

Peanut is a Miniature Schnauzer

This certifies the authenticity of Peanut's canine genetic background as determined following analysis of more than 300 genetic markers using **Wisdom Panel**. The purebred dog breed signature matches included in this analysis are those that were detected in the last three generations of Peanut's ancestry.

Dr. Cynthia Cole DVM, PhD, DACVCP
Research & Development Director

Cynthia Cole January 9, 2016



January 9, 2016

Dear Vera,

Following is Peanut's *Wisdom Panel* report for your review.

Our analysis of the DNA extracted from the provided sample indicates that the DNA from this dog was previously analyzed by another test powered by *Wisdom Panel*. We wanted to alert you to this and inform you that the results of the second analysis may, in some circumstances, differ from the first analysis of Peanut's DNA. The reasons why this can occur are outlined below.

First, we periodically make upgrades to our breed database to incorporate new breeds and expand coverage of our existing breed signatures. We also update the computer program that analyzes your dog's DNA and predicts the best model of your dog's breed ancestry. While the effect of most of these upgrades is minor and unlikely to affect the number or nature of the breeds detected in the majority of customer dogs, a few results may come back noticeably different.

Secondly, we have also developed several tests since the inception of the *Wisdom Panel* to better serve client's needs, ranging from Mixed-breed to Purebred to Designer Dog tests. These tests may utilize different sets of breeds, perform different analyses, and utilize different sources of DNA. All of these factors may have an impact on the final result.

Finally there is the possibility of a small variation in the laboratory analysis. When a sample is repeatedly tested with our marker panel, run-by-run fluctuations in the number of successfully returned markers can occur. While this is not usually sufficient to alter the range of breeds detected in the analysis, occasionally differences (particularly in the breeds detected at our lowest confidence category) may be seen.

Should you have any questions or concerns about your *Wisdom Panel* results, please contact us at customercare@marsveterinary.com, so we can answer any further questions.

Best wishes,

Mars Veterinary

Wisdom Panel[®] 3.0

Congratulations!

Peanut is a Miniature Schnauzer

In the following pages, you will learn about:

- **KEY BREED DETECTED**
- **KEY BREED HISTORY, APPEARANCE, & BEHAVIOR**
- **MDR1 SCREENING**
- **PRINCIPAL COMPONENT ANALYSIS CHARTS**
- **ADDITIONAL INFORMATION**



January 9, 2016

Dear Vera,

As part of the **Wisdom Panel** analysis, we have considered if Peanut's results are consistent with the purebred Miniature Schnauzer samples in our database using a variety of analyses. The results show that Peanut's results are indeed consistent with the purebred Miniature Schnauzer samples in the **Wisdom Panel** database.

Our findings are based on the following results:

