Mission Statement

The Theriogenology Foundation is a global resource that supports education and research in reproductive medicine; ensuring that future generations of animals continue to enrich our lives through service, companionship, and food for a growing human population while conserving our natural resources.

From the pen of the president

In a world of instant messaging, same-day FedEx and overnight weight loss while you sleep, there are some things that still can’t be rushed. Maybe that’s why we call it a Foundation, because it is the painstakingly built, enduring base that we can count on to support the important tasks we heap on it.

In the short 10-year history of the Theriogenology Foundation, we have compiled a hefty list of accomplishments. Hundreds of students have benefited from your generosity in providing funds for travel, externships, research, student chapter events, and speakers. Nineteen AKC/AKC CHF/TF residency programs are churning out next generation of theriogenologists. The Working Dog Project, the most ambitious canine genetics project in the world today, is starting its third year. This scientific partnership of the Theriogenology Foundation with Broad Institute of MIT and Harvard, will someday help all dog breeders select for genetic advantages in temperament, working ability, confidence, and health.

However, future of theriogenology, and therefore vision of the Theriogenology Foundation, is not merely an extension of the present. Researchers and entrepreneurs are working to redesign the food industry with cultured meat production, reducing world’s greenhouse gas emissions by 50% and conserving natural resources. Contributions of the reproductive sciences on the environment, livestock production, conservation management, and wildlife and human health are all being examined through a futuristic lens.

We must assess these potential changes to our discipline, evaluate their consequences and be a driver in how they unfold. This is a key function of the Foundation which relies on input from every SFT and ACT member. Our upcoming strategic planning session at Leader Dogs for the Blind in Michigan will include forward thinking reports from the TF Task Force for Theriogenology in Conservation and the TF Genomics Initiative Committee, which is investigating the preservation of genetic material by establishing a frozen fibroblast bank.

I hope that in the past 10 years, the Foundation has earned your trust as a donor, has demonstrated our importance to theriogenology and has built partnerships that you value and support. Next 10 years will be sustained, and methodically grown, on this scientific bedrock.

After a mere 22 years of building a foundation in the study of martial arts, I was recently invited to test for the Masters Level in Uechi-ryu karate (6th degree black belt). If this type of patience is a virtue, then I believe there’s a lot less virtue these days. Studies show impatience sets in when loading a webpage exceeds 16 seconds or if waiting at a traffic light takes > 25 seconds. You only need a foundation if you’re looking to build a future. That’s why we have the TF.

Anita M Migday DVM MS
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Please mark Tuesday, December 3, 2019 on your calendar.

The Theriogenology Foundation is asking all SFT and ACT members to donate $25.00 on “Giving Tuesday”. By making a donation to the Theriogenology Foundation you can help a student learn and experience a world outside of the normal classroom as part of a Foundation sponsored externship. You can support SFT student chapters bring in a renowned speaker to strengthen their interest in theriogenology. You can help a student secure travel funds to the annual meeting. You can support research grants in multiple species related to reproduction. You can support special projects, such as the Working Dog Project.

Please consider making a donation to the Theriogenology Foundation and join others around the world who will come together on December 3 for one common purpose: to celebrate generosity and give.

To donate text one of the following codes to 44321:

- **CONSERV** - Projects to enhance conservation of endangered species
- **RES11** - Research grants selected on merit (food animal, equine, and companion animal)
- **EDU11** - Sustain and strengthen theriogenology teaching at veterinary schools through support for Therio Residencies and faculty positions.
- **STU11** - Veterinary student support (scholarships, externships, travel to meetings, SFT Student Chapter speaker support, etc.)
- **WDP11** - The Working Dog Project– Research project to enhance scientific selection and production of working dogs (Military Working Dogs, assistance dogs, detector dogs, guide dogs, etc.)
- **TFB11** – Theriogenology Foundation Board discretion (unrestricted)

You will get a secure link texted back that will take you to the mobile donation page. From there, you can select your amount to donate.

Mark your calendars now to join us in the beautiful city of Pittsburgh, Pennsylvania.

Pittsburgh is known as the city of steel, city of bridges, and the city of champions. When visiting this unique city, you are warmly greeted from the locals and instantly become a part of the community. Join us to view the breathtaking skyline, enjoy trendy shops and eateries, venture in the outdoors, and explore Pittsburgh’s 90 charming and distinctive neighborhoods.

