



Dr. Sara Thomasy (center) examines Teddy's eye following a corneal surgery to treat endothelial degeneration.

Improving **ANIMAL VISION**

It's fitting that Dr. Sara Thomasy is an ophthalmologist. Her eyes light up when she talks about the breakthroughs being made thanks to recent acquisitions of state-of-the-art imaging equipment. Eight new pieces of imaging equipment and one new piece of laboratory technology, made possible by grants from the [Center for Companion Animal Health \(CCAH\)](#), are now in use by the [Ophthalmology Service](#).

"All of these have advanced the way we practice," Thomasy said. "As an example, we just examined a dog with an injury that previously would not have been discovered. We struggled for weeks to determine why this patient had so much corneal swelling. When we did imaging with the spectralis, we saw that a layer of the cornea was detached."

The spectralis unit provides detailed cross-sectional imaging of the cornea, anterior chamber, iris, retina and optic nerve, and is commonly utilized in physician-based ophthalmology for clinical research and patient care.

With striking similarities between human and animal eyes, veterinary ophthalmologists at the school are able to collaborate with their human

"With the support of the CCAH, we're now able to do imaging and patient care that is unrivaled at any other veterinary hospital."

— Dr. Sara Thomasy

A Message from **THE DIRECTOR**

All of the work we fund through the CCAH is done to promote animal health and well-being. Your support allows us to push the boundaries of animal care. We do this through basic science, translational and clinical research. In this issue we talk about harnessing the immune system to fight cancer, learning how to better image eyes to save sight and improving orphan kitten survival.

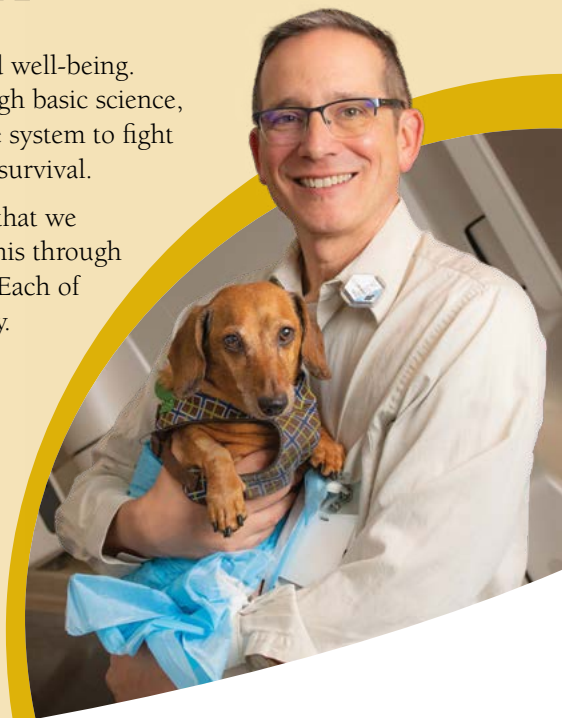
As director of our center, it is my job to make sure that we use your gifts wisely and that we distribute them to the people and projects likely to have the biggest impact. We do this through several programs, including our faculty grants, resident grants and equipment fund. Each of these are vital, competitively awarded and entirely funded through your philanthropy.

We get to highlight just a few of our completed projects in each newsletter, allowing us to show you how we put your generosity to work. All the while, the challenges of discovery, testing and implementing continue—along with inspiration for new ideas that will change how we diagnose and treat disease, and improve the lives of companion animals. With your support, we can continue to fund the best and the brightest to advance animal health everywhere.

Thank you,



Michael S. Kent, MAS, DVM, DACVIM, DACVR
Director, Center for Companion Animal Health



Racing for **RESEARCH**

Dr. Tim Helms '04, DVM '10 goes the extra mile when it comes to caring for his patients and advancing animal health. Last December, he completed the XTERRA World Championship triathlon to inspire donations for the [Companion Animal Memorial Fund \(CAMF\)](#). Helms and his team at the Central Animal Hospital in Petaluma, California, generously raised \$1,500 for the fund.

The race challenged athletes to a 1-mile swim, a 20-mile muddy mountain bike trail that climbed 3,500 feet up and down the lower slopes of the West Maui Mountains, and a 6.5-mile run that traversed forest trails. He placed 85th out of 800 competitors.

Helms' compassion for his patients and passion for fitness sparked his idea to compete in the triathlon to raise money.

"Honoring my patients through CAMF is important because I'm able to pay tribute to both pets and their owners who loved and cared for them," Helms said. "What better way to remember a beloved pet than by donating to this fund—supporting research that will improve the lives of companion animals?"

