections of AAQ restored vision in mice, but only in very bright light. Dr. Kramer will be engineering compounds to work in dimmer light. And, because injections of AAQ have worked only temporarily, Dr. Kramer will evaluate *microspheres*, small biodegradable particles, to provide sustained release of the compounds.

American Optometric Association Legend Award—Kenneth Polse '68

Professor Emeritus Kenneth A. Polse will receive a Legend Award from the Contact Lens and Cornea Section of the American Optometric Association in June. He was recognized for his contributions to the culture of contact lenses through leadership and dedication. The Legends Award was created to distinguish individuals who have demonstrated intellectual depth and have a passion about contact lenses, the cornea or refractive technology.

American Academy of Optometry Life Fellow Award—Michael Harris '65

Michael G. Harris was awarded Life Fellowship status in the American Academy of Optometry after presses had already rolled for last year’s magazine. The distinction of Life Fellowship was created to provide recognition to those Fellows who, through long-time membership in the Academy, have rendered distinguished service to the science and art of optometry.

2014 Fry Medal from The Ohio State College of Optometry—Gerald Westheimer

On September 16, 2014, the actual centennial date of optometry at The Ohio State University, Berkeley Professor Gerald Westheimer received the 14th Fry Medal, awarded to individuals who have truly distinguished themselves with long and exemplary records of vision research.

Dr. Westheimer trained in and practiced optometry in Sydney, Australia, before going to Ohio State for his PhD study with Dr. Glenn Fry. He was on the faculty of The Ohio State University School of Optometry until coming to Berkeley in 1960. His teaching and research accomplishments have been widely recognized. He is the only optometrist to have been elected to the Royal Society of London. He is the recipient of ophthalmology's Proctor Medal, the Academy of Optometry's Prentice Medal, and is a fellow of the American Academy of Arts and Sciences.

Hoya Student Vision Grant and Scholarship—Susannah Lee '15

Susannah Lee received the 2014 Hoya Student Vision Grant and Scholarship. Third- and fourth-year students from each school and college of optometry compete for this award, which is presented during an awards luncheon during the annual meeting of the American Optometric Association. Susannah is the first Berkeley Optometry recipient of this award.

Vistakon Award of Excellence in Contact Lens Patient Care—Jeffry Wu '14

This award recognizes outstanding fourth-year student clinicians who have demonstrated excellence in contact lens patient care during their optometric education. The award is given to a graduating student from each school and college of optometry in North America. Jeffry Wu is this year's recipient from Berkeley Optometry.

J. Pat Cummings Scholarship—Krystal Vanichsarn '15

This award is conferred annually to a second- or third-year optometry student at each of the North American schools and colleges of optometry who best demonstrates the ideal eye-care standards of practice, achievement in both academic performance and extracurricular activities, and participation with other professional pursuits such as involvement with patients through internships, community service and other volunteer activities.

Douglas W. Hopkins Primary Care Residency Awards—Gloria Chow '12 and Mark Landig '13

The Douglas Hopkins Residency Award is intended to promote the practice and development of the field of primary care optometry by pro-

viding incentive and support to talented optometric residents who demonstrate a passion and commitment to practice, research and education in primary care. The award was established by the Primary Care Section of the American Academy of Optometry in 2012 to honor Dr. Hopkins who was a leader within the Primary Care Section of the Academy and who passed away unexpectedly in 2007. Gloria is the second recipient of this award. Mark is a primary care/geriatric resident at the West Los Angeles Veterans Affairs Health Care Center.



Gloria Chow is shown with Stephen Chun '74, one of Gloria's former instructors at Berkeley Optometry.



Stephen Chun '74 (back right) is shown with the Douglas Hopkins family: Mrs. Roberta Hopkins top row and daughter front row. Also shown with Dr. Chun are Drs. Ann Clark, Jeff Magun and Linda Casser—all co-founders of the Primary Care Section of the American Academy of Optometry.

STUDENT SPOTLIGHT

BERKELEY OPTOMETRY IS THRILLED TO ANNOUNCE that Ka Yee, Eric Larios, Angela Shahbazian, Shannon Lee and Michelle Wong have been selected as Schweitzer Fellows. The Albert Schweitzer Fellowship was founded in 1940 to support Dr. Schweitzer's medical work in Africa during World War II. Since Dr. Schweitzer's death in 1965, the Fellowship has continued to provide direct assistance to the Schweitzer Hospital in Lambaréné, Gabon.

The U.S. Albert Schweitzer Fellows Program (ASFP), established in 1991, has provided support for graduate students in the healthcare field to turn idealism into action in the United States. Each year 200 fellows across the country are chosen to design and implement individual service projects aimed at addressing health needs in their local communities. The goal of the fellowships is to give students the skills that will help them develop into leaders committed to serving the underprivileged, a key piece of the legacy left by Albert Schweitzer.



Schweitzer Fellows: Ka Yee, Eric Larios, Angela Shahbazian, Shannon Lee, Michelle Wong

KA YEE '17

Though born in Hong Kong, China, Ka was raised in Halifax, Nova Scotia, and later Toronto, Ontario, Canada. Despite her love for the arts and all things Canadian, Ka graduated from her arts-focused high school and moved to Berkeley for her undergraduate education. She then discovered EyePACS, an organization and web-based application started by Dr. Jorge Cuadros '80 that aims to improve access to vision care by allowing optometrists to provide diagnoses remotely. Her experiences with EyePACS, working with low-income communities in San Francisco as a volunteer fundus photographer and coordinator, fueled her passion for community health. These memorable patient encounters catalyzed Ka's deviation from her path as a dietician to optometry. Graduating with a BS in Nutritional Sciences and Dietetics, she happily returned to Cal as an optometry student.

In her first year, she strove to build a sense of community with her peers as the class of 2017's co-president while maintaining her involvement with the Levi Lab as a graduate research assistant. Under

the guidance of Dr. Roger Li, she applied concepts and techniques learned in class to improve the vision of patients with amblyopia. With her lab, she has published two abstracts and received the Tyson Research Initiative/PAOF/Retina Research Foundation travel grant to present a poster at the Association for Research in Vision and Ophthalmology (ARVO) in Orlando, Florida. She is continuing her work at the Levi Lab through the funding of the National Eye Institute (NEI) T35 Summer Research Training Program.

Ka is grateful to be selected as a Schweitzer fellow. She is working under the mentorship of Dr. Harry Green '08 and Angela Chu of the Chinese Community Developmental Center to address ocular health in low-income residents of San Francisco's Chinatown. With the talents of her peers and the use of fundus photography, she works to provide patient education and on-site diagnoses in English, Cantonese and Mandarin. Upon graduation, Ka hopes to remain active in research and focused on community health.

ERIC LARIOS '16

Eric's summer was not as relaxing as he had envisioned, but that was not altogether a bad thing. Seeing patients, recommending lens options and the occasional novice mishap has only led to one great learning experience after another. He is very excited to finally be working in the clinic, alongside great faculty and peers, as well as working with Angela Shahbazian on their Schweitzer Fellowship project.