The Annual Therio Conference will be held at the Sheraton Pittsburgh Hotel at Station Square. The 2020 Conference will feature Small Animal, Equine, and Production Animal Tracks and a pre-conference Equine Symposium.
Did you know you can support veterinary students by helping them attend the Therio Annual Conference? The TF Student Annual Conference Opportunity is a perfect way to do this. This program provides a way for you to support veterinary students from a school of your choice. These students compete in the student case presentations, present abstracts, participate in the Quiz Bowl competition and are able to interact with you as your future colleagues each year at the Annual Conference.

Your donations are needed to provide this support. Won’t you show your competitive spirit by supporting students from your school today? If you prefer to make a general-SACO donation, these funds will be used to support students where the need is greatest.

This link provides additional information about SACO and provides a direct link to donate: https://www.theriofoundation.org/page/SACOAlumni

The students would appreciate your support today!

Student Travel Grants Awarded for the 2019 Therio Conference
Breanthony Baker – Texas A&M University
Catarina Benavides – Auburn University
Anne Burdette – Virginia-Maryland
Ryan Farrell – Auburn University
Elizabeth Frieden – Virginia-Maryland
Lindsay Hilburger – Cornell University
Katelyn Kimble – Texas A&M University
Colleen Kutzler – University of Minnesota
Gabrielle Montone – Auburn University
Samantha Perry – Virginia-Maryland
Caitlin Sanders – Auburn University
Jenna Ward – Texas A&M University
Julia Zuercher – Virginia-Maryland

The Theriogenology Foundation
Honor a Mentor Program

Have you had mentors in your early years as a part of the veterinary profession and throughout your career who have influenced your theriogenology interest? Would you like to honor them with the recognition they deserve? You can nominate these mentors for recognition through the Theriogenology Foundation.

Once donations reach $1000 (you and your colleagues can pool donations to reach this level) your mentor’s name will be listed as a nominee for recognition. When donations total $5000, your mentor, along with a brief biography, photograph and select comments from nominators, will be highlighted on the website, in THERiver, at the Therio Conference and in other ways.

Recognize your mentor by visiting: https://www.theriofoundation.org/donations/donate.asp?id=7103
Research Grants
The Theriogenology Foundation offers research grants up to $5,000 for proposals that focus on all aspects of theriogenology including (infertility, endocrinology, neonatology, obstetrics, etc.). In exceptional circumstances, grants up to $10,000 may be considered. Active Diplomates, Honorary Members of the American College of Theriogenologists, veterinarians who are Society for Theriogenology members in private practice, industry or on faculty, or residents enrolled in ACT approved residency programs (including the alternate route) and have a minimum of one year remaining in their training program are eligible to apply for these grants.

Two research grants were awarded in 2019: Dr. Alvaro Garcia Guerra, The Ohio State University “Effect of anogenital distance on age at onset of puberty in beef heifers”; and Dr. Jamie L. Stewart, Virginia-Maryland College of Veterinary Medicine, “Efficacy of deslorelin acetate on induction of ovulation in does”.

The Working Dog Project
The goal of the Working Dog Project is to identify genetic explanations for why some dogs succeed in working dog programs while others do not, and to help better target individual dogs to different programs, such as assistance versus law enforcement work. This new project is based at the Broad Institute of MIT and Harvard, in Cambridge, Massachusetts, and is generously funded by the Theriogenology Foundation and AKC Reunite.

ACT Student Outreach
The ACT seeks to promote awareness of the College and to encourage veterinary students to aspire to Diplomate status after graduation. The purpose of this fund is to facilitate travel and related expenses for non-local ACT Diplomates invited by student groups to visit and teach at veterinary schools. ACT/TF hopes that these visits will stimulate student enthusiasm and interest in the College by broadening students’ awareness of the many opportunities open to our Diplomates. This opportunity is open to all student groups. It is not required that the school has an active Student Chapter of the SFT. One grant totaling $1,000 was awarded in 2019.