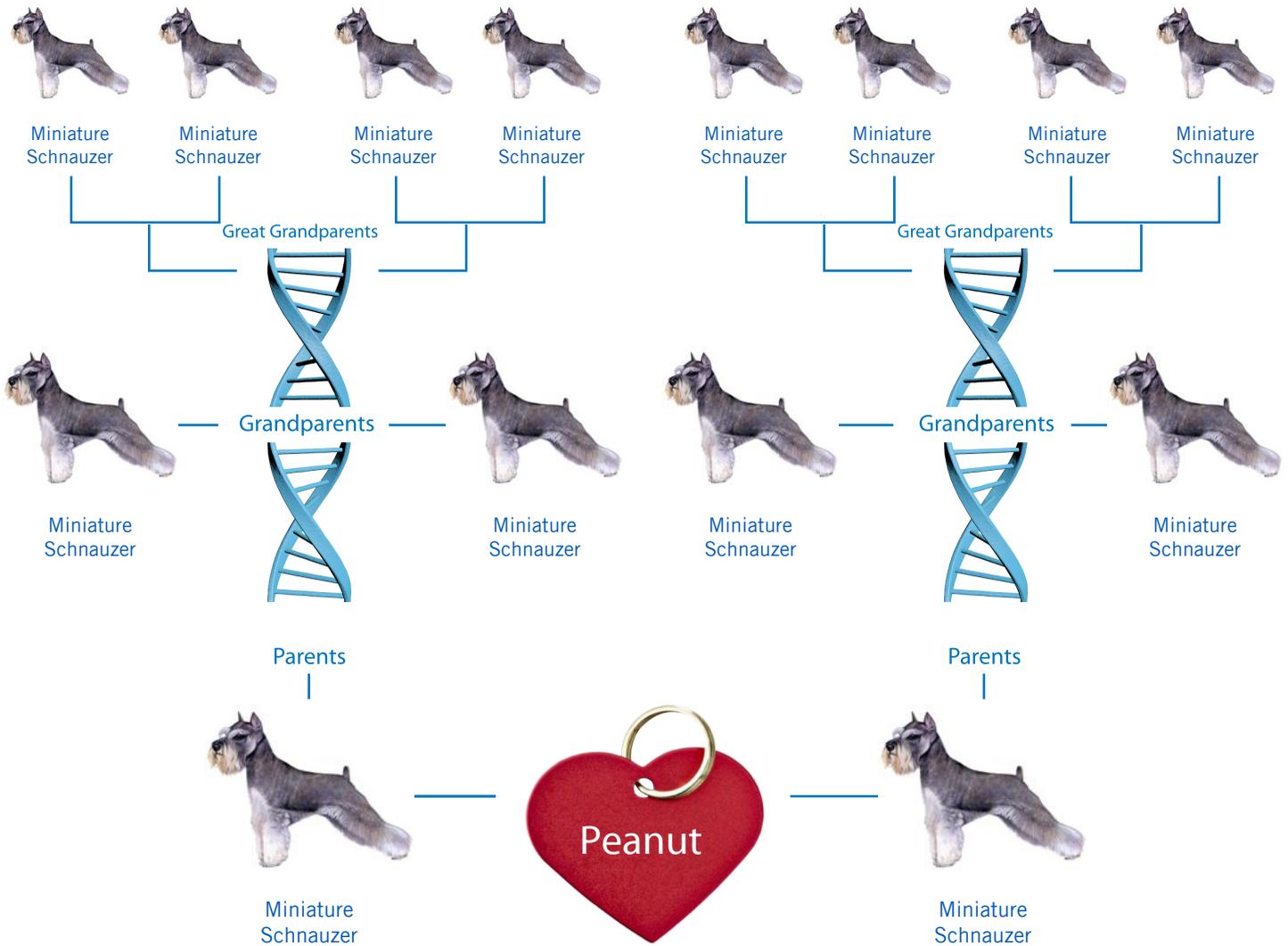
- In a Principal Component Analysis (PCA), Peanut's DNA sample appears within the Miniature Schnauzer cluster.
- In a PCA, Peanut's DNA sample appears within the Miniature Schnauzer cluster when also compared to an outgroup.
- In a PCA, Peanut's DNA sample appears within the Miniature Schnauzer cluster when compared to samples of the two next best matched breeds in the Wisdom Panel Ancestry analysis.
- The observed homozygosity of Peanut's DNA data is within the expected range for this breed.
- The Miniature Schnauzer is detected as the sole predominant breed in a Wisdom Panel ancestry analysis.
- The Miniature Schnauzer is the top matching breed in a pairwise comparison analysis between Peanut's DNA data and all the purebred dogs in the Wisdom Panel database.
- The Miniature Schnauzer is detected most frequently in the top 20 best matched dogs in an individual pairwise comparison analysis with all of the nearly 10,000 dogs in the Wisdom Panel database.

A more detailed explanation of the specific tests performed on Peanut's DNA data are explained at the end of the report. If you have any questions about the information enclosed, please contact our customer care team at customercare@marsveterinary.com.