Eric's first foray into optometry started with vision screenings in college, which expanded into becoming a retinal photographer and working at several private practices. He then took a year-and-a-half stint as a designer for a solar company before coming back to school. Although he didn't expect to find himself back at his alma mater, the caliber of the program at Berkeley was too much to dismiss.

Last summer Eric had the pleasure of working with Angela Shahbazian under Seva Foundation's America Indian Sight Initiative, and they will continue that partnership in their efforts to bring vision resources to

students and their parents in the Oakland school districts. They are both very excited to begin on their Schweitzer project and help these communities with services that they would not have otherwise.

With his career starting to take hold, Eric is very enthusiastic about his future and looks forward to growing his skills and knowledge as a clinician, both in and out of the classroom.

ANGELA SHAHBAZIAN '16

Angela is excited about seeing patients as a third-year student clinician. When she decided several years ago to leave her career in website/media management to begin a new career in optometry, she knew that the satisfaction of helping patients with their real-life visual needs would far outweigh the sacrifices of returning to school. Now that she is beginning to experience the fruits of her labor, she cannot wait to dive more into her studies so she can provide her patients with the best optometric care possible.

As a returning student, balancing the demands of family life and home life has been challenging. But Angela has found inspiration in her fellow students who continually amaze her with their commitment, professionalism and enthusiasm. She has also been thrilled to meet so many students with similar goals of increasing access to eye care, and has been able to collaborate with fellow student Eric Larios on related projects.

She and Eric conducted research for the Seva Foundation during the initial stages of their American Indian Sight Initiative. She is looking forward to expanding on this work next year. Through their Schweitzer Fellowship project, they will increase access to eye care for students and their families in underprivileged parts of Oakland.

Angela looks forward to many adventures in optometry as her career continues, and she is thankful to her family, particularly her husband, for the opportunity to grow and learn every day in this profession.

SHANNON LEE '16

Raised in San Jose, California, Shannon loved science, but never enjoyed the dissection

labs in class. Oddly enough, her first experience with a cow's eye in 6th grade was the only dissection activity that she was thoroughly fascinated by. In high school she accompanied doctors to rural China to help North Korean refugees; witnessing these individuals use their profession to help others sparked a passion in Shannon to do the same. She majored in human biology at the University of California, San Diego, in hopes of pursuing a health profession career. Her experience of studying abroad in Singapore and traveling all over Southeast Asia solidified her passion for traveling and helping the global community. After shadowing an optometrist upon graduation and realizing her fascination for eyes, she began to pursue a career in optometry by working for a local optometrist while completing her prerequisite course work.

At Berkeley Optometry, she was the vice president for the Volunteer Optometric Services to Humanity (VOSH), Berkeley chapter, and served on the Student Life Committee in her second year. Though many hours of planning were involved, she enjoyed coordinating events and boosting the morale of students by planning fun activities. She grabbed the opportunities to combine her love for optometry and travel by participating in a VOSH trip to Nicaragua in 2012 and accompanying an optometrist and two other optometry students to Mexico in 2013. She will be helping the local community as an Albert Schweitzer Fellow this year. She and her partner, Michelle Wong, will be working with Monument Crisis Center in Concord, California, by offering vision screenings to low-income individuals. Through this project, she hopes to create more awareness about being proactive about one's eye health. Shannon looks forward to all the potential learning experiences ahead—from patient encounters to all the opportunities to try delicious food with her optometry colleagues.

MICHELLE WONG '16

Michelle was born and raised in San Leandro, California. She attended UC Berkeley as an

undergraduate, receiving a bachelor's degree in Molecular & Cell Biology. Michelle started exploring optometry as a career option after taking Dr. Richard Van Sluyster's freshman seminar on the anatomy of the human eye, and Dean Emeritus Jay Enoch's sophomore seminar on eye care in rural India. Michelle gained more knowledge about optometry through the pre-optometry club, Foresight, where she heard about the profession, different optometric programs, and engaged with Berkeley Optometry faculty and students over lunches and workshops.

Michelle eventually decided on optometry as her career after volunteering in the community with EyePACS, Project Vision, and Prevent Blindness Northern California, and seeing what an impact she could make in people's lives by restoring their vision. Michelle ultimately chose Berkeley Optometry for the rigorous curriculum, high volume of patient encounters, and the tight-knit community of students and faculty.

As a graduate student, Michelle has continued her commitment to service. She has coordinated volunteer opportunities for students at local health fairs and vision screenings, as well as educational outreach events at nearby elementary schools. She also volunteered with VOSH to provide eye care to over 3,000 residents of San Juan Del Sur and neighboring cities in Nicaragua, and she looks forward to entering clinic to care for patients and grow in her optometric career.

As 2014–2015 Albert Schweitzer Fellows, Michelle and Shannon Lee plan to offer vision screenings at Monument Crisis Center in Concord, California. Monument Crisis Center supports over 14,000 households, many low income. Monument Crisis Center strives to alleviate poverty by providing services such as grocery distribution, workshops on language and career development, and assistance for insurance enrollment. Monument Crisis Center also offers health exams through RotaCare and dental screenings through local student volunteers. Michelle is excited to expand the health offerings of Monument Crisis Center by providing a vision component to address the visual needs of these patients and to educate patients on the importance of eye and systemic health.

FACULTY FOCUS



SHIRIN BAREZ, MD

Shirin Barez came to Berkeley as an undergraduate and quickly became intrigued by the complexity of the visual system. This interest led her to enter the UC Berkeley School of Optometry, where she worked with Professor Lawrence Stark, a pioneer in the field of bioengineering, on a model of the pupil response mechanism. She received a master's degree in Physiological Optics. While at UCBSO she successfully ran for an elected seat on the Associated Students of University of California (ASUC) senate, representing the professional schools on campus. Dr. Barez received her medical degree from the George Washington University School of Medicine.

Following her interest in basic science and ocular disease, she spent a year at the National Eye Institute studying the immunology of retinoblastoma. She completed her residency in ophthalmology at the George Washington University Medical Center and a two-year vitreoretinal fellowship at the Devers Eye Institute in Portland, Oregon. Upon returning to the Bay Area to begin private practice in the East Bay, Dr. Barez joined the clinical faculty at Berkeley Optometry in 1997, where she currently is a clinical professor. In addition to her teaching and clinical responsibilities, she remains active in clinical research. A decade-long collaboration with former Dean Anthony Adams' Diabetes Study has resulted in numerous abstracts and publications.

Dr. Barez has served as an advisor to and qualifying exam committee member for a number of PhD students in the Vision Science Program. She is senior consultant to EyePACS diabetic screening program and provides treatment for many patients with diabetic retinopathy who would otherwise not have access to treatment for this potentially blinding disease. Dr. Barez is a diplomate of the American Board of Ophthalmology and a fellow of the American Academy of Ophthalmology. She has been named as one of the East Bay's top doctors by *Oakland Magazine*. Dr. Barez enjoys organic gardening, hiking, photography and spending time with family and friends.