Travel Grants
In 2019 the TF also awarded $3,275 in Student Travel Grants to assist veterinary students who were travelling to attend the Therio Conference in Savannah, GA. These students were presenting abstracts, posters, student case presentations or taking part as a quiz bowl team member at the conference.

AKC, AKC-CHF, TF Residency Travel Grants
All of the residencies are made possible by generous grants from the American Kennel Club and the AKC Canine Health Foundation. Each resident was awarded $750 towards their travel to the annual Therio Conference.

Student Externship Grants
Student Externship Grants are grants intended to support experiential educational advancement of students interested in theriogenology. One student externship grant totaling $1,000 has been awarded.

Student Chapter Grants
The TF receives and considers requests for funding of student chapter grants intended to provide educational advancement of students interested in theriogenology. Furthermore, primary consideration is given to funding requests which provide an educational experience in theriogenology that is beyond the scope of the basic curriculum. The TF may consider all or partial funding of a request based on the annual budget and the merit of the educational experience to students. Funding to cover a speaker’s travel expense is also available. Two student chapter grants have been awarded totaling $995.

Zemjanis Outreach Fund
This grant is intended to aid veterinarians traveling from developing countries to the United States for educational purposes or for sending a trainer to a developing country to conduct training on-site.

David E. Bartlett Lifetime Achievement Award
The Bartlett Award for Lifetime Achievement in Theriogenology is awarded annually by the Society for Theriogenology and the American College of Theriogenologists to recognize an outstanding individual who has made significant contributions to the discipline of Theriogenology.

2019 TF Grants Awarded as of 10/25/19

<table>
<thead>
<tr>
<th>Grant Type</th>
<th>Number of Grants</th>
<th>Total Amount</th>
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<tr>
<td>Student Travel</td>
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<td>$3,275</td>
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<tr>
<td>Student Externship</td>
<td>1</td>
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<tr>
<td>Research-Bovine</td>
<td>2</td>
<td>$10,953</td>
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<tr>
<td>AKC, AKC-CHF, TF Travel</td>
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<td>$2,250</td>
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<tr>
<td>ACT Student Outreach</td>
<td>1</td>
<td>$1,000</td>
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<tr>
<td>Student Chapter</td>
<td>2</td>
<td>$995</td>
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2019 Funds Raised at the Annual Therio Conference

<table>
<thead>
<tr>
<th>Fund Type</th>
<th>Amount</th>
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<tbody>
<tr>
<td>Live Auction</td>
<td>$32,578.00</td>
</tr>
<tr>
<td>Silent Auction</td>
<td>$5,585.00</td>
</tr>
<tr>
<td>Beer Tasting</td>
<td>$2,040.00</td>
</tr>
<tr>
<td>Quiz Bowl audience</td>
<td>$260.00</td>
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<tr>
<td>participation</td>
<td></td>
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<tr>
<td>Sponsorship of Stories</td>
<td>$25,000.00</td>
</tr>
<tr>
<td>Text-to-donate voting</td>
<td>$4,416.45</td>
</tr>
<tr>
<td>for stories</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$69,879.45</strong></td>
</tr>
</tbody>
</table>
Our goal is to find the genetic loci associated with key behavioral traits of military and service dogs. While decades of selective breeding practices have shaped the canine genome, we now look to genetics to guide our selection of dogs for specific training and career paths.

THE BROAD INSTITUTE

The Broad Institute of MIT and Harvard was launched in 2004 to use genomics to advance science and human health. In 2005, Broad scientists led an international team to decode the DNA of Tasha, the first dog ever sequenced. Since then, scientists have compared the DNA of hundreds of dogs and found millions of differences. Hidden in this complexity are the genetic variants shaping each dog’s behavior.

INVEST IN IN-GENE-IVITY!

We have a unique opportunity today to apply cutting edge technology to identify the genes driving dog behavior. This is a critical first step. With the key genetic factors found, we can strategically select better working dogs, saving time, energy and dollars. Rarely do we have the opportunity to make such an impact for our national security and our disabled Americans. Please consider supporting the effort.

