UC DAVIS
VETERINARY MEDICINE
*Center for Companion Animal Health*

# CCAH UPDATE

FALL 2023

Photo: Vu Dao

## Dangers of Antimicrobial Resistance in Pets

**Antimicrobial resistance (AMR)** has long been identified as a concern in human medicine and has now gained attention as a serious issue in our companion animals. AMR happens when germs like bacteria and fungi develop the ability to defeat drugs designed to kill them.

"Over the past two decades, we've seen a rise in antimicrobial resistance in pets," said Dr. Jane Sykes, professor of small animal internal medicine at UC Davis. "This is concerning because it limits antibiotic options to treat severe infections in these animals. The problem can delay treatment response, require us to use injectable-only drugs, lead to complications post-surgery, and result in longer (and more expensive) hospitalizations."

In addition, Sykes said, there is discussion regarding possible restrictions on anti-microbial use in companion animals (as occurs in food-producing animals), so in the not-too-distant future, critical antibiotics used in humans might not be available for companion animal care. To avoid such restrictions, judicious antimicrobial use in companion animals by veterinarians is of paramount importance.

See Antimicrobial Resistance on page 4

# From the Director

**The Center for Companion Animal Health** remains vibrant and active in bettering the lives of animals and their families. We believe in the One Health concept that recognizes that we share the same environment, diseases and biology with our animal companions—and that what affects one species affects all.

You can see examples of One Health in most of the articles in this issue—whether it is the threat of antimicrobial resistance, the devastating effects of wildfires, or in the societal factors that lead to animal homelessness. As we tackle problems that plague our society, we hope to not only improve the wellbeing of our patients, but protect their families as well.

I will soon begin my 10th year as CCAH Director and am truly proud of what we have accomplished. From our donors, who make this work possible, to our researchers, who discover disease causes and better treatments, to frontline shelter workers, we are all working to improve lives in California and beyond.

As you can see from our updates, it is rare for any of us to work in a vacuum. It is through collaboration and teamwork that we make the most progress. I look forward to seeing what the next decade brings for our center. Together we will continue tackling the biggest problems that face companion animals, and hope to make the lives of the people who live and care for them better too.

Thank you for all of the support each of you have shown us and continue to show. Together we will do great things!

My best,

Michael Kent, DVM, DACIMV (Oncology), DACVR (Radiation Oncology) Director, CCAH

Photo: CCAH

# HIGHLIGHTS

## OF CCAH DONOR-FUNDED RESEARCH STUDIES

**With your support, the CCAH just funded 23 new research grants to advance companion animal health. Here are a few of these studies that will have impact:**

- **Exploring the potential of a therapeutic agent for the treatment of canine osteosarcoma**
- **Evaluating an extended storage window for donated blood platelets**
- **Determining the accuracy of artificial intelligence in identifying heart enlargement in dogs**
- **Developing a non-invasive test to predict outcome of treatment for cats with chronic gingivostomatitis**
- **Assessing freeze-dried raw cat diets to better describe the safety of these products**
- **Creating stem cells to help cure cats with severe forms of gingivostomatitis**

# LASER UPGRADE

## Advances Less Invasive Treatment

A corrective laser procedure helped Aubrey find her forever home.
Courtesy photos

**Aubrey, an adorable Labrador retriever,** suffered from incontinence since her birth in 2020. Because adopters were reluctant to deal with this messy condition, Aubrey was surrendered to a rescue.

She was ultimately diagnosed with an ectopic ureter (an abnormal tube from kidney to bladder). These congenital abnormalities cause urine to be carried to the urethra (the tube from the bladder to the outside) instead of the bladder and cause incontinence. To correct this disorder, veterinarians use a laser to move the ureter openings to a more typical location near the neck of the bladder. For Aubrey, this resolved her leaking urine and she was soon adopted.

Internal medicine specialists Drs. Carrie Palm and Jodi Westropp primarily use this laser technology—recently upgraded, thanks to a CCAH donation by Barbi McCoy—in minimally invasive procedures to treat common problems of the urinary tract such as ectopic ureters, bladder stones, and some tumors. Without the laser, surgery would be needed which is more involved and invasive.