CLAUDIA C. RUEGG, OD '11

Claudia Ruegg joined the full-time clinical faculty in 2013 as an assistant clinical professor and works at various on- and off-campus clinics. She supervises third- and fourth-year clinicians at UC Berkeley and the Alameda County Medical Center in Oakland, with a focus on primary care and ocular disease, particularly diabetes and glaucoma. As the clinical supervisor at our new satellite clinic at the UC Santa Cruz Student Health Center, she performs direct patient care and supervises fourth-year students. She is enjoying the rewards and challenges of starting a new clinic from the ground up. Located on campus, the Student Health Center serves UCSC undergraduate and graduate students, and optometry is a well-integrated part of the healthcare team. As a mentor at numerous Glaucoma Grand Rounds, Dr. Ruegg has provided continuing education to many optometrists in the process of glaucoma certification.

Dr. Ruegg grew up in the South Bay and later moved to Los Angeles to obtain a BS in Psychobiology from UCLA in 2007. Subsequently she completed her OD degree at UC Berkeley in 2011. She attributes much of her ocular disease experience to her residency training at the Albuquerque VA hospital in New Mexico where she was mentored by Michael Sullivan-Mee, OD and focused on ocular disease management and integration with systemic disease, including vascular, infectious and neurologic conditions. She also completed a year-long glaucoma research project to investigate novel use of the Heidelberg Spectralis OCT in glaucoma detection. Her work was subsequently published in the *American Journal of Ophthalmology* in 2013 and the project is still on-going. After residency she moved to Washington to join the medical staff at the Spokane VA hospital, providing direct patient care as well as supervising fourth-year interns from Pacific University. Dr. Ruegg was excited at the opportunity to move back to California to join the excellent faculty at UC Berkeley and continue teaching. She enjoys seeing her students grow as clinicians and expand their knowledge of ocular disease and evidence-based medicine.

Dr. Ruegg loves spending time with friends, exploring the Bay Area's culinary scene and traveling internationally, especially to Europe to visit her family and cultivate her European roots.

CHRISTINA S. WILMER, OD '96

Chris Wilmer was born in Ojai, California, and has a continuing connection to the beauty of the Southern California Mountains and the Ojai Valley. Most of her school age years were spent living and playing in Long Beach before moving to Santa Cruz to attend college. Dr. Wilmer received her BA in Biology from the University of California at Santa Cruz and attended UC Berkeley Optometry for her OD degree. She completed her optometry residency training at the San Francisco VA Medical Center in primary care optometry.

Dr. Wilmer joined the clinical faculty part-time in 1997 and quickly jumped in full-time by the end of that calendar year. Her early clinical teaching was in primary care, contact lenses and vision screenings, and she was one of the first faculty members to teach in the eye clinic at San Francisco State University. In 1998 she became Chief of the Tang Eye Center, housed in the University Health Center. The emphasis on anterior segment disease and urgent care consultations at Tang was the catalyst for her interest in this area of eye care.

Residency education has been a major focus of Dr. Wilmer's career here at the school. In 1999 she became Chief Mentor of the Primary Care Residency Program. In 2001 Dr. Wilmer was appointed to the position of Director of Residency Programs where she provides guidance and oversight to the affiliated optometry residency programs located in the Fresno, Palo Alto, Reno and San Francisco VA Medical Centers.

In addition to her activities at the school, Dr. Wilmer is a frequent lecturer locally, regionally and nationally, on a number of topics with the emphasis on treatment and management of anterior segment disease and injury. She is the Chair Elect for the Anterior Segment Section of the American Academy of Optometry. She is also a member of the Disease Examination Development Committee for the National Board of Examiners in Optometry.

This year, Dr. Wilmer's contributions to Berkeley Optometry have taken a new focus. She became Associate Dean of Clinics on July 1, 2014. Her spouse Miesje and two sons Kai (8) and Rory (6) are incredibly supportive of her decision to take on this new role. When Dr. Wilmer is not thinking about optometry, she is coaching her sons on the soccer field, mountain biking, skiing, hiking and traveling with her adventurous family. This April, she achieved two of her long-term goals: she was appointed Clinical Professor at UCB and completed a 100-mile mountain bike ride on the White Rim Trail in Canyonlands, Utah, with her son Kai.



CARL JACOBSEN, OD '92

Carl Jacobsen is a graduate of Berkeley Optometry and a Fellow in the American Academy of Optometry. After completing a residency in hospital-based optometry at the Veteran's Administration Medical Center in San Francisco, he returned to UC Berkeley to manage a group of sub-specialty ophthalmologists as Chief of the Medical Eye Services Clinic.

He works with a group of four sub-specialty doctors: retinal, glaucoma, corneal and ophthalmoplastics. His duties at Berkeley Optometry are many and include patient care, clinical instruction, ocular photography and classroom lectures. He is also Chief Mentor for the ocular disease resident training program. Dr. Jacobsen has received the school's prestigious Roy Brandreth Teaching Award on several occasions and has entertained several graduating classes as their Faculty Commencement Speaker. He is an active member of the Optometric Glaucoma Society (OGS), serving on the executive board as chair of the OGS e-journal/newsletter committee. One of his teaching colleagues says of Carl, "His combination of clinical knowledge, sound judgment and interpersonal skills make him a perfect clinician!"

In his spare time, Dr. Jacobsen can be found riding one of his three motorcycles around the Bay Area and beyond.



CLASS NOTES

41 MORRIE KIRSCHEN enjoyed a nostalgic visit back to the Berkeley campus on May 31, 2014. With his son, **DAVID KIRSCHEN** OD '72, PhD '77, he walked through Sather Gate and up the hill to Minor Hall. David notes that it was great listening to all of his father's stories about when he was a student at Berkeley and all the changes to the campus he noticed since he had been there last, "not bad for a man 95 years old."



58 JIM LAWSON joined the military as a Second Lieutenant directly out of school. Jim says, "I got patriotic and volunteered because otherwise I would have been drafted as a private." After four years in the

service, he left as a Captain and purchased a private practice in Klamath Falls, Oregon. "I practiced solo (nobody would put up with me) for 40 years and retired 12 years ago."

He and his wife travel extensively and own a townhouse apartment on the Caribbean island of Bonaire. They stay there three months at a time, twice a year for a total of six months each year, scuba diving nearly every day. His hobbies have always been music and sailing. He plays his guitar and sings whenever he can find a captive audience. He has a 31-foot racing trimaran in Oregon and a 14-foot racing Sunfish on Bonaire. As his wife Chris says, "It's a tough life, but somebody has to do it." When asked if he misses his optometric practice, he says, "Well, I miss the good patients, but not the bad patients—been there, done that for over 40 years—time to do something else!"