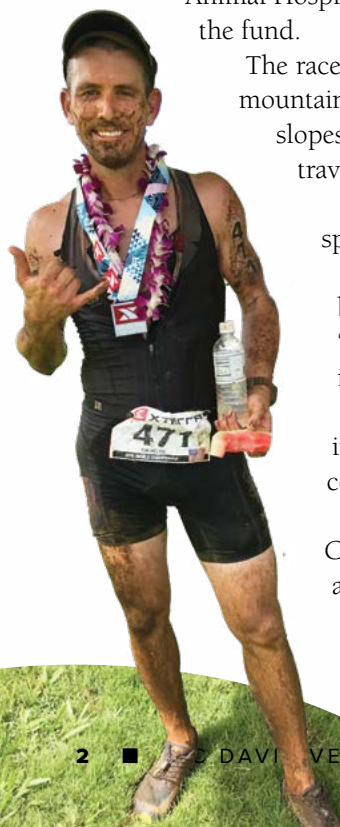
With a long-time interest in racing, Helms competed as an undergraduate for the UC Davis Aggies in both cross country and track and field. He then pursued his dream of becoming a veterinarian and continued to race by competing in off-road XTERRA triathlons intermittently since 2005.

"UC Davis is in my blood. Go Ags!" Helms said. "This was my third race at the XTERRA World Championship. I thought it would be a great way to motivate myself to train and to also raise excitement and awareness of CAMF."

Do you have a beloved animal you'd like to honor? Please visit give.ucdavis.edu/VCAH/V483022. For more information, contact us at 530-752-7024 or petmemorial@ucdavis.edu. See latest CAMF Honor Roll donors on [page 7](#).



Dr. Tim Helms and his two dogs.



ADVANCING PERSONALIZED MEDICINE for Dogs

After former U.S. President Jimmy Carter was successfully treated with immunotherapy for metastatic melanoma several years ago, Dr. Stephen McSorley started wondering—why isn't this treatment being offered to companion animals?

McSorley, an infectious disease immunologist who serves as director of the [Center for Comparative Medicine \(CCM\)](#), reached out to Dr. Robert Rebhun, a veterinary oncologist with the CCAH. By combining the strengths of researchers and clinicians at both centers, they began creating an immunotherapy drug for dogs modeled after pembrolizumab, the anti-PD-1 checkpoint immunotherapy drug that cleared Carter's melanoma.

The drug works by removing brakes placed on the immune system by tumor molecules (PD-1 in this case) that prevent the immune system's T cells from attacking the cancer. By creating antibodies to bind to these molecules, researchers allow the immune system to continue functioning properly and rid the body of a cancerous tumor.

"We're just copying what's been done in human medicine and shown to be successful," McSorley said. "The key to doing it here was combining the expertise of both centers."

Thanks to funding from donors to the CCAH, the collaboration has reached the point of creating an immunotherapy drug modified for canine patients. McSorley credits Dr. Jin Choi, a post-doctoral research fellow funded jointly by CCM and CCAH, with driving this project forward. Next steps include ramping up production and then making it available to CCAH oncologists to start clinical trials that will test the efficacy of this novel treatment for dogs with several types of cancer. Rebhun hopes that these trials will begin before the end of the year, but acknowledges that the process of clinical development is both time consuming and expensive.

While others are also developing immunotherapy drugs to treat cancer in dogs, Rebhun emphasized that researchers at [UC Davis](#) are working not only to come up with a successful treatment, but also to determine which canine patients might respond best. These additional projects are funded by CCAH donors and the [National Institutes of Health](#).

"It's tremendously powerful if you can offer personalized medicine to identify which patients are most likely to respond to immunotherapy before delivery," Rebhun said. "That's the goal. If you can identify them up front, you can avoid exposing them to more toxicity through chemotherapy and radiation. Not that we will get rid of all toxicity, but our goal is to choose the therapy that maximizes benefit and minimizes risk for each individual patient."

Immunotherapy isn't a magic bullet for all patients. In humans, for PD-1/PD-L1 inhibitors (drugs that target these specific cancer molecules), the response rate is about 25 percent or less depending on the type of cancer. That may not seem like a high percentage rate McSorley said, but those who do respond can show eradication of the tumor. That's different from previous cancer drugs where they would block cell division for a while until the tumor found a way around the drug.

"It's a very different thing to give a drug to patients and have some of them respond by a tumor being cured," McSorley said. "This has changed the way people think about cancer therapy. Immunotherapy is a hot field in human medicine and we should be able to keep translating it into canine medicine."



Dr. Jin Choi is a postdoctoral researcher in Dr. Stephen McSorley's lab at the Center for Comparative Medicine.

Improving Animal Vision

Continued from page 1

medicine counterparts at [UC Davis Health](#). Understanding there is much to be learned from both sides, researchers employ new technologies that could lead to shared breakthroughs.