Best wishes,
Mars Veterinary

YOU HAVE A MINIATURE SCHNAUZER

The *Wisdom Panel* computer algorithm performed over seven million calculations using 11 different models (from a single breed to complex combinations of breeds) to predict the most likely combination of pure and mixed breed dogs in the last 3 ancestral generations that best fit the DNA marker pattern observed in Peanut. The ancestry chart depicting the best statistical result of this analysis is shown in the picture below.



While *Wisdom Panel* is not designed as a pure bred test our results indicate that the recent ancestry of Peanut only includes **Miniature Schnauzer**.



MINIATURE SCHNAUZER

All dogs should be considered individual animals. Because each is a product of their unique environment and handling, they may exhibit different traits and behaviors than those listed here.



HEIGHT:

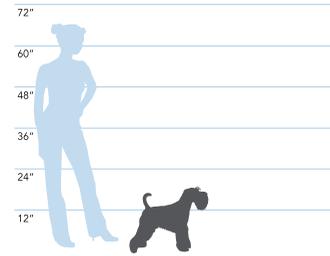
13 - 14 in

WEIGHT (SHOW):

9 - 16 lb

WEIGHT (PET):

9 - 19 lb



EARS



MUZZLE



TAIL



Miniature Schnauzers were bred to hunt rats and other vermin and to guard small flocks. They were created by breeding the Standard Schnauzer with smaller breeds, such as the Affenpinscher, the Miniature Pinscher and the Poodle. It was not until 1899 that the Miniature Schnauzer was presented as its own distinct breed. Miniature Schnauzers were brought to the United States in 1925, and the breed was recognized by the American Kennel Club in 1926. Following World War II, the breed's popularity soared and, at one time, raised it to the position of third most popular breed in America.

The Miniature Schnauzer has a wiry outercoat with a close undercoat. The AKC standard recognizes three colors; black, black and silver, and salt and pepper. The hairs in the salt and pepper coat are made up of black and white banded hairs as well as solid black and white hairs in the topcoat.



Do You Recognize Any of These Miniature Schnauzer Traits In Peanut?

- Intelligent, active, and alert dogs. Good watch dogs.
- Quick learners with reward-based training and as such enjoy dog sports such as agility, tracking, earthdog trials, rally and competitive obedience.
- May engage in chasing and barking at wildlife and can be tenacious or difficult to disengage from an activity that has its attention.
- Tend to be suspicious of strangers; may require careful socialization to prevent or reduce defensive aggressive tendencies.



MDR1 Screening Results

Condition	Gene	Mode of Inheritance	Test Results
Multi-Drug Sensitivity	MDR1	Dominant	Normal/Normal

Please be sure to share these results with your veterinarian at your first opportunity. They may be critical to the health care of your dog.

Test Results Analysis

MDR1 Normal/Normal - These dogs have two copies of the normal MDR1 gene and do not have the MDR1 mutation. They will not pass on the mutation to their offspring. These dogs are not at increased risk for experiencing side effects from drugs that are pumped by P-glycoprotein.

About MDR1

MDR1, or Multi-Drug Resistance-1 is a genetic mutation found in many of the herding breeds, some sight-hound breeds and many mixed breed dogs. The MDR1 gene is responsible for production of P-glycoprotein, which is a transport pump that plays an important role in limiting drug absorption and distribution (particularly to the brain), and in enhancing the excretion of many drugs used in dogs.

Some dogs, particularly herding breeds or mixed-breed dogs with herding breed ancestry have a mutation in the MDR1 gene that makes them defective in their ability to limit drug absorption and distribution. These dogs are also slower to eliminate drugs from the body that are normally transported by P-glycoprotein. All dogs have two copies of this gene, and dogs with mutations in both copies will be much more sensitive to many commonly used drugs. Even dogs with only one copy of the mutation, however, are more sensitive to drugs than dogs with two normal MDR1 genes. Therefore it is important to test your dog and share your results with your veterinarian so they can provide your dog with the best possible care.