63 DAN SANDERS '63, ERNIE TAKAHASHI '68, MIKE HARRIS '65 and LARRY THAL '75 were available for consults on the 2013 Alumni Association trip to Vietnam and Cambodia.



65 Opto Bears cheered the Cal Bears to a 59–56 victory over Colorado in double overtime on September 27, 2014. Shown from right to left are **WEYLIN ENG '65**, Jenny Takahashi, **ERNIE TAKAHASHI '68**, Professor Janaki Bakhle, Chancellor Nicholas Dirks, Kathy Dumbleton, **PAM FONG '77**, Dean John Flanagan, Rose Eng, Esther Thal and **LARRY THAL '75**.

"Yes, Michael, we did tell you we would come back as soon as you yelled—but we got hungry and forgot." **MICHAEL HARRIS** says he enjoyed the last Alumni Trip to Vietnam and Cambodia, despite the python!



68 ERNIE TAKAHASHI and his wife, Jenny, explored the 12th-century temple at Angkor Wat during the last Alumni trip to Vietnam and Cambodia.



74 STEPHEN CHUN has a new passion—dragon boat racing! His Berkeley-based team, Dragon Max, won a bronze medal at the World Dragon Boat Championships in Ravenna, Italy, in September. Steve is shown here after his crew won a gold medal in the San Francisco International Dragon Boat Festival (senior division) on Treasure Island. A few



other things you may not have known about Steve include the fact that he was a competitive cyclist, served as a storyteller at the Asian Art Museum in San Francisco, and as a docent at the California Academy of Sciences, has been married to Doris for 38 years and is the grandson of a member of Dr. Sun Yat Sen's committee, which overthrew the last dynasty in China!

BRUCE DONG says that friends consider him "lucky," and he agrees. He enjoys three days a week in a two-office, two-OD practice that he sold on January 1, 2014. "No headaches here, loving the fun!" Bruce says his family is healthy, and all are working. His fiancé, Huey Chen, is "the greatest," and their retirement life is "covered."

Bruce believes that what makes him different is that from day one of being in solo practice, he's been a believer in nutritional supplementation technology. Today, nutritional supplements are more "mainstream" but not back then. Being an American-born Chinese in California, he had exposure to both American and Chinese culture and health technology. Though he says he was raised on "junk" food, he now has the best blood tests of his adult life by living a paleo "lite" life style—he weighs less now than when he was 24 years old!

Seeing as golfers are into technology, Bruce acquired a sport bracelet. He notes that athletes wear them. "I heard that some Koreans wear 5 and Canadians wear 15. I followed suit and good things happened. My chronic and painful hip flexor tendonitis from golfing has recovered to where I am delighted! No more suffering and feeling 'old' and sometimes

playing like a 35 year old; that's different!" Bruce continues, "If this sounds like a commercial, could be. I am 'advertising' that I went from suffering to delighted from this technology. Someone else may benefit from trying it too. I do not have the most 'toys' or money, but am among those having the most fun!" His e-mail is drdong2020@yahoo.com.

75 CHRIS CABRERA spent most of his career in the San Jose area. He worked in several modes of practice, including Kaiser, a large refractive surgery center and a stint with the Air Force Reserve. Chris raised his son there, and his son is now working for a Bay Area credit union in investment services.

When Chris "retired," he left his small ethnic private practice and Valley Medical Center behind and moved to Humboldt County when his mother was terminally ill. Eventually, he made his way to Sacramento where he "unretired" and is now working in an MD/OD practice in Woodland and has a Costco office in Manteca.

Although he has a busy six-day week, Chris very much enjoys what he is doing and plans to continue for at least two more years and then plans to slow down to part-time. He would eventually like to live part-time in California and part-time in a Latin American country like Mexico, Costa Rica or Panama.



RICHARD HOM is currently working on a project to integrate optometry and primary care medicine within the Anthem family of Blue Cross and Blue Shield companies throughout the United States. He began at WellPoint (parent of Anthem) as National Optometric Director in April 2012. Additionally, Richard is a recognized social media author on optometry and career management. He currently resides in San Mateo, CA.



In November, **ARTHUR LOW**'s son, Evan Low, came in first in the election for State Assembly seat #28. The former incumbent, Paul Fong, was being termed out and endorsed Evan. Congratulations!

On another note, Arthur went on a fishing trip to Sitka, Alaska



in July and caught his biggest-ever king salmon, weighing 31 lbs!

LARRY THAL and Esther (about to celebrate their 46th anniversary) are shown here visiting the Angkor Archaeological Park in Cambodia



during the most recent Optometry Alumni trip. Larry is retiring for the third time at year end (Air Force, private practice and Berkeley Optometry). Esther retired more than a year ago and has many more trips planned. Daughter Danielle and husband Ben live in New Orleans where they met while going to Tulane. They both completed MBAs and are “off the payroll.” Middle daughter Nicole has a scholarship to Tulane Law School and is nearly “off the payroll.” Arielle, the youngest, is in her second year of medical school at George Washington University, Washington, DC—no scholarships to be had and a while to go yet, so “still on the payroll.” Larry’s mother, widow of Bernhardt Thal ’48, is 95, doing very well and making all the Thals quite proud!

76 In January 2014, **DAVID HSIEH** earned a master’s of science degree in systems engineering from George Washington University, Washington, DC. In April, he renewed his Project Management Professional (PMP) certification.

80 Congratulations to (pictured left to right) **RANDALL YUMORI** and **DONALD MATSUMOTO** whose office was named Optometry Giving Sight (OGS) National Practice of the Year.

Optometry Giving Sight, a global fundraising organization that

specifically targets the prevention of blindness and impaired vision due to uncorrected refractive error, has honored Pacific EyeCare and its doctors, Randall and Donald, as the National Practice of the Year for 2013. Drs. Yumori and Matsumoto have tirelessly given and sponsored fundraising efforts for OGS to help fund OGS’ efforts to train local eye-care professionals, establish vision centers for sustainability and deliver eye care and low-cost glasses.

OGS was created by the World Council of Optometry, the Brien Holden Vision Institute Foundation and the International Agency for the Prevention of Blindness (IAPB) in 2003 to mobilize resources from the global optometric community to help eliminate refractive error blindness and low vision. OGS supports the goals of VISION 2020—the global initiative to eliminate preventable blindness sponsored by IAPB and the World Health Organization (WHO).

82 **DON MUTTI** OD ’82, PhD ’92, received The Ohio State Alumni Association Award for Distinguished Teaching.

85 **VENGU LAKSHMIANRAYANAN**, PhD ’85, just completed a yearlong sabbatical as a visiting professor of physics and electrical engineering at the University of Michigan, Ann Arbor. Last year, he was awarded the Esther Hoffman Beller medal



of the Optical Society of America for contributions to optical science and engineering. He serves on the Steering Committee of the International Year of Light, declared to be in 2015 by the United Nations.

His eldest daughter, Molly, is currently finishing an MS in ethnomusicology at Memorial University in Canada, and his second daughter, Kelly, is a second-year student in software engineering at the University of Waterloo.