With bladder stones, which are formed when minerals in the urine solidify, the laser is used to break them into tiny fragments that can be flushed out without surgery. Minimally invasive procedures generally cause less pain and lead to faster recovery times and fewer complications.

This laser equipment has also been effective in humans for the correction of stenotic nares (pinched nostrils) and the removal of non-cancerous granulomas that obstruct the throat. Both conditions are common in brachycephalic dogs, so expansion of this technology may prove useful to treat these and other canine respiratory issues.

While some university teaching hospitals have this type of equipment, there are only a few private veterinary hospitals in California that offer this treatment. Since the obtaining this laser technology, UC Davis has been at the forefront of providing these minimally invasive treatments that avoid invasive surgeries. Thanks to this generous donation, dogs like Aubrey will benefit from top-notch care for many years to come.

## Antimicrobial Resistance

from page 1

Sykes was part of a UC Davis research team who conducted a CCAH-funded study through the school's extensive electronic medical record system to better understand the rising prevalence of extended-spectrum β-lactamase (ESBL)-producing Enterobacterales.

She explained that these bacteria are of particular concern because they produce enzymes that fight penicillin and critically important beta-lactam drugs used for treatment of resistant infections in humans.

Their study, published in *Veterinary Sciences*, described the clinical features, antimicrobial susceptibility patterns, and genotypic features of infections associated with ESBL-producing Enterobacterales in dogs and cats that underwent culture and susceptibility testing at the veterinary hospital over the past decade.

Bacterial isolates from those patients were identified using a search of the hospital antimicrobial susceptibility test software database. Researchers reviewed their medical records to determine the source of infection, clinical findings, and antimicrobial susceptibility test information.

Thanks to the collaboration and expertise of Professor Bart Weimer's laboratory, those bacterial isolates were also evaluated for antimicrobial resistance genes with whole genome sequencing.

Thirty ESBL-producing isolates were identified based on phenotypic testing. All but one came from a cat. Urinary tract infections (UTIs) were the most commonly identified clinical problem associated with infection. Additionally, 90% of the samples showed resistance to three or more antimicrobial classes, including classes of antibiotics critical for treating human infections.

**"Many dogs and cats shed bacteria in their urine without having clinical signs of a UTI such as straining to urinate or blood in the urine. These animals usually don't require antibiotic treatment."**

– Dr. Jane Sykes

"Of those 30 cases, 17 of them were from the final two years covered in the study," Sykes said. "That's pretty alarming and shows a rapid rise in cases."

Other veterinary teaching hospitals on the east coast have experienced even more serious problems, with hospital outbreaks caused by carbapenemase-producing bacteria. These bacteria destroy carbapenem antimicrobials like meropenem, which are sometimes the only options for treating serious infections. Such outbreaks threaten hospital operations, have human health implications due to the potential for zoonotic (animal-to-human) spread, and underscore the need for strict attention to proper infection control processes and judicious antimicrobial use.

"There is an increasing need for full-time infection control/antimicrobial stewardship personnel in large veterinary hospitals to prevent such outbreaks," Sykes said.

In addition to educating more veterinarians about best practices regarding antibiotic use in suspected UTIs, Sykes pointed out that there are efforts underway to develop more rapid point of care tests (as used in human medicine). She sees a future of diagnostic tests using AI-based computer tools to evaluate whether a sediment stain in a urine sample is indicative of a UTI and requires an antibiotic.

"Many dogs and cats shed bacteria in their urine without having clinical signs of a UTI such as straining to urinate or blood in the urine." Sykes explained. "These animals usually don't require antibiotic treatment."

The study underscores the important warning that veterinarians need to be more vigilant about AMR, use antibiotics wisely and only when indicated. Animal owners also can help by asking their veterinarian if there are alternative treatments when an antimicrobial is prescribed or whether additional diagnostics might help to identify an underlying cause for infection.

Sykes recently presented at the Clinical and Translational Science Award One Health Alliance Translational Summit on Antimicrobial Stewardship and then at the Inaugural Small Animal Antimicrobial

Image: Getty Images

Stewardship Workshop for U.S. and Caribbean Veterinary Schools at the University of Minnesota, Minneapolis. These workshops brought human physicians, epidemiologists, public health professionals, pharmacists, academicians, microbiologists, and legislators together to have critical discussions on the path forward to fight AMR.