For more information about MDR1 and a full list of drugs affected by MDR1 please visit:
http://www.wisdompanel.com/mdr1_disease_screening/ or <http://vcpl.vetmed.wsu.edu>

Origins of the Test

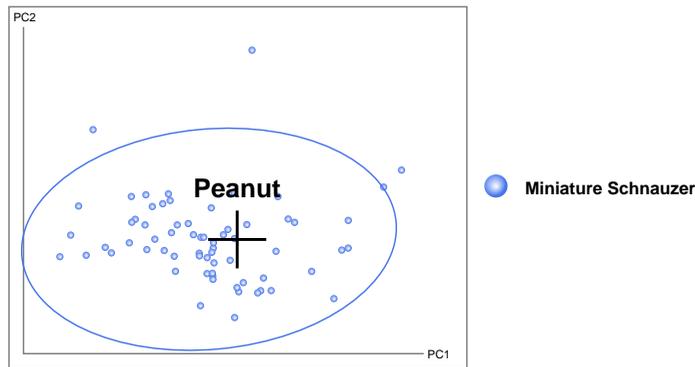
The discovery of the mutation of the multi-drug resistant gene (MDR1) and its effects on multi-drug sensitivity in dogs, was made by Washington State University. It is a patent-protected diagnostic test offered by Washington State University that has been licensed to Mars Veterinary for use in the *Wisdom Panel* tests.



Comparison against purebred samples of Miniature Schnauzer, and your dog Peanut

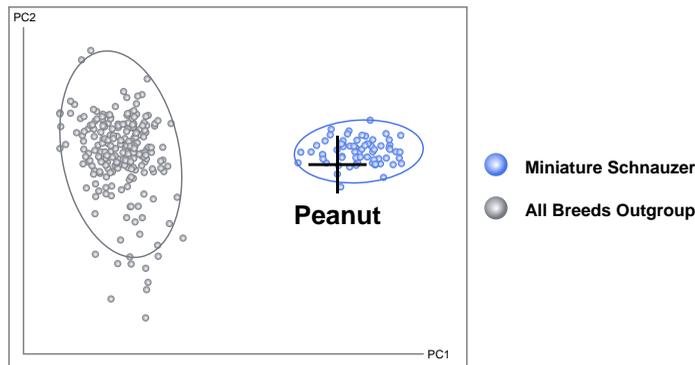
PCA Analysis of Peanut's DNA sample and Miniature Schnauzer samples from the Wisdom Panel database:

Principle Component Analysis (PCA) allows us to see how similar samples are. Closely related samples, like dogs from the same breed, will be expected to be closer together than samples from other breeds. This tends to create a cluster of points for each breed or sub-population within a breed. If a sample is within the cluster for the breed, this is a very good indication that it is likely a pure member of this breed. The PCA below shows Peanut's data compared to Miniature Schnauzer samples from the Wisdom Panel database. The sample falls within the Miniature Schnauzer cluster indicating that its genetic profile is consistent with other dogs from this breed.



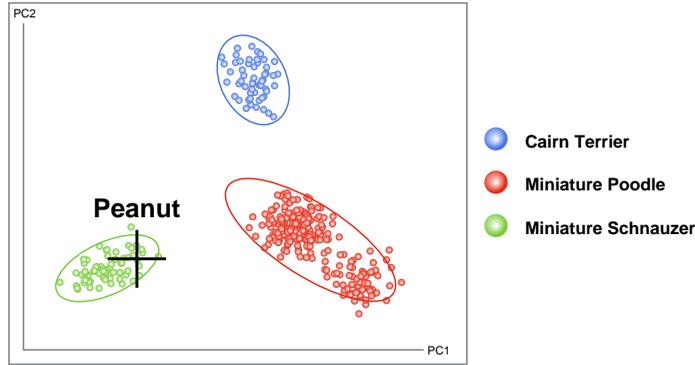
PCA Analysis of Peanut's DNA data including Miniature Schnauzer samples and an All Breeds outgroup:

The PCA below shows Peanut's data compared to samples of Miniature Schnauzer, as well as an All Breeds outgroup comprised of a single representative sample from the other breeds in the Wisdom Panel database. This is another means of verifying that Peanut's data is more consistent with the Miniature Schnauzer than with any other breed and here the sample is clustering closely with the purebred Miniature Schnauzer cluster.