89 **CLAUDIA BEAR** is currently Managing Optometrist at the Kaiser Permanente South Bay Medical Center, which includes 18 optometrists working in 4 locations. In her spare time, she conducts parent-training workshops for her daughters’ charter schools, along with exhibiting paintings and artist books in several art shows.

90 **CORINA VAN DE POL** joined the faculty at Marshall B. Ketchum University (Southern California College of Optometry) as an Assistant Professor in June 2014. She is now teaching Geometric and Physical Optics to first-year students.



86 Pictured from left to right are **MIKE BOGGS**, **BLAKE KUWAHARA**, **KARIN MENG** and **JEFF AZUS** celebrating Mike’s birthday in San Francisco’s North Beach.





92 This summer **CARL JACOBSEN** completed a 3,300-mile solo motorcycle trip to Colorado. He has recently expanded his teaching duties to include work as a motorcycle riding instructor for Moto-U, a local riding school. He lives in an El Cerrito home with a stunning view, a lovely wife and a grumpy cat.

93 Randall Lum moved his practice to a new shopping center in South San Francisco, Westborough Square. This move will be the last of his career as he has up to a 25-year lease. It is his second move since purchasing the practice in 1998. The grand opening was scheduled for October!

Randall has two children at St. Ignatius High School in San Francisco. Matthew is in the class of 2016, and Carolyn is in the class of 2018.

98 **KRISTINE ENG, WEYLIN ENG** '65 and their family attended the showing of *The Price Is Right* in Los Angeles. Kristine notes that it was quite the “Eng Adventure,” as Shannon Eng (Kristine’s sister and Weylin’s daughter) was a contestant... and won!

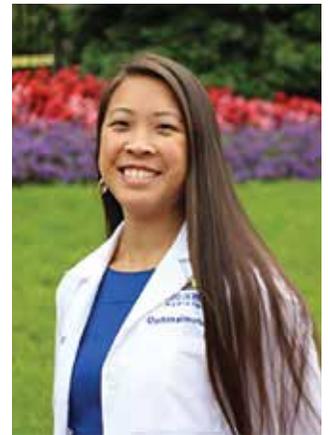


06 Classmates **SARA CHIU** and **CHRISTOPHER GEE** purchased the practice of retiring **MARK McADAMS** '74 in Dublin, CA. The grand opening of Iron Horse Optometric Group was scheduled for October. You can follow the updates on their Facebook page at www.facebook.com/ironhorseoptometry.

They are pictured in their office (which used to be a tile store).



10 **TIFFANY CHAN** was recently promoted to Assistant Professor of Ophthalmology in the Vision Rehabilitation Service at the Wilmer Eye Institute, Johns Hopkins School of Medicine.



IN MEMORIAM

SHERWYNE R. BAKAR '61

WINIFRED HIRSCH
(WIFE OF FORMER DEAN, MONROE HIRSCH)

CURTIS BENTON '42

ROBERT R. RECTOR '51

CHARLES F. BROWN '47

VINCENT G. SANCHEZ '90

WILLIAM E. DORE '56

PETER V. SIGNOROTTI '49

JOHN R. GRIFFIN '58

SHELDON M. SMITH '58

ALUMNI FOCUS

Dr. Karla Zadnik has been clear about her life's purpose since she was 16 years old. Her paternal grandfather, Dr. William J. Henry, an optometrist in Ohio, had a huge influence on her. Shortly after her grandfather's passing, Dr. Zadnik decided to follow his professional path and become an optometrist. While she originally planned a career in the private practice of optometry, life presented her with mentors and opportunities that led her on a path to being one of the most prolific optometric researchers of our time.

AFTER UNDERGRADUATE WORK at the University of California, Santa Barbara, Dr. Zadnik received all three of her academic degrees from the University of California, Berkeley, School of Optometry (BS '80, OD '82, PhD '92). After optometry school and before graduate school, she worked in the Department of Ophthalmology at the University of California, Davis, full-time, ultimately serving on the faculty there for 14 years.

In 1996 Dr. Zadnik joined the faculty at The Ohio State University College of Optometry where she became a full professor and the first and only Glenn A. Fry Professor in Optometry and Physiological Optics. She has chaired the university's Biomedical Sciences Institutional Review Board for 10 years. As Associate Dean for a decade, Dr. Zadnik was responsible for both the professional and graduate programs and research. In June of 2014 she was named the fifth (and first female) dean of The Ohio State University's College of Optometry.

Dr. Zadnik has an impressive list of academic and professional achievements. Very early in her career, she attended the American Academy of Optometry meeting and found the organization of her heart. She quickly became a Fellow and Diplomat in Cornea and Contact Lenses. While ascending to chair the Section on Cornea and Contact Lenses, she served as Chair of the Academy's Research Committee. In 1995 Dr. Zadnik received the American Optometric Foundation's Glenn A. Fry Award,

in recognition of the quality, significance, impact and relevance to optometry of her research contributions. After many years of service on the Board of Directors, she served the Academy as President in 2010–2012.

Dr. Zadnik has served as Chair of the American Optometric Association's (AOA) Council on Research since



Dr. Karla Zadnik OD '82, PhD '92 was named to the National Optometry Hall of Fame.

2000. She is especially proud of the Council's Summer Research Institutes, held every other summer since 1988 and co-sponsored by the AOA and the Academy, that have resulted in an estimated \$78 million in extramural funding for optometric research.

Her record of leadership is impressive. Dr. Zadnik served on the National Eye Institute's (NEI) National Advisory Eye Council in 2000–04, based on her research success. She chaired the Collaborative Longitudinal Evaluation of Keratoconus Study, the first multicenter study based in optometry that was funded by the NEI. Simultaneously, she and Don Mutti (OD '82, PhD '92) and Emeritus Dean Tony Adams initiated the Orinda Longitudinal Study of Myopia, which became the Collaborative Longitudinal Evaluation of Ethnicity and Refractive Error Study, a 20-year, multi-center project to develop predictors for juvenile-onset myopia.

Dr. Zadnik has served the optometry profession well. For her outstanding accomplishments and significant contributions to the profession, Dr. Zadnik was recently honored as an inductee of the National Optometry Hall of Fame. She is well known among her colleagues as

an accomplished researcher, gifted educator and skilled administrator, yet her most remarkable attribute is her energetic personality and selfless concern for others; she has hosted countless faculty members from all over the country over lobster served in her Ohio backyard. In fact, when her husband, Kurt Zadnik, managing editor of *Optometry and Vision Science*, sees someone at an optometric gathering and the person says, "I've had lobster at your house," he replies drily, "Hasn't everyone?"