CCAH also provided funds to acquire an electroporator, a piece of laboratory equipment that allows genetic modification of cells in culture dishes.

“Through the use of this technology, we can better understand the cell-signaling interactions that lead to scarring of the eye,” said Dr. Brian Leonard, an assistant professional researcher in comparative ophthalmology. “With this knowledge, we are able to develop novel therapeutics to improve the surgical outcome in veterinary and human patients.”

Thomasy recently collaborated with an ophthalmologist from UC Davis Health to diagnose epithelial downgrowth in a dog—a rare, aggressive ocular complication that can cause blindness. Because of the new imaging modalities, they were able to find an open wound in the cornea and correct it with surgery. This dog had already lost one eye, so saving the remaining eye was crucial.

“Our chances of success with this surgery were definitely higher because of the imaging capabilities of our new equipment,” Thomasy said. “We strive to operate our Ophthalmology Service at a similar level of practice as human medicine.”

The Ophthalmology Service has numerous clinical trials for which the new equipment is a vital component of the study.

“This new instrumentation has been absolutely imperative for our researchers to run clinical trials,” said Dr. Kathryn Good, chief of the service. “Transferring those discoveries to the clinic directly benefits our patients.”

Researchers are utilizing the imaging equipment to study some of the leading causes of blindness in pets. It’s also being used to advance corneal transplants.

“We could not provide this level of care and research without the support of CCAH,” Thomasy said. “We’re now able to do imaging and patient care that is unrivaled at any other veterinary hospital.”



The new Heidelberg Spectralis unit allows veterinary ophthalmologists to acquire detailed cross-sectional images of the cornea and retina at a resolution that approaches that of tissue histology.

Improving **NEWBORN KITTEN SURVIVAL**

If you’ve ever fostered neonatal kittens who require bottle feeding every two to three hours, you know how exhausting it can be. They are born underdeveloped with eyes sealed closed and ears folded, making them blind and deaf for the first 10-14 days.

They don’t start standing and walking until about four weeks old, and depend on their mother to keep them warm, provide them with food and help them eliminate waste.



Neonatal kittens are kept at consistent warmth in an incubator.

Without a mother cat, newborn kittens require round-the-clock human care to survive.

To increase newborn kittens’ chance of survival and lessen the load on foster parents, UC Davis researchers are conducting a study with incubators to determine whether there are optimum temperature and humidity levels that make it possible to feed them less frequently. The study, led by Dr. Karen Vernau and postdoctoral researcher Dr. Mikel Maria Delgado, started in May of 2018.

MEASURING MERCURY in Dog Food

Mercury consumption poses a toxicological health risk to humans and animals, so naturally, dog owners want to know if the food they provide their canine companions is safe to eat.

Nutrition resident Dr. Rae Sires examined that issue in a recent study published in [Topics in Companion Animal Medicine](#). She tested 24 commercial dog foods to determine total mercury and methylmercury concentrations. While previous studies have measured total mercury in commercial pet foods, additional testing for methylmercury had not been done.

“That is the form where we worry about bioaccumulation,” Sires said. “We knew there is some level of total mercury in commercial dog foods based on recent studies, but we didn’t yet know whether it is cause for concern.”

Because methylmercury is known for its presence in aquatic species, Sires said the researchers evaluated diets containing fish (mostly salmon) and control samples, which didn’t have other fish-based ingredients. Out of the 24 diets tested, only three were positive for low concentrations of total mercury, and only one of those contained detectable methylmercury. Surprisingly, Sires said they found two of the three positive samples among the non-fish diets, suggesting that common sources of mercury in pet foods may not necessarily be from seafood origin.

“The concentrations detected are unlikely to pose a risk to healthy adult dogs,” said Sires, who completed her DVM at Iowa State. “These results should be reassuring to dog owners.”

Dr. Rae Sires (left) is completing her nutrition residency under the mentorship of Drs. Jennifer Larsen (right) and Andrea Fascetti (not pictured).

Vernau and Delgado are collaborating with various animal shelters and foster organizations like the [Orphan Kitten Project](#) run by UC Davis veterinary students, Yolo SPCA and Kitten Central, local nonprofit rescues. They distributed incubators (and other supplies for care) to foster parents so that two or three kittens can be kept in each one for about three weeks.

The incubators cost about \$1,000 each and look a little like toaster ovens. The kittens sleep on a warming pad inside. Some of the incubators in the study are kept at 90 degrees and others at 80 degrees.

“We predict that there will be benefits to keeping them warmer and moister,” Delgado said. “What we’re hoping to

Sires acknowledged this study includes a relatively small sample size, and should be viewed as a jumping-off point for further research that could be expanded to cover more samples and completed over a longer period of time and seasons. She completed the project as part of her residency training and presented the findings at the recent Veterinary Resident & Intern Research Symposium.