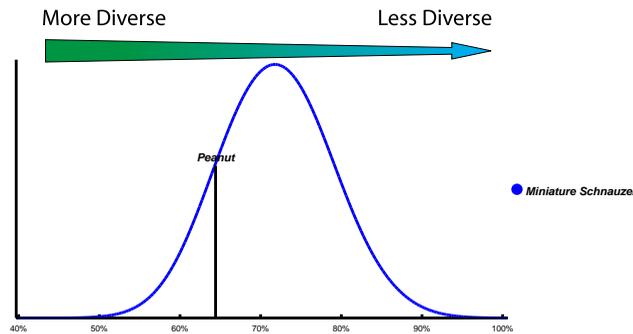
PCA Analysis of Peanut's DNA sample, Miniature Schnauzer and the two next closest matching breeds in the Wisdom Panel analysis:

The PCA below shows Peanut's data compared to Miniature Schnauzer samples, as well as samples of the next two best matched breeds from the Wisdom Panel Ancestry analysis. Peanut's DNA sample clusters tightly with the purebred Miniature Schnauzer cluster. This is what we would expect from a purebred Miniature Schnauzer.



Homozygosity Profile:

Homozygosity is a measure of how many of Peanut's genetic markers are identical because both the sire and dam passed down the same marker variant. Purebred dogs tend to have a higher homozygosity than most mixed breed dogs. Each breed within the Wisdom Panel database has a specific range of homozygosity scores. Peanut's homozygosity score falls within the range that is seen for purebred Miniature Schnauzer samples.



Pairwise Comparison Testing for the Best Overall Breed Match:

A pairwise comparison test was performed between Peanut's DNA data and that of each of nearly 10,000 dogs in the Wisdom Panel purebred dog database. In this analysis the top matching breed detected is the Miniature Schnauzer.



Pairwise Comparison Testing for Match to the Top 20 Database Samples:

A pairwise comparison test was performed between Peanut's DNA profile and that of each of nearly 10,000 dogs in the Wisdom Panel purebred dog database. Looking at individual samples, the Miniature Schnauzer occurred most often in the top 20 ranked sample matches in this analysis. This is what we would expect from a purebred Miniature Schnauzer.

Further Information:

You may wish to research more information regarding the breeds found in Peanut. The following links provide useful information into breed characteristics, training and health.

- The American Kennel Club (AKC) provides information on AKC registered and Foundation Stock Service breeds at www.akc.org.
- The United Kennel Club (UKC) has a range of information on UKC registered breeds at www.ukcdogs.com.
- The Kennel Club is the major British registry and their website contains information about the breeds they register at www.thekennelclub.org.uk.
- The free encyclopedia Wikipedia contains a range of information on most breeds, including breed histories, at www.wikipedia.org.
- The Dog Breed Info Center has information on most breeds at www.dogbreedinfo.com.
- The US Pedigree website provides information about dog breeds and many US breeders at www.pedigree.com.
- The Australian Pedigree website has a very detailed breed library which includes temperament and what breeds are like to live with at www.pedigree.com.au.
- The *Wisdom Panel* website contains additional information about the breeds, as well as our Photo Gallery at www.wisdompanel.com.

Breed standards may vary between registries and can result in ambiguity of breed traits, which may be acceptable with some registries but not others. Additionally, the requirements of registration may differ between registries. Please check with the specific kennel club or registry to determine their registration requirements.





Predicted Adult Weight Profile

Based upon the breeds detected in Peanut's ancestry and the genetic markers analyzed by **Wisdom Panel**, as well as the information provided that Peanut is **male** and intact, we have calculated the likely weight that Peanut should reach when an adult. The **Wisdom Panel** target weight profile is presented as a range based on the unique mix and proportion of breeds detected.