"There's an opportunity to do more in terms of stewardship and decrease AMR among companion animals," Sykes said. "We all have the responsibility for treating this problem."

Sykes credited Dr. Dennis Woerde —who completed his residency in small animal internal medicine at UC Davis and is now a fellow in urology/nephrology and extracorporeal therapy—for the majority of the heavy lifting on this study. Other researchers who contributed to the study include Drs. Bart Weimer, Krystle Reagan, Barbara Byrne, Steven Epstein, Cory Schlesener and Bihua Huang.

# Partners in Improving the Lives of ANIMAL COMPANIONS

Barbi McCoy and her loyal canine companion, Bear. Courtesy photo

**Barbi McCoy describes Bear,** her beloved English Labrador retriever and companion of five years, as a total lap dog with a million-dollar personality. Despite his 70 pounds, Bear's favorite activity is relaxing with her on the recliner.

Devoted animal lovers, Barbi and her husband Gary have enjoyed the companionship of eight other retrievers since they were married 41 years ago. Horses also have a special place in Barbi's heart since she competed in the equestrian sport of show jumping for more than 55 years.

When their dog Fiji passed away in 2018, her veterinarian Dr. Nicole Milici DVM '07 at the Bishop Veterinary Hospital in Bishop, California made a thoughtful donation in her honor to the Companion Animal Memorial Fund at the CCAH. It was then that they learned about the CCAH's work to improve the lives of animal companions.

"We appreciate UC Davis for their excellence in veterinary medicine and unparalleled educational and training opportunities for students who become outstanding veterinarians like Dr. Milici," Barbi said. "Animals bring us so much joy. We want to do whatever we can to advance their health by supporting the latest equipment."

Each year since 2020, the McCoys have faithfully supported the CCAH Equipment Grants Program and made possible the acquisition of many pieces of vital equipment. One example is the Odyssey 30 Holmium Laser System that upgraded existing laser technology used by internal medicine specialists Drs. Carrie Palm and Jodi Westropp. The new laser can be used in minimally invasive procedures for common urological disorders such as ectopic ureters, bladder stones, and sometimes tumors. (For more information, see page 3.)

"The best care starts with people working in teams to come up with new ideas on how to fight disease and improve health," said CCAH Director Michael Kent. "To do this, our faculty, residents, researchers and students need the best equipment. We are immensely grateful to Barbi and Gary for their partnership in making this possible."

# Mentorship Leads to AWARD-WINNING RESEARCH

**With the largest and most diverse** resident training program in the country, UC Davis is able to offer exceptional research opportunities. This unique ability to conduct research during a residency can have profound impact on veterinarians and can shape their career decisions. Recently, a CCAH-funded research project won school and national awards while cultivating a faculty-resident mentorship that will last a lifetime.

Dr. Shirley Kot, who just completed her three-year residency with the Dentistry and Oral Surgery Service (DOSS), won the 2023 Outstanding American Journal of Veterinary Research Resident Manuscript Award for her investigation that assessed the biomechanical properties of an implant used to repair broken jaws in cats. The L-shaped malleable titanium plates are used in human maxillofacial surgeries, and Kot investigated whether they could be used to fix challenging jawbone fractures in cats. The research also won the Outstanding Small Animal Research Study and Presentation Award at the 2023 UC Davis Gerald V. Ling Veterinary Intern and Resident Research Symposium.

Among the co-authors of the paper was Dr. Boaz Arzi, chief of DOSS and one of Kot's faculty mentors throughout her residency. His innovative approaches, dedication to furthering the field of oral medicine, and unwavering professionalism make him an ideal role model for residents.