For the Working Dog Project, it is critically important that we include both successful and unsuccessful dogs. We are interested in:

Dogs who about to enter a training program
Dogs who are currently enrolled in training
Successful working dogs
Dogs who were unable to complete their training program for behavioral reasons

We will compare the behavioral and genetic profiles of successful and unsuccessful dogs to identify genes associated with working dog performance. By setting concrete and measurable goals with the two year Working Dog Project, we expect to powerfully advance any future phases, which may take years to explore. Our long term goal is to provide our partners with practical guidance, based on our research, that will increase the number of dogs succeeding in our program.

The Working Dog Project

AKC Reunite

AKC Reunite, formerly AKC Companion Animal Recovery (AKC CAR), founded in 1995, is North America’s largest not for profit pet ID and recovery service.

Microchips and Pet ID

AKC Reunite is committed to Pet Identification, specifically ensuring pets have two forms of ID, a collar or pet id tag and a microchip (or tattoo), to aid in their quick identification and return home if they get lost.

Recovery

With your help, AKC Reunite will maintain its position as the national recovery database of choice in the companion animal community. AKC Reunite offers an incredible value for its microchip and ID service, with proceeds supporting the needs of the animals that inhabit and enrich our lives.

Giving Back

Our reach goes beyond identifying and reuniting pets, one-at-a-time. It is our hope to remain a pipeline of support through microchip and scanner donations, the AKC Pet Disaster Relief program, and our many other charitable programs.

Manton Foundation

The Manton Foundation was created in New York in 1991 by Jim and Gretchen Manton as a vehicle for their charitable giving. Today the foundation is managed by the Mantons’ descendants and functions as a family endeavor. Funded projects fall largely into a range of fields encompassing education, arts and culture, medical research, and community preservation.

To donate to the Working Dog Project or learn more, please visit: www.workingdogproject.org
Executive Summary

The Working Dog project is applying cutting-edge genomics technologies to identify genetic variants that influence optimal working dog qualities. In the two years since its inception, the project has expanded from an initial focus on scenting and retrieving to study a broad set of behavioral characteristics that can help to predict a dog’s potential as a working dog. This includes “harness sensitivity”, “activated by stress”, and “inhibited by stress.” As diseases affecting the healthy, working lifespan of a dog are factors in working dog success, we are also establishing the infrastructure for future research into cancer and other longevity associated diseases.

In this first phase of the Working Dog Project, we are addressing three key objectives:

1) Assess the feasibility of the collaborative approach needed to achieve the large sample sizes proposed for subsequent phases of the project
2) Identify genetic variants that influence two initial traits of interest: scenting and retrieving behaviors
3) Develop and test research and analysis methods needed for subsequent phases of the project

Project Component Details

As noted in the Working Dog Project proposal, three components will support the successful achievement of the key objectives for Phase 1 listed above.

Component 1. Collect detailed behavioral phenotypes and DNA samples.

We will include dogs from three different populations: (1) We will collect saliva samples and behavioral assessments from 100 NEADS assistance dogs, including both dogs in training and dogs that have been placed; (2) the Canine Performance Sciences (CPS) group at Auburn University, led by Dr. Paul Waggoner, has already assembled a databank with DNA samples and full performance evaluations for 140 dogs from their breeding program, and will be a partner on this project; (3) Our Darwin’s Dogs citizen science project (darwinsdogs.org) has enrolled over 13,000 dogs and collected detailed owner-reported behavioral phenotypes. We are currently generating dense genotype data for 600 of these dogs through an NIH R21 grant. We will include these dogs in The Working Dog Project at no additional cost.

Progress: This component has been completed. We are still working on a legal agreement needed with Auburn, but, using samples from other sources, we have exceeded our goal for the working dog population by 2.1 fold and from the pet dog population by 1.7 fold.

Status: 100% complete.
Table. Dogs enrolled in the Working Dog Project to date (July 7, 2019)