- If intact, the adult weight is predicted to be between 9 - 19 lbs.
- If neutered, the adult weight is predicted to be between 10 - 21 lbs.

Many factors can influence an adult dog's weight, including sex and neuter status. Both of these factors have been used to calculate the predicted weight profile. Another major influence on canine weight is body condition score, which is a factor of your dog's lifetime nutrition and exercise regimen. For more information visit WisdomPanel.com and go to the "How it Works" section.

Talk to Your Veterinarian

Congratulations on taking the steps to learn about Peanut's ancestry and to understand what breeds are in your mixed breed dog using **Wisdom Panel!** Knowing your dog's breeds is more than a novelty, it is a medical necessity. Each breed in your dog's genetic paw print may have unique health concerns you should know about so that you can provide a lifetime of excellent care.



We recommend discussing your dog's ancestry report and genetic disease screen results with your veterinarian, as he or she can help you use your **Wisdom Panel** report to help better care for Peanut. The next time you visit your veterinarian, consider asking these questions in addition to any you come up with on your own:

- Are there any specific issues that may be relevant to my dog's well-being?
- Are there any special techniques that may help in training a dog with this particular mix?
- Are there any particular dietary considerations to bear in mind for a dog like mine?

How Wisdom Panel Works

The process started when you sent a sample to our laboratory, where the DNA was extracted from the cells and examined for the 321 markers that are used in the test. The results for these markers were sent to a computer, that evaluated them using a program designed to consider all of the pedigree trees that are possible in the last three generations. The trees considered include a simple pedigree with a single breed (a likely pure-bred dog), two different breeds at the parental level (a first-generation cross), all the way up to a complex tree with eight different great-grandparent breeds allowed.

Our computer used information from over 250 breeds, types and varieties from our breed database to fill these potential pedigrees. For each of the millions of combinations of ancestry trees built and considered, the computer gave each a score representing how well that selected combination of breeds matched to your dog's data. The pedigree with the overall best score is the one which is shown on the ancestry chart. Only breeds that reached our set confidence threshold for reporting are reported in the ancestry chart.



...Or Another Kit for You!

We'd like to say thank you for purchasing a **Wisdom Panel** DNA kit with \$15 off another kit for you, or to pass along to friends or family. Just visit WisdomPanel.com and use this promo code* below at the time of checkout.

**PROMO CODE:
FF6014282VE**



Check Out the Dog Community!

Want to share your results with other **Wisdom Panel** users and dog lovers? We've got a Dog Community for you! Just visit WisdomPanel.com and click on "Dog Community" and you can search for dogs with the same mix of breeds as your own, or upload a photo and story about your own dog. It's easy, fun and a great way to share your results.

Terms and Conditions

Each dog is unique and their physical and behavioral traits will be the result of multiple factors, including genetics, training, handling, and environment. Using a proprietary analysis and database, **Wisdom Panel** products can provide insight into the breed ancestry of your dog, the predicted genetic adult weight range, and breed-related risks of developing certain genetic diseases. A dog's weight range can vary significantly depending on age, diet, and exercise.

Wisdom Panel products are not intended to diagnose diseases or predict behavior in any particular dog. **Wisdom Panel** products are designed and intended to be used solely to identify the genetic breed makeup and predict the adult size of such a mixed-breed dog; to confirm the genetic profile observed in a tested dog matches a particular breed profile; or in certain products to identify risks of developing certain genetic diseases or conditions. No other purpose is intended, authorized, or permitted.

Upon receipt of the sample, Mars Veterinary will analyze the dog's DNA to determine the breed(s) present in its recent ancestry. In all cases this is done with a reasonable degree of certainty. Portions of DNA samples of some dogs may not include any purebreds and those ancestors will simply be noted as being mixed breeds. **Wisdom Panel** products are based upon the Mars Veterinary database of validated breeds. If a dog's ancestry contains breeds not represented in our database, the results may identify related breeds that are contained in the database.