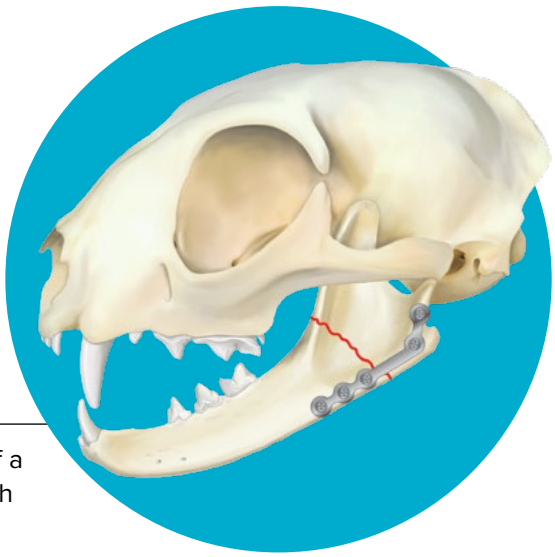
"Dr. Arzi's attitude toward scientific research made a huge impact on me," said Kot. "He nurtured a 'green' researcher like me with unfailing support and guidance, and introduced me to various opportunities, expanding my network. That nourishment further reinforced my strong interest in research and motivated me to be a pioneer."

Dr. Shirley Kot (2nd from left) with her faculty mentors Drs. Maria Soltero-Rivera, Boaz Arzi, and Stephanie Goldschmidt
Courtesy photo

Taking knowledge learned from human medicine and applying it to veterinary medicine through this research may lead to a new treatment for fractured jaws in felines, which are difficult to manage with limited options.

Kot has moved on to a practice in Hong Kong, expanding the global reach of UC Davis veterinary medicine. She aims to advance veterinary dentistry and oral surgery in the Asia-Pacific region, thanks to Arzi and the network he helped facilitate during her time at UC Davis. She remains a UC Davis research affiliate and will visit the campus on a regular basis to conduct research.

"I am undoubtedly a better clinician and researcher than before my residency," Kot said. "It was by standing upon the shoulders of giants at UC Davis that I achieved this."



3D reconstruction of a fractured cat jaw with implant for repair.

# Cats Injured in Wildfires at Risk of DEADLY BLOOD CLOTS

**Cats who suffer burns and smoke inhalation** in urban California wildfires are at risk of forming deadly blood clots, according to a CCAH-funded study at the UC Davis veterinary hospital.

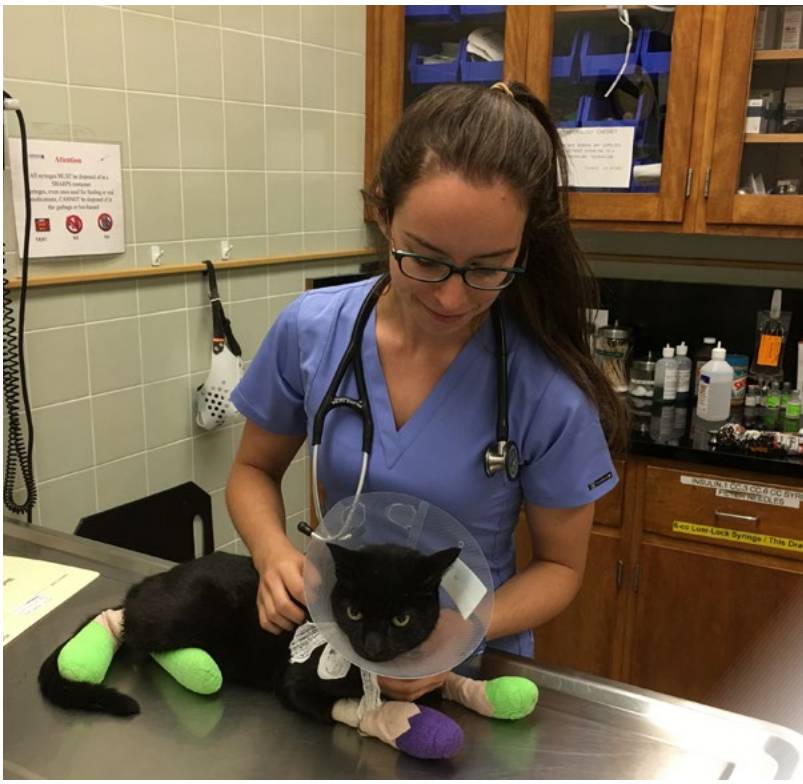
The study, published in the journal *Frontiers in Veterinary Science*, follows up on a previous discovery that showed cats injured in urban wildfires had a high incidence of heart problems.