<table>
<thead>
<tr>
<th>Organization</th>
<th>Samples collected</th>
<th>Sequenced</th>
<th>Sequenced &amp; Phenotyped</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEADS</td>
<td>109</td>
<td>109</td>
<td>106</td>
<td></td>
</tr>
<tr>
<td>Guiding Eyes for the Blind</td>
<td>105</td>
<td>103</td>
<td>103</td>
<td></td>
</tr>
<tr>
<td>State police (CT)</td>
<td>24</td>
<td>24</td>
<td>13</td>
<td>Awaiting behavioral data for remaining 11 dogs</td>
</tr>
<tr>
<td>Southeastern Guide Dogs</td>
<td>295</td>
<td>295</td>
<td>293</td>
<td></td>
</tr>
<tr>
<td>GDFB</td>
<td>98</td>
<td>0</td>
<td>0</td>
<td>Awaiting legal agreement</td>
</tr>
<tr>
<td>Auburn University</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Awaiting legal agreement</td>
</tr>
<tr>
<td>Leader Dogs</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>New collaboration</td>
</tr>
<tr>
<td>Total (Working dogs)</td>
<td>635</td>
<td>531</td>
<td>515</td>
<td></td>
</tr>
<tr>
<td>Darwin’s Dogs pet dogs</td>
<td>5,000+</td>
<td>1,066</td>
<td>1,066</td>
<td></td>
</tr>
<tr>
<td>Total in analysis</td>
<td></td>
<td></td>
<td>1,581</td>
<td></td>
</tr>
</tbody>
</table>

**Component 2. Generate low-cost, full genome sequence information on each dog using Broad Institute multiplex sequencing and whole genome imputation.**

Association studies in dogs to date have used low density genotyping arrays (with up to 200,000 markers) that capture just a small proportion of the genetic variation in each dog, severely limiting the development of useful genetic tools. This is in stark contrast to current studies of complex traits in humans, where millions of markers are tested and a technique called genomic imputation is applied. With this approach, the state of millions of additional genetic markers can be then determined. Genomic imputation requires low-cost, whole genome sequence information and large, freely available reference databases. Imputation has helped human geneticists combine information from genetically diverse populations, identify causal genetic variation, and develop predictive genetic tests. We expect similar results for dogs through genomic imputation.

In component 2, we propose to generate full genome sequence information on each dog by applying genome imputation to low-coverage, whole genome sequencing data. At a price point comparable to using genotyping arrays, we will produce a dataset with far more statistical power, and one in which we can detect interesting genetic variation missed in the smaller panel of markers chosen for the array.

Until now, we have not had the tools needed to use this method in dogs, but that is changing.

Dr. Elaine Ostrander and her colleagues have done full genome sequencing on over 1000 dogs, and are making this resource freely available through the data sharing platforms at the Broad. In addition, Broad Genomics has pioneered new methods for high-throughput, highly multiplexed sequencing. With these two resources, we will generate data for millions of genomic markers for under $200 a dog.
We will apply these methods to dogs from all three populations, yielding a dataset with over 5 million data points per dog, for all 840 dogs in our study. This approach will be critical to later phases of the project, allowing us to quickly generate nearly complete genetic data for thousands of dogs.

Progress: This component has been completed. We have established a robust

sample-processing pipeline with our partner company, Gencove. At a price point of ~$150/dog, we can collect, process, sequence, and impute near-complete genome sequence for less than the cost of using a genotyping array. We called 7,210,657 genetic markers for all dogs (42 times more markers than typical genotyping arrays). Additionally, we validated our process in 10 dogs, and found our accuracy is higher than genotyping arrays (99.17% compared to 98.94%).

Our sequencing approach has yielded a dataset with far more statistical power, and from which we can detect interesting genetic variation missed in studies that used genotyping arrays. As part of the Dog 10K consortium (Ostrander et al. 2019), we are now collaborating with Dr. Elaine Ostrander and the dog genomics community to generate an even larger reference panel of fully sequenced dogs, which will further strengthen our imputation-based approach.

Status: 100% complete.

Component 3. Develop and apply new statistical methods for meta-analysis of both working dog populations and a cohort from Darwin’s Dogs.

Discovery of most genetic risk variants in human complex diseases have resulted from large-scale meta-analyses of genomewide association studies (GWAS). Meta-analysis synthesizes information from multiple independent studies to increase statistical power and reduce false-positive findings. One of the biggest to date, a very successful meta-analysis of GWAS of depression published in Nature Genetics (Wray et al. 2018), combined carefully phenotyped patient populations with a cohort for which they had only self-reported depression diagnoses. This design is similar to our proposal to combine information from working dogs, with professional behavior evaluations, and pet dogs, with owner reported behavioral phenotypes.