Dr. Zadnik notes her own career "has been highlighted by a series of mentors," and she is a sought-after mentor herself, especially by young students and optometrists who are navigating their own personal and professional juggling acts. Her experiences raising daughters Andra (29, working in international film distribution at Lionsgate in Los Angeles) and Nina Marie (24, a preschool teacher in Powell, Ohio) give her lots of stories to tell about having it all, leaning in, and just getting through the day. Building on the legacies of her own mentors—Mark Mannis, Tony Adams and Mert Flom (OD '51, PhD '57)—she is excited to take The Ohio State University College of Optometry to new heights.



Out of Ohio State's five deans, three are graduates of Berkeley Optometry. From left to right: Karla Zadnik OD '82, PhD '92, Frederick Hebbard MS '51, PhD '57 and Richard Hill OD '58, PhD '61.

HALL OF FAME

In honor of those alumni and retired faculty whose contributions to the profession of optometry, through service, teaching or research have been so monumental as to be universally recognized, the school has dedicated the “Hall of Fame.” These individuals have made contributions that distinguish the University of California, Berkeley, School of Optometry above all others!

BERKELEY OPTOMETRY CELEBRATED its third induction to its Hall of Fame at a gala on February 22. Being inducted this year were Tony Adams, Colin Blakemore, Darrell Carter, Ted Cohn, Ed Elliott, Ralph Freeman, Mike Harris, Don Korb, Sheldon Miller, Don Mitchell, Tom Peters, Larry Stark and Karen Walker-Brandreth. The formal presentation started with a brief and humorous introduction by Assistant Dean Larry Thal, who with former Clinical Professor Craig Hisaka, originally conceived of the Hall of Fame to recognize not only those who have had such an important historical role at Berkeley Optometry, but also for whom future students should reflect upon as role models.

Larry and Craig had noted that with discussions with students in Primary Care Clinic regarding the heritage of our profession that Chuck Segar (past AOA president and HOF member) was thought to be a famous guitar player (probably confused with Robert Clark Segar and the Silver Bullet Band), that Monroe Hirsch (former Dean and HOF Charter member) was confused with the famous football player, Elroy “Crazy Legs” Hirsch from the University of Wisconsin, and that Allan Freid (another HOF Charter member and at the time a professor and chair of the COA Legislative Committee), was thought to be Alan Freed, the founder of “Rock n’ Roll.”

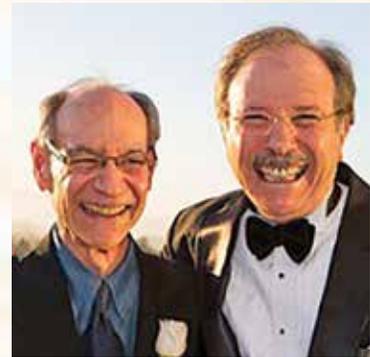
As a result Larry and Craig assigned each student in the Practice Management class that they taught a biography. The biographies were quite good and students enjoyed doing them, especially the interviews

of those who were still living. Larry took them to Dean Adams and out of this project came the HOF.

Tony appointed Meredith Morgan to chair the first committee and asked Larry to serve as secretary. Of course he would not pass up an opportunity to work with Meredith on such a project. He told the story of his first meeting where he met Meredith outside of what was then the contact lens clinic at the top of the stairwell near the dean’s office. At that time, the bronze bust of Meredith was there. Meredith arrived shortly before Larry, and as he came up the stairs from the clinic he heard a fourth-year student ask Meredith if he could help him. Meredith asked if he looked like he needed help and the student responded that he thought Meredith looked lost. Meredith asked the student if he knew who he was, which he didn’t. Just as Larry reached the top of the stairs to try and bail him out, he saw the student look over at the bronze,

back at Meredith, back at the bronze and then turn as red as a pomegranate.

What has evolved is not yet perfect but that is the challenge moving forward. Meredith Morgan established a precedent that to avoid politics in the selection process, if the nominee was a faculty member that he or she was not eligible until retired. After Executive Vice Chancellor and Provost George Bresslauer thanked Dean Dennis Levi for his tenure and great service, Dennis and Bob Mandell introduced each Hall of Fame inductee. (Complete descriptions are available on the Berkeley Optometry website.) Among the remarks that were particularly memorable are the following:



George Bresslauer and Master of Ceremonies Dennis Levi



Hall of Fame 2014 inductees (pictured from left to right): Donald Korb, OD; Tony Adams, OD, PhD; Darrell Carter, OD, PhD '57 (seated); Donald E. Mitchell, PhD; Colin Blakemore, PhD '68; Karen Walker-Brandreth, OD '68; Michael G. Harris, OD '65, Ed Elliott, OD '65; Sheldon S. Miller, PhD.

I am honored to be inducted to the University of California, Berkeley, Optometry Hall of Fame. To join the ranks of some of my “optometry heroes” and to appear alongside many of optometry’s outstanding leaders is indeed an honor. Of particular note is my friend, mentor and colleague, Meredith Morgan. Meredith was a major factor in my becoming an optometrist and was a genuine supporter and

often a cheerleader when I had the opportunity to lead and speak for our profession. My education at UC, my opportunity to teach and lead at the school added prestige and credence to my quest of putting optometry “at the table.” To be part of the discussion leads to being part of the decisions that affect our profession and our role in healthcare.

—Ed Elliott



Bob Mandell presenting award to Ed Elliott.

I’ve been privileged to be a part of Berkeley Optometry for over 50 years. I’ve had an opportunity to train at the best optometry program in the world, and in turn, to train the best optometry students in the world. I’ve had the best job in the world. Every day, I woke up looking forward to another wonderful day of

teaching and working at Berkeley Optometry. (Well, almost every day!) As I’ve learned over the years, and as I’ve tried to teach my students, you’ll be happy in your career if you do what you love and love what you do. It’s worked for me and it can work for you.

—Michael Harris



Michael Harris acceptance speech.

I am not only appreciative but humbled by this recognition. Berkeley has always been the quintessential model for excellence in education, clinic and research. I was both taught and challenged by the remarkable contributions in cornea and contact lenses at Berkeley in the golden era of contact lens development—an era that included many luminaries and legends on the Berkeley faculty. The names and contributions of Sarver, Mandell, Polse, Harris, Fatt, Radke and many others are legendary. They taught the

world. How fortunate I was to be taught and inspired by these giants, and also to work with them. And Tony Adams has been, and remains, a primary mentor for me. Berkeley was and remains in a class without peer. I have always had both respect and affection for all that Berkeley Optometry has and continues to be. To realize that you have allowed me to join a group with Meredith Morgan and so many luminaries and friends is truly difficult to imagine.

—Don Korb



Bob Mandell presenting award to Don Korb.

HALL OF FAME

The School of Optometry and the Berkeley campus have benefited each one of us in unique ways and I feel privileged and very lucky to share with all of you this particular and very special cycle of life. I would like to begin by emphasizing what I believe all of us understand—the School of Optometry is a relatively unique entity on the Berkeley campus.

There are a variety of different reasons for this and I'd like to point out one of them. It has to do with the different ways we can carry out our scientific mission. The history of the School of Optometry encompasses a critical association with two important ways of thinking about how science should be done. For example, there is the notion of “pure” science. What we usually mean by that is basic or laboratory-based research that is reductionist in nature and usually hypothesis driven. In contrast with that form of thinking and behaving, is science for “use.”