“Animals and humans are becoming more commonly exposed to wildfire smoke, particularly in California,” said lead co-author Dr. Ronald Li, associate professor of small animal emergency and critical care at UC Davis. “So, when we make gains in understanding how one species is affected, this knowledge can be beneficial across species.”

Cats treated for their injuries from the 2018 Camp Fire in Paradise, California, were some of the patients in this study. Researchers examined their platelets, the cells that circulate in blood and help stop bleeding or form blood clots. They found that cats with wildfire injuries had increased overactive platelets compared to healthy cats or those with existing heart disease, in this case subclinical hypertrophic cardiomyopathy—the most common feline cardiac disease.

The platelets of wildfire-injured cats also released high amounts of microvesicles—microscopic membranous bubble-like structures filled with proteins—which are associated with cardiovascular disease and an elevated risk of clotting.

This discovery has led to a third study, which is underway, to discover new cellular processes that may explain why feline platelets are so sensitive and prone to clotting, especially those with heart conditions or wildfire injuries. The data collected is critical to developing early treatment plans, Li said.



Photos: UC Davis School of Veterinary Medicine

Studies like this take a large team with different skills to carry out. Other researchers who worked on the project include veterinary cardiologists Joshua Stern, Catherine Gunther-Harrington and Ashley Sharpe; veterinary critical care specialists Yu Ueda, Steven Epstein and Satoshi Haginoya; and research associates Nghi Nguyen and Mehrab Hussain in the Li Comparative Platelet and Neutrophil Physiology Laboratory. The treatment of feline burn victims reported in this study were funded through the UC Davis Veterinary Catastrophic Need Fund.

# Creating a HUMANE-HEARTED STATE

**Over the past few years,** as our nation has been undergoing a reckoning in major social justice issues, the animal sheltering world has also taken a look inward.

Some of the systems historically in place are being re-evaluated and dismantled to better address the needs of not only the animals who come through the shelter door, but their human companions at the other end of the leash.

Factors such as a family's loss of stable income or the lack of affordable and pet-inclusive housing puts an animal at risk of shelter entry. Barriers within the sheltering system itself—such as high fees, limited hours, and materials that haven't been translated to commonly spoken languages—keep animals there and accelerate the cycle of homelessness, without addressing root causes.

The UC Davis Koret Shelter Medicine Program (KSMP) is committed to rooting out its own inequities and forging stronger partnerships within the animal sheltering community. Systemic change requires participation at individual, organizational, community, and governmental levels, with long-term investment from city and state leaders and funders to make it stick.

We've assembled an advisory committee to expand our collective perspective and cultural competency. Applications to join this advisory group were anonymized and priority given to applicants with lived experience. The committee will work alongside KSMP on the next round of grants open to animal shelters beginning September 15th.

KSMP's work—from shelter outreach to training and granting—revolves around a holistic One Health, prevention-focused, and community-centered practice of shelter medicine. Our strategy recognizes the fundamental needs for an expansion of services and coordinated care between animal and human services, while also keeping the wellness and preparedness of our animal care teams at its core. As grantors, we're holding our program accountable and encouraging greater representation and transparency through co-designed proposals, multidisciplinary advisory committees, and collaborative funding models.

The KSMP's statewide initiative, California for All Animals, recently launched More Pets and People Together, a campaign that invites shelters to review their adoption, foster, and redemption processes, and join individuals and partner organizations in dismantling the

## **Art for All:** Draw, color, or paint your way to a more humane-hearted California

Enter to win **$5,000** for the animals in your community when you answer the question *"More Pets and People Together, More_____?"*

All ages and skill levels are encouraged to participate! For details, visit https://www.californiaforallanimals.com/get-involved/together/contest/

barriers that keep Californians from having equitable access to care and services. The campaign works to build bridges between communities historically left out by instituting welcoming practices.

“We’re excited to help shelters ensure that all Californians can join in on the lifesaving, while co-designing homeless prevention solutions that work for them,” said KSMP Director Kate Hurley.

We’ve also prioritized participation in two funding collaboratives, which ensure rigor and transparency among funders and an equitable distribution of resources across the state. By pooling funds, grantors maximize impact while streamlining the proposal process for organizations seeking funding.

Over the last year, California for All Animals has partnered with outside organizations to share strategies and distribute over one million dollars in collaborative funding. To date, California for All Animals has distributed over 15 million dollars to California communities.