By meta-analyzing full genome sequencing data, we will be able to pinpoint the precise genetic variation responsible for behavioral differences. This is in contrast to earlier genetic mapping studies in dogs, which used sparser data and were only able to find regions of association.

While interesting, associated regions usually contain many genes and thousands of variants, and are not specific enough for precision use. Our ability to identify specific, causal factors will support the development of high-quality predictive genetic tests later in subsequent phases of the Working Dog Project.

Using the data from component 2, we will develop the methods for applying meta-analysis to large, very dense genomic datasets for dogs. We will adapt tests used in human populations to account for factors unique to dogs, including the limited genetic diversity within breeds, the large genetic differentiation between breeds, and the mixing of breeds seen in many pet dogs.

We will apply the dog specific methods we develop to the data from component 2 and search for genetic variants associated with scenting and/or retrieving ability.

To facilitate development, we will first assess our overall statistical power to detect any causal variants using the genome-wide distribution of association scores. We will examine in depth the top loci and their effect on phenotype. As we have detailed information for each dog, we will integrate environmental factors that might influence the behavior(s) of interest into the analysis through a joint meta-analysis for main and interaction effects. We will also use cross-phenotype meta-analysis to check for multiple associations at a single marker for both retrieving and scenting ability, to assess whether they share a common genetic background or are entirely distinct abilities. Finally, we will carry out exploratory cross-phenotype checks, to see if any of our significant markers are also associated with other phenotypes.

Progress: We are applying several distinct approaches to enable meta-analysis across studies conducted in pet and working dogs. Combining information from large, very dense genomic datasets collected in distinct populations will increase our power to associate specific genomic makers with specific traits.

First, we are collaborating with Guiding Eyes for the Blind to identify phenotypes to prioritize for our analysis, as well as potential environmental factors we need to include and control in the analyses. In our initial pass, we are focusing on traits that have been identified by Guiding Eyes for the Blind as highly heritable. These are also the traits that will be most amenable to genome-wide association studies (GWAS), and to selection pressure for improvement. As noted, the traits identified include “harness sensitivity,” “activated by stress,” and “inhibited by stress.” This component of the project is completed.

Second, we developed a linear mixed effect model based statistical approach for canine genetics that accounts for non-independent samples, due to, for example, relatedness between dogs. This method allows us to analyze dogs from different breeds and diverse ancestries together, and to include environmental factors as covariates in the analysis, including sex, age, spay/neuter status and body size. This is possible because of the exceptionally dense genetic information we generate for each dog (see component 2). We have completed a pilot GWAS of size in pet dogs of any breed ancestry, and demonstrated that we have both more statistical power and higher resolution that any previous study of this trait. This component of the project is completed.
Third, we are currently applying this mixed-model based approach to our working dog genetic data to complete a GWAS of behavioral traits. Our dataset of 453 dogs from four different organizations have been phenotyped using a behavioral checklist developed by our collaborator Jane Russenberger and colleagues. This widely used and robust testing methodology assesses a standardized set of behavioral metrics at a range of different ages, allowing us to assess a large set of dogs from multiple organizations with equivalent phenotype data. This analysis is ongoing, with results expected by September 2019.

Fourth, we are extending this approach to combine data from dogs with different types of phenotype information, thereby maximizing the size of our dataset. A number of the behavioral checklist traits are also measured in our Darwin's Dogs dataset. We are using meta-analysis to combine the results of the working dog and pet dog GWAS, focusing on traits relevant to retrieving and scenting ability. This analysis is ongoing, with results expected by October 2019.

Fifth, we are now collaborating with the International Working Dog Registry (IWDR) to enroll additional working dogs directly through the registry. This will facilitate the collection of phenotypic and genomic data, while providing a critical resource for breeders working to enhance their dog's success and health. In addition, these dogs will have a PennHip score to enable analyses of hip conformation phenotype, allowing us to expand the phenotypes we are studying. This component is now underway.

Status: 50% complete.

Additional Work Supporting the Goals of the Working Dog Project

As science is dynamic and ever-evolving, it is inevitable that the scope of work expand or evolve from the plan. This section will describe some of the work that was not included in the original proposal that we have carried out or are planning to carry out in the near future.