“We need more data to determine where the total mercury detected in dog foods is coming from, but our study doesn’t support avoiding fish or salmon-based diets,” Sires said.

Donors to the CCAH made this study possible by helping to cover the cost of evaluating the methylmercury samples, which is more expensive than testing for total mercury. This is another example of a resident research project funded through the CCAH grant program that not only provides valuable information for canine health, but also helps train the next generation of veterinary researchers.

“Those funds helped tremendously,” Sires said. “I’m thankful to have that support and the resources to complete this research project that enhances our knowledge of canine nutrition.”



find is that if a kitten is kept in a warm environment, then they’ll need fewer feedings and it would be easier to find foster parents.” This will help save many kittens.

If it turns out that keeping kittens at a particular temperature and humidity helps, Delgado plans to design an inexpensive alternative to an incubator that animal shelters could use.

The project is supported by generous donors to the [Koret Shelter Medicine Program](#) within the CCAH.

Reducing Shelter Crowding **SAVES LIVES**

Utter this three-letter acronym in any animal shelter and you'll quiet a room faster than any of the four-letter varieties: URI. With incident rates as high as 30 percent, Upper Respiratory Infections are the most common cause of feline illness in shelters. Although URI is compared to the common cold, the cascading effects are far graver. Holding cats for treatment leads to shelter crowding, which in turn leads to tough decisions.

The struggle to defeat URI goes back to the beginning of Shelter Medicine. UC Davis was the first university to formally study veterinary medicine in a shelter environment; in fact, the [Koret Shelter Medicine Program](#) is still housed in the same CCAH hallway it was born in 18 years ago. The specialty's first resident, Dr. Kate Hurley, now leads the program.

"After four years in veterinary school, I was so proud to finally be living my dream, working as a veterinarian serving homeless animals," Hurley said. "But my days at the shelter were often defeating. No sooner had I cured one cat than two more started sneezing. The treatment ward quickly filled and I found



myself with the impossible choice of euthanizing the cats that were nearly recovered or the ones who had only just gotten sick. I knew there had to be a better way; I didn't go to school for this. I made a promise to those cats right then and there and I returned to UC Davis to find that better way."

With a grant from the [Morris Animal Foundation](#), Hurley and the Shelter Medicine team began a nationwide research project designed to test different variables that cause URI. They found their answer, a solution that lived outside the medicine cabinet.

"Floor space is key," said Dr. Denae Wagner, a contributor to the study published in [PLOS One](#) last year. "Animals, just like us, need room to move about, stretch out, and they also need a separate bathroom area. When we meet animal needs, stress levels plummet. Reduce stress, reduce disease."

These findings have become the heartbeat of the entire program. Decisively shifting focus to preventive care in the shelter environment has led to a holistic shelter management model—[Capacity for Care \(C4C\)](#)—that is grounded in housing that supports an animal's basic needs.

Shelters that have implemented C4C are already drastically improving their lifesaving capacity. Recently, the Canadian Federation of Humane Societies systematically adopted C4C as part of a major "Cat Force" initiative and the results are in: URI is down as much as 77 percent in some shelters while euthanasia rates have dropped by 68 percent.

"The research we've done here has allowed me to make good on my promise," Hurley said. "That's something I'll always be grateful for."



◀ A shelter cat with an upper respiratory infection.



Thank You



Companion Animal Memorial Fund Honor Roll

Thank you to our Companion Animal Memorial Fund veterinary partners! Through your heartfelt tributes to pets, you've brought comfort to the families who love them and also made an impact in improving animal health. Your gifts enable us to make great strides in advancing cancer treatment, identifying genetic causes of certain diseases, saving shelter animals, and discovering other life-saving knowledge and treatments. The following partners contributed \$400 or more from January to December 2018.

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Center for Companion Animal Health
c/o Office of the Dean—Advancement
School of Veterinary Medicine
University of California
944 Garrod Drive
Davis, CA 95616-5270

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The CCAH is dedicated to advancing studies in veterinary medicine—encompassing new ways to prevent, diagnose and treat diseases including cancers, genetic and immune disorders, infectious diseases, kidney and heart diseases, and nutritional disorders in companion animals. We welcome visitors to come and learn more about our mission and programs. To schedule a visit, please call 530-752-7295. *The University of California does not discriminate in any of its policies, procedures or practices. The university is an affirmative action/equal opportunity employer.*



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Here are a few of the studies we are currently funding with your generous support. Thank you for the impact you continue to make in the lives of our companion animals.

- Decreasing operating room infections
- Using stem cells to treat cats with oral stomatitis
- Evaluating a urine test for cannabis intoxication
- Using new PET scanning technology to diagnose lameness in dogs

Center for Companion Animal Health

Business office: 530-752-7295 Fax: 530-752-7701

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