## Students Lead the Way

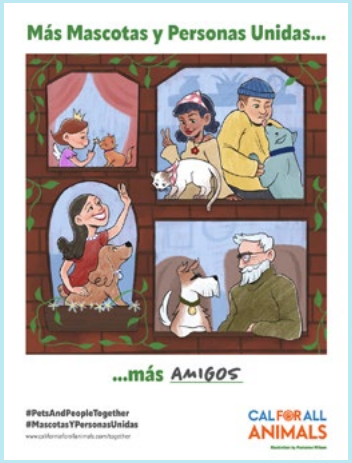
**Six California College of Arts students** answer the question “More Pets and People Together, More_____?” Through a series of illustrations, we see the human-animal bond celebrated and we’re reminded that we all benefit from more love, solidarity, care, belonging, community, and friendship when we work to keep pets and people together.

### Artists

- Jade Howe (Care)
- Ann Liu (Belonging)
- Erika Wahlberg (Community)
- Cami Morgan (Amor)
- Jaia Linden-Engel (Solidaridad)
- Marianne Wilson (Amigos)



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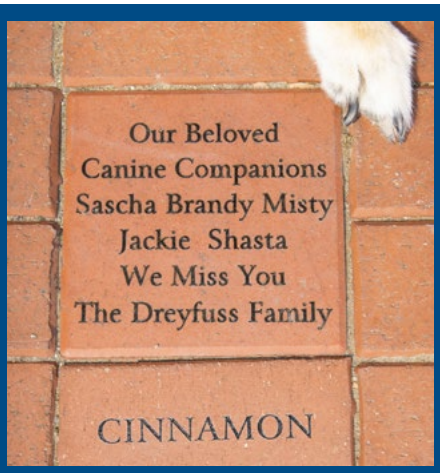

# DISEASE DISCOVERY
## in Kittens May Affect Treatment

**The two most common causes of death** in kittens are diarrhea and severe upper respiratory tract infections. Thanks to a Center for Companion Animal Health grant, UC Davis veterinary scientists have made a small discovery that may give veterinarians a better understanding of one of those issues.

A new study of Tyzzer disease shows that it is more common than previously believed in orphaned kittens.
Courtesy photo

"This is a little dent out of a big problem," said Dr. Karen Vernau of the recently published research that found Tyzzer disease—which can affect the intestines and cause diarrhea—to be more common than previously believed in orphaned kittens. Often associated with rodents, Tyzzer disease is likely spread environmentally to orphaned kittens, since most are born to feral cats.

The study, published in the *Journal of Veterinary Diagnostic Investigation*, examined tissue samples from 37 deceased kittens that were seen at the UC Davis veterinary hospital from 2000-2021 that fit the criteria for potentially having the disease. Nineteen of them tested positive for the bacteria *Clostridium piliforme*, the known causative organism for Tyzzer disease. Colitis (inflammation of the large intestine—the main sign of which is diarrhea) was the major lesion in 18 of the 19 kittens, leading the researchers to believe that there may be a connection between a kitten's diarrhea and this disease.

"Tyzzer disease was never thought to be an issue in unweaned kittens, but we found that it is with this study," said Vernau, a neurology professor and faculty advisor for the Orphan Kitten Project. "Since this was a pathology study, however, we don't yet know how important this discovery will be clinically."

Photo: Don Preisler

Going forward, clinicians will look at how they will test for Tyzzer disease. Also, once it's diagnosed, they will need to determine how they will treat it. Vernau said the discovery is a good first step in recognizing that the disease is present in kittens, and is hopeful that clinicians can find a way to diagnose and treat the often-fatal disease.

**"Tyzzer disease was never thought to be an issue in unweaned kittens, but we found that it is with this study."**

– Dr. Karen Vernau

# THANK YOU!

## Friends of Companion Animal Honor Roll

**We extend our heartfelt gratitude to our friends** for making a difference in the lives of beloved animal companions. Your support helps us continue our vital work to make their lives better, healthier and longer. It's your dedication and compassion that drive us forward, and we are truly grateful for your generosity. We are pleased to recognize those who contributed $1,000 or more to the Center for Companion Animal Health from July 2022 to June 2023.

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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.


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