Testing gEBVs for improving breeding decisions:
The long-term goal of the Working Dog Project is to use new genomic technology to improve the breeding and training of working dogs. To this end, we are collaborating with IWDR and Breno Fragomeni, an assistant professor of genomics at the University of Connecticut, to develop an initial set of genomic estimated breeding values (gEBVs) for Guiding Eyes for the Blind's population of Labrador Retrievers. This proof-of-principle study will assess the utility of gEBVs for improving breeding decisions. gEBVs provide breeders with objective measurements of traits of interest. If effective, gEBVs would allow working dog breeding organizations to benefit more quickly from our data. This component adds no additional cost and is now underway.

Expansion of working dog diversity: we are establishing new collaborations to enroll diverse types of working dogs beyond the initial groups identified in conjunction with Theriogenology Foundation. To date, we are involved in collecting phenotypic and genomic data from sled dogs, Finnish livestock protection dogs, dogs trained for the sport of flyball, and dogs bred to herd livestock. The Working Dog Portal (described below) will further expand our project reach. This component is underway.

Creation of the Working Dog Project portal: we have committed to the launch of a special portal on the Darwin's Ark website designed specifically to support the enrollment and engagement of any type of working dog in the project, allowing us to increase our sample size further. The portal is added scope approved by the Theriogenology Foundation and is scheduled to launch in late 2019.

Cancer and other health related traits: building on a large grant from the NIH to study cancer in pet dogs, we are expanding this work to include working dogs. This is in response to working dog breeders communicating to us that a major concern they have is the healthy, working lifespan of their dogs. By collecting long term health information on working dogs through our collaborators and through the working dog portal, we will expand the scope of the project from behavioral traits, measured early in life, to complex diseases, which impact longevity. This expanded component is scheduled to start later this year.

The Working Dog Project has caught the attention of national and local breed and obedience clubs! Collectively, with over 5000 clubs nationwide, they have the resources to significantly impact this ongoing genetic research. As all of you work with clubs in your local area and give presentations, the downloadable WDP videos are all available at www.workingdogproject.org. Please contact us for rack cards and promotional materials; we are relying on you to spread the word!

Thank you to the following clubs that have donated year to date:

Charles River Dog Training Club
Concord Dog Training Club, Inc.
Fort Detroit Golden Retriever Club
The Greater Lowell Club, Inc.
Purebred Dog Breeder Referral Service
Wachusett Kennel Club, Inc.
TF Donor Recognition

Contributions to the Theriogenology Foundation increase educational opportunities, support research and enhance the field of theriogenology.

Supporting our Future: Levels of Annual Individual Giving

**Genesis Society:** $5,000 or more  
**Visionary:** $1,000-$4,999  
**Pathfinder:** $100-$999  
**Supporter:** $25-$99

Donors will be recognized in the Foundation publication THERiver.

Rocky Mountain Society

This Society recognizes donors who have made an annual commitment to giving at the Supporter Level or higher for five or more consecutive years. The milestone years for recognition in the Society are 5, 10, 15, 20 and 25 consecutive years.

The 10 year level is known as the Dr. S. J. Roberts Circle of the Rocky Mountain Society.

The 20 year level is known as the Dr. David Bartlett Circle of the Rocky Mountain Society.

First-time Rocky Mountain Society members, or those reaching new milestones, will receive by mail a RMS welcome letter and lapel pin denoting the milestone period of consecutive year giving.

1954 Society

This Society recognizes donors whose legacy gifts play a key role in securing the future of the Theriogenology Foundation. These donors have remembered the TF with a lifetime income gift or as a beneficiary of a will, trust, retirement plan, or life insurance policy.

The 1954 Society is named for the year in which the Rocky Mountain Society for the Study of Breeding Soundness in Bulls (now the Society for Theriogenology) was organized. Circles within the 1954 Society provide for additional recognition opportunities:

- **Legacy Circle** honors donors whose cumulative lifetime giving totals between $60,000 and $100,000.
- **Founders Circle** honors cumulative lifetime giving that totals between $100,000 and $150,000.
- **Inventors Circle** honors cumulative lifetime giving that totals between $150,000 and $200,000.
- **Fertile Circle** honors cumulative lifetime giving exceeding $200,000.