Science for use is sometimes referred to as translational science or in the biomedical world—clinical science. There is a dynamic tension that has historically existed between those two ways of behaving. That tension has been noticed at least since the time of Aristotle. Some think that those two ways of thinking about science are really disparate and are necessarily separated by long periods of gestation.

I think, however, there are clear examples to show that is not necessarily the case and that those two ways of doing science can be encompassed together. An example is the recent spectacular advances in stem cell biology that have been made in the last eight years or so.

They have demonstrated that human adult somatic cells can be reprogrammed into their pluripotent state, practically equivalent to embryonic stem cells. Those induced pluripotent stem cells can be then differentiated into stable authentic adult cells of almost any kind. These cells have been used in a wide variety of investigations to significantly deepen our understanding of mechanisms of

human disease in organs throughout the body. These basic science advances have led to fundamentally important discoveries in human developmental biology. Whole organs from throughout the body (including the eye) have been generated by a single population of these cells.

This outcome has provided the basis for fundamentally important clinical advances in regenerative medicine (transplantation) and in the development of small molecule therapeutic interventions against a growing number of diseases. What this work shows is that concomitant clinical and basic work can expand, via positive feedback in both directions, at an edifyingly rapid pace.

This example illustrates one aspect of science, sometimes called translational, that embodies separate ways of thinking. Unfortunately, each of these separate ways of thinking are often exaggerated/disparaged in the competition for research dollar support.

Here the point of my comments is to illustrate how clinically driven (science for use) advances serve to drive the basic science part of the equation by causing an enormous increase in our understanding of human developmental biology.

I believe that the embodiment of pure science and science for use is a critically important aspect of the Berkeley Optometry mission, along with teaching and service. These pillars honor the highest goals of this University, of the biomedical community, and of the public that we all serve.

—Sheldon Miller



Dennis Levi presenting award to Sheldon Miller.

As a former graduate student here at Berkeley I have to single out the counsel provide by my supervisor, Gerald Westheimer, who taught me true scientific rigor.

Toward the end of my graduate training, Gerald provided me with wise advice that set me on the career path that followed. He suggested that I should borrow an old practice from my Australian roots, called squatters rights, which would allow me to broaden my future career prospects by obtaining a postdoctoral position in a field like psychology. After a while he suggested that people may not question my qualifications for an academic position in this field. This strategy worked extremely well as I obtained a position in the Department of Psychology (now the Department of Psychology & Neuroscience) at Dalhousie University in Halifax NS, Canada.

It has not all been a bed of roses at Dalhousie; I remember early on an incident triggered by the high teaching loads associated with psychology. I was required each morning to teach three different classes in four hours, and on the second day of the new term I mixed up the four-digit numbers of the lecture room and

turned up at the wrong room. The philosophy students in the room were expecting a lecture on logic but instead I began to describe the scotopic luminosity curve.

Either because of the subject matter or my use of colored chalk, they became very attentive and silent. Ten minutes into the class an elderly student (as I thought) who was the true professor for the class (philosophy profs are habitually late), entered the room and began to yell at me. I told him to be quiet and wait until later to ask a question. Eventually I realized that I was in the wrong room and beat a hasty retreat that was accompanied by money changing hands as students settled their bets as to the length of time it would take for me to realize my error.

—Donald Mitchell



Dennis Levi presenting award to Donald Mitchell.

They say that no one is ever sorry on their deathbed that they spent too little time at the office, but in the case of my father, he wished until his last moment that he was able to work. He loved his work, his great good fortune at getting

paid for doing what he loved, and his colleagues and graduate students from all around the world, who filled our home during my childhood.

**—Elizabeth Stark Powers
on behalf of her father, Larry Stark**

I am truly honored and deeply touched by this recognition. I have a brief story to share with you. Often, over the last few years, in the middle of night, when it was dark and quiet, and when I let my mind wander, I would have a recurrent vision. It was an image of my photograph hanging in “The Hall” with the picture of my late husband, Roy.

Then, in the light of day, I’d tell myself to “snap out of it” and “quit dreaming,” because the reality was that such an event was never going to happen. Well, tonight, from the bottom of my heart, I must thank you for making my dream come true, for making this my reality

—Karen Walker-Brandreth



Bob Mandell presenting award to Karen Walker-Brandreth.

ADMISSIONS AND STUDENT AFFAIRS OFFICE



The Admissions and Student Affairs Office (ASAO) is: Dr. Richard Van Sluyters, Associate Dean; Sharon Joyce, Assistant Dean; Rebecca Andersen, Assistant Director; Kait Guthrie, Interim Coordinator; Kailin Hu, Assistant Director
Not pictured: Heather Iwata, Associate Director

APPLICATIONS FOR ADMISSION were up in 2013–2014 as we collected 256 applications for Fall 2014 entry. Interview Day, in February, introduced the use of Multiple Mini-Interviews (MMIs), as part of our overall holistic file review of the 114 prospective students who interviewed at Berkeley Optometry.

MMIs are used to better assess critical thinking and problem-solving skills as the interviewees rotate through “think on your feet” stations.

New Student Orientation was from August 19–21 and 64 students in the Class of 2018 started this fall.

The quality of our applicant pool remains high, as reflected by the incoming Class of 2018:

Average OAT AA = 349
Biology/Chemistry/ Physics GPA = 3.40

There are 52 women and 12 men in the entering class, 9 are out-of-state students, which includes 1 Canadian. Forty-three of the entering Class of 2018 students graduated from a UC school, which is reflective of national data indicating that 30 percent of all optometry applicants in the U.S. and Puerto Rico attend a UC school for their undergraduate degree.

CONTINUING EDUCATION

Each year the Berkeley Optometry Continuing Education Office certifies over 15,000 continuing education hours for optometrists practicing in California and other states, making it the largest program at an accredited optometry school in North America. Highlights include the Berkeley Practicum, Morgan Symposium and Berkeley Glaucoma Day.

Directed by Patsy Harvey, OD, MPH '81, and coordinated by Danni Peck, MBA, CMP, the

Continuing Education Office seeks to provide a variety of high-quality courses for optometrists as they fulfill their requirements of licensure renewal set by the California State Board of Optometry.

Other CE programs provided by our clinical faculty, Vision Science faculty and the Office of Development and Alumni Relations include the annual Berkeley Optometry CE Conference and Reunion Celebration, Glaucoma Grand Rounds and the Resident Forum.

DEAN FLANAGAN TO KEYNOTE BERKELEY PRACTICUM

Dean John Flanagan, OD, PhD, will be the Keynote Speaker and present the Karen Walker-Brandreth Lecture at the Berkeley Practicum on January 17-19, 2015.

His lecture, "**Glaucoma: What We Know, How We Should Practice, and What the Future May Hold,**" will present valuable information and insight on glaucoma diagnosis and management, as well as possible directions for the future.