In the unlikely event that it is not possible to determine breed history, predicted adult weight range, or breed related health risks, or that an error in the analysis occurs, liability by Mars Veterinary or related companies and individuals is expressly disclaimed. Damages, if any, are limited to the payment actually received by Mars Veterinary for the specified analysis at issue.

Mars Veterinary's testing procedures are designed to provide reliable and accurate results. Mars Veterinary is not responsible for any errors in obtaining the swab sample or for any injuries or loss that may occur as a result.

Many countries and provinces have breed-specific ordinances and laws that may require special handling or prohibit the ownership of some dogs with a particular breed in their genetic background. **Wisdom Panel** is not intended to be used by regulatory or animal control officials to determine whether a particular breed is legislated or banned in a particular country or province. Nor is **Wisdom Panel** intended to be used in any judicial proceedings. Rather, it is intended to be used as a tool or resource in determining a dog's genetic history. Neither Mars Veterinary nor any related company is responsible for compliance or notification regarding these matters.

Use of the tests acknowledges consent that Mars Veterinary may use any portion of the leftover sample, as well as the data collected, for research and development purposes only.

*This code is good for one-time use, on wisdompanel.com only. It cannot be combined with any other promotions or discounts and cannot be used on/in any other retailer site(s) or storefronts.





STATEMENT OF AUTHENTICATION

Owner's name: **Vera Clark**

Dog's name: **Peanut**

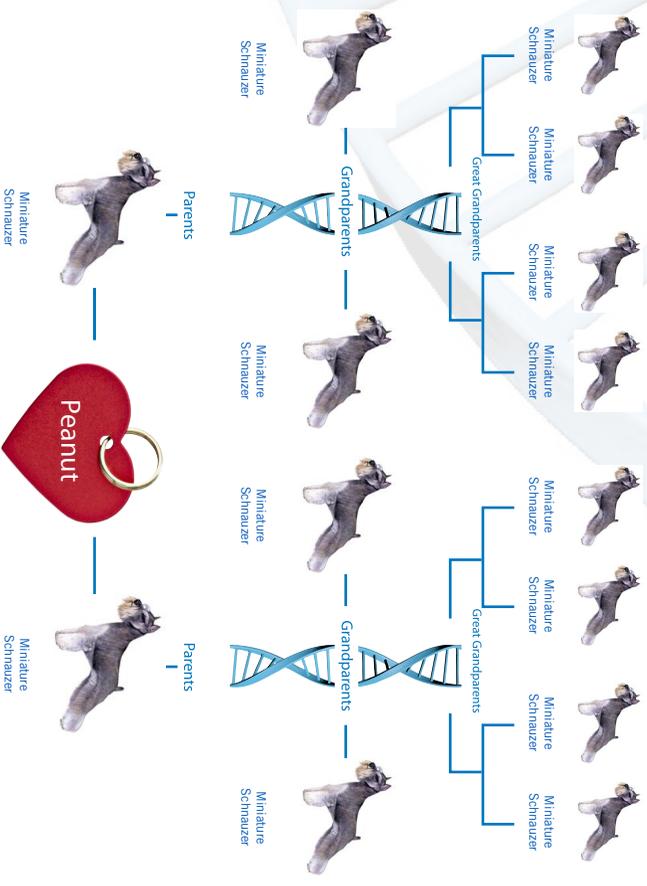
Date: **January 9, 2016**

This certifies the authenticity of Peanut's canine genetic background as determined following careful analysis of more than 300 genetic markers using *Wisdom Panel*. The purebred dog breed signature matches included in this analysis are those that were detected in the last three generations of Peanut's ancestry using the proprietary breed detection algorithm at Mars Veterinary.

Cynthia Cole

Dr. Cynthia Cole DVM, PhD, DACVCP

Research & Development Director



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