An appropriate plaque and lapel pin will be presented for each level of recognition. Members of the 1954 Society will be invited to attend a private stakeholders reception at the Annual Conference and will receive updates on Foundation giving news.

Planned Giving Donors

Thank you to the following supporters for their generous designated gifts to support theriogenology and the Theriogenology Foundation. Have you been thinking about this but just not finished setting it up? Please give us a call for more information or to let us know when you have included TF in your will. Your planning now will support theriogenology in the future and insure that your wishes are fulfilled.

**1954 Society**

- Steven Brinsko  
- Russell Crisman  
- Lowry Heussler  
- Ira Kaplan  
- Michelle LeBlanc  
- Carol McLeod

**1954 Society**

- Anita Migday  
- Tom Riddle  
- Mike Thompson  
- Warren Wilson  
- Dwight Wolfe

**Rocky Mountain Society**

- Ana Adams  
- American College of Theriogenologists  
- Barry Ball  
- Jane Barber  
- Gerald Blackburn  
- Roger Borgmeyer  
- Isaac Bott  
- Steven Brinsko  
- Claire Card  
- Carla Carleton  
- David Christiansen  
- Gail Colbern  
- Robert Coley  
- Jill Colloton  
- Russell Crisman  
- Sarah Eaton  
- Ben Espy  
- Charles Estill  
- Charles and Nita Franz  
- Ira Kaplan and Anita Migday  
- Foundation  
- Jason Johnson  
- Shirley Johnston  
- Kit Kampschmidt  
- Ira Kaplan  
- Ram Kasimanickam  
- Audrey Kelleman  
- Lloyd Kloppe  
- Kara Kolster  
- Michelle Kutzler  
- Rejean Lefebvre  
- Fred Lehman

**Rocky Mountain Society**

- Carrie Long  
- Sara Lyle  
- Herris Maxwell  
- Carol McLeod  
- Anita Migday  
- Peter Morresey  
- John Myers  
- Cyndi O’Connor  
- Dale Paccamonti  
- Willis Parker  
- Patterson Veterinary Supply  
- Cynthia Pratt  
- Deirdre Carver Raffa  
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- Tom Riddle  
- Juan Romano  
- Peter Ryan  
- Don Sanders  
- William Schultz  
- Mary Sebzda  
- Katherine Settle  
- Peter Sheerin  
- Society for Theriogenology  
- Mike Thompson  
- Gary Warner  
- Warren Wilson  
- Dwight Wolfe  
- Christy Carson Young  
- Robert Youngquist  
- Walter Zent  
- Iris Zinck

www.theriofoundation.org
Donate your required minimum IRA distribution to the Theriogenology Foundation

Did you know? People age 70½ or older can transfer funds directly from an IRA to a qualified charitable organization like the Theriogenology Foundation. While the contribution isn’t deductible, it’s not subject to income tax, either. Since the donation of the IRA money would otherwise be taxed when you withdraw it, this equates to a 100% deduction for the amount donated, up to $100,000.

To qualify for this tax break, the distributed funds must go directly from the IRA trustee to the charitable organization.

Consult your tax professional for more information or give us a call with any questions.

Donating to the Theriogenology Foundation

Did you know that there are several ways that you can make a donation to the Theriogenology Foundation that will not affect your current lifestyle, or will even pay you an income? You can leave benefits from a Retirement Account, Life Insurance policy, real estate or personal property (collectibles, art, books). Take advantage of the many creative ways to benefit yourself, your beneficiaries and the Theriogenology Foundation while saving tax dollars in the process. Please take a moment to explore the Planned Giving page on the Theriogenology Foundation’s website.

Gifts That Pay You Income

Which Life-income Gift Best Fits Your Needs?
- Charitable Gift Annuity
- Deferred Gift Annuity
- Charitable Remainder Unitrust
- Charitable Remainder Annuity Trust

Gifts Anyone Can Make

Popular Giving Arrangements
- Gifts from Your Will or Trust
- Gifts from a Retirement Plan
- Gifts from Your Donor-Advised Funds
- Gifts of Stock and Appreciated Assets
- Gifts of Life Insurance
- Gifts of Real Estate
- Gifts of Personal Property

Gifts That Protect Your Assets

Popular Giving Arrangements
- Retained Life Estate
- Charitable Lead Trust

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