The remainder of the 26th Annual Berkeley Practicum will feature a wide range of exciting topics as well as the return of its third keynote speaker, Jonathan Horton, MD, PhD, Professor of Ophthalmology, Neurology and Physiology at UC San Francisco. Dr. Horton will present "**My Approach to Vision Loss,**" his methodology for investigating vision loss at points along the visual pathway with examples and cases involving the photoreceptor layer to the visual cortex.

Additional presentations will include "**Nutrition: Looking Beyond the Golden Arches**" with nutrition specialist, Kimberly Reed, OD. Exploring a prevalent disease and recent findings of its ocular manifestations will be "**Alzheimer's Disease: Causes, Treatments and Ocular Manifestations**" by Patsy Harvey, OD, MPH. Ocular disease presentations will include "**Early Detection of Glaucoma—Clinical Clues,**" "**Glaucoma Pharmacology A–Z,**" "**High Risk Refractive Surgery: Complications and Solutions,**" and our interactive series "**Grand Rounds: What Would You Do?**"

The Berkeley Practicum will be held at the DoubleTree Hotel, Berkeley Marina. More information may be found at optometry.berkeley.edu/ce and online registration is available at regonline.com/UCBSO_BP2015.

ONLINE CONTINUING EDUCATION

UC Berkeley Optometry's Lectures and Demonstrations (UC-BOLD) will be rolling out a new and continuing series of COPE-approved online Continuing Education programs. We will be offering programs covering a wide-variety of TPA-certified topics, including various lectures on the diagnosis and treatment of ocular and systemic diseases. We will also have programs dedicated to enhancing knowledge about new developments in ophthalmic materials and advancements in contact lenses.

UC-BOLD's goal is not only to provide the convenience, efficiency and financial advantages of delivering content over the internet, but also to continually utilize and integrate technology to provide an unmatched quality of education, both through superlative content and through user experience and interactive content.

For more information please visit the UC-BOLD website: www.berkeleyce.org

UC-BOLD |

Glaucoma Certification and Online CE



Visit www.berkeleyce.org to learn how over 1,000 California optometrists are becoming glaucoma certified while earning CE.

Check out the new features for BOLD 2.0:

- a new look with simplified navigation
- a mobile-ready platform to stay connected on the go
- new courses to stay current and earn CE credit

The video-based lectures are given by renowned ODs and MDs and can be watched on your personal computer or hand-held device at your convenience.

To see what everyone's talking about, sign up for a course today.

Online: www.berkeleyce.org

Email: ceonline@berkeleyce.org

Phone: 800-548-8229

New Content Coming Soon!

STATE SENATOR HERNANDEZ SHINES AT MORGAN SYMPOSIUM

California State Senator Ed Hernandez, OD, was the keynote speaker and recipient of the 2014 Meredith Morgan Memorial Award. As an optometrist and Chair for the Senate Committee on Health, Senator Hernandez has been involved in many vision and healthcare bills that impact optometry and medicine.

On Saturday, May 3, Sen. Hernandez delivered the 29th Morgan Memorial Lecture titled “**Vision Care in California: New Directions, New Treatments.**” After reviewing the history of healthcare reform, Hernandez provided an in-depth analysis of the Covered California and Medi-Cal

plans including early intervention for pediatric patients, comprehensive treatments and preventive procedures. He then described the upcoming legislation affecting the scope of optometry, including the Optometry Practice Act (SB 492), which he authored.

Sen. Hernandez’s presentation of key developments in public health and medical legislation is an example of the unique and important educational topics that Berkeley Optometry CE programs provide to optometrists throughout each year.



State Senator Ed Hernandez presents at the 2014 Morgan Symposium.

2015 EVENTS

January 17–19
Berkeley Practicum with Berkeley Anterior Disease Lecture

March 25–26
Glaucoma Grand Rounds

April 24–26
Morgan Symposium with Berkeley Glaucoma Day

June 14
Resident Forum

The Meredith W. Morgan University of California Eye Center

THE MEREDITH W. MORGAN University of California Eye Center strives to maintain the goals of providing the very best clinical education for future optometrists while also providing the very best clinical care for our patient population.

Our role as Clinic Administrators is to facilitate these goals by providing support to students in order for them to focus on translating their knowledge and skills into independent and critical thinking toward providing the best possible care for patients. The Clinic Administration has a unique role of serving not only the optometry students, but also the faculty, staff and patients of the clinic. Common issues that we address on a typical day include repairing broken equipment, adjusting student or faculty schedules, and managing our externship sites across the nation. Under the guidance of the clinic director, we work to ensure we are meeting the needs of this community with optimally running clinics. This community consists of 50 clinical faculty, 130 students, 40 staff members and over 200 patients using our campus facility each day.

In order to provide a top-notch education for students and the best care for patients, we steadily grow our clinics

and incorporate the latest technologies. We continually expand our services with the development of new local clinics and externship sites nationwide. Some of our greatest improvements have occurred over the last year. Our Refractive Surgery Center now provides All-Laser LASIK. We also offer LipiFlow for the treatment of evaporative dry eye symptoms. In addition, we have a new Myopia Control Clinic that specializes in reducing the progression of myopia in children and young adults.

Dr. Edward Revelli, our clinic director of 23 years, who worked tirelessly to develop one of the country's best clinical training programs, recently retired. After searching for over a year, the School proudly announced Dr. Christina Wilmer '96 as the new Associate Dean of Clinical Affairs. Her many accomplishments include serving as Clinical Professor and Chief of the Tang Eye Center, Director of the Affiliated Residency Programs, and Chief Mentor of the Primary Care Residency. The future of the Meredith W. Morgan Eye Center is promising with Dr. Wilmer's future leadership.

Left to right: Erika Racklin, Financial Services Analyst, Online Grading System Supervisor; Irais Rodriguez, Student Absences, Online Grading System Administrator; Vikki Yu, O.D. (Class of 1999) Assistant Clinical Professor, Externship Director; Christina Wilmer, O.D. (Class of 1996) Associate Dean for Clinical Affairs, Director of Clinics, Director of Affiliated Residency Programs; Kerri Yoshiyama, O.D. (Class of 2004) Assistant Clinical Professor, Assistant Clinic Director; Tom Michelsen, Clinic Administrative Office Manager, Building Coordinator for Minor Hall Addition; Linh Le, O.D. (Class of 2011) Clinical Faculty, Faculty/Student Schedules Manager; and Anney Han, O.D. (Class of 2013) Special Projects Coordinator, Faculty Credentialing Coordinator



UNIVERSITY OF CALIFORNIA, BERKELEY
SCHOOL OF OPTOMETRY
302 Minor Hall # 2020
Berkeley, California 94720-2020

Nonprofit Organization
U.S. Postage Paid
University of California, Berkeley

ADDRESS SERVICE REQUESTED



BERKELEY
OPTOMETRY

The Class of 2014

