Paw Print Genetics
A division of Genetic Veterinary Sciences, Inc.

Canine Genetic Health Certificate™

Call Name:	Callie	**Laboratory #:**	111004
Registered Name:	Loremar Black Quetzalli of Cedar Key	**Registration #:**	SS05799102
Breed:	Labrador Retriever	**Microchip #:**	956000010156832
Sex:	Female	**Certificate Date:**	Nov. 30, 2018
DOB:	Feb. 2018		

This canine's DNA showed the following genotype(s):

Disease	Gene	Genotype	Interpretation
Centronuclear Myopathy	*PTPLA*	WT/WT	Normal (clear)
Congenital Myasthenic Syndrome (Labrador Retriever Type)	*COLQ*	WT/WT	Normal (clear)
Copper Toxicosis (Labrador Retriever Type) ATP7A	*ATP7A*	WT/M	Carrier Female
Copper Toxicosis (Labrador Retriever Type) ATP7B	*ATP7B*	WT/WT	Normal (clear)
Cystinuria (Labrador Retriever Type)	*SLC3A1*	WT/WT	Normal (clear)
Degenerative Myelopathy	*SOD1*	WT/WT	Normal (clear)
Elliptocytosis	*SPTB*	WT/WT	Normal (clear)
Exercise-Induced Collapse	*DNM1*	WT/WT	Normal (clear)
Hereditary Nasal Parakeratosis	*SUV39H2*	WT/WT	Normal (clear)
Hyperuricosuria	*SLC2A9*	WT/WT	Normal (clear)
Myotubular Myopathy 1	*MTM1*	WT/WT	Normal/Clear Female
Narcolepsy (Labrador Retriever Type)	*HCRTR2*	WT/WT	Normal (clear)

WT, wild type (normal); M, mutant; Y, Y chromosome (male)

Helen F Smith, PhD
Assistant Laboratory Director

Christina J Ramirez, PhD, DVM, DACVP
Medical Director

Paw Print Genetics® performed the tests listed on this dog. See the Laboratory Report for interpretation and recommendations based on these findings. The genes/diseases reported here were selected by the client. Normal results do not exclude inherited mutations not tested in these or other genes that may cause medical problems or may be passed on to offspring. These tests were developed and their performance determined by Paw Print Genetics. This laboratory has established and verified the tests' accuracy and precision. Because all tests performed are DNA-based, rare genomic variations may interfere with the performance of some tests producing false results. If you think these results are in error, please contact the laboratory immediately for further evaluation. In the event of a valid dispute of results claim, Paw Print Genetics will do its best to resolve such a claim to the customer's satisfaction. If no resolution is possible after investigation by Paw Print Genetics with the cooperation of the customer, the extent of the customer's sole remedy is a refund of the fee paid. In no event shall Paw Print Genetics be liable for indirect, consequential or incidental damages of any kind. Any claim must be asserted within 60 days of the report of the test results. Genetic counseling is available at Paw Print Genetics.

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Registered Name:	Loremar Black Quetzalli of Cedar Key	**Registration #:**	SS05799102
Breed:	Labrador Retriever	**Microchip #:**	956000010156832
Sex:	Female	**Certificate Date:**	Nov. 30, 2018
DOB:	Feb. 2018		

This canine's DNA showed the following genotype(s):

Disease	Gene	Genotype	Interpretation
Progressive Retinal Atrophy, Cone-Rod Dystrophy 4	*RPGRIP1*	WT/WT	Normal (clear)
Progressive Retinal Atrophy, Golden Retriever 2	*TTC8*	WT/WT	Normal (clear)
Progressive Retinal Atrophy, Progressive Rod-Cone Degeneration	*PRCD*	WT/WT	Normal (clear)
Pyruvate Kinase Deficiency (Labrador Retriever Type)	*PKLR*	WT/WT	Normal (clear)
Retinal Dysplasia/Oculoskeletal Dysplasia 1	*COL9A3*	WT/WT	Normal (clear)
Skeletal Dysplasia 2	*COL11A2*	WT/WT	Normal (clear)

WT, wild type (normal); M, mutant; Y, Y chromosome (male)

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220 E. Rowan, Suite 220
Spokane, Washington 99207
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Laboratory Report

Laboratory #:	111004	**Call Name:**	Callie
Order #:	48638	**Registered Name:**	Loremar Black Quetzalli of Cedar Key
Ordered By:	Kara Hite	**Breed:**	Labrador Retriever
Ordered:	Nov. 5, 2018	**Sex:**	Female
Received:	Nov. 23, 2018	**DOB:**	Feb. 2018
Reported:	Nov. 30, 2018	**Registration #:**	SS05799102
		Microchip #:	956000010156832

Results:

Disease	Gene	Genotype	Interpretation
Centronuclear Myopathy	*PTPLA*	WT/WT	Normal (clear)
Congenital Myasthenic Syndrome (Labrador Retriever Type)	*COLQ*	WT/WT	Normal (clear)
Copper Toxicosis (Labrador Retriever Type) ATP7A	*ATP7A*	WT/M	Carrier Female
Copper Toxicosis (Labrador Retriever Type) ATP7B	*ATP7B*	WT/WT	Normal (clear)
Cystinuria (Labrador Retriever Type)	*SLC3A1*	WT/WT	Normal (clear)
Degenerative Myelopathy	*SOD1*	WT/WT	Normal (clear)
Elliptocytosis	*SPTB*	WT/WT	Normal (clear)
Exercise-Induced Collapse	*DNM1*	WT/WT	Normal (clear)
Hereditary Nasal Parakeratosis	*SUV39H2*	WT/WT	Normal (clear)
Hyperuricosuria	*SLC2A9*	WT/WT	Normal (clear)
Myotubular Myopathy 1	*MTM1*	WT/WT	Normal/Clear Female
Narcolepsy (Labrador Retriever Type)	*HCRTR2*	WT/WT	Normal (clear)
Progressive Retinal Atrophy, Cone-Rod Dystrophy 4	*RPGRIP1*	WT/WT	Normal (clear)
Progressive Retinal Atrophy, Golden Retriever 2	*TTC8*	WT/WT	Normal (clear)
Progressive Retinal Atrophy, Progressive Rod-Cone Degeneration	*PRCD*	WT/WT	Normal (clear)
Pyruvate Kinase Deficiency (Labrador Retriever Type)	*PKLR*	WT/WT	Normal (clear)
Retinal Dysplasia/Oculoskeletal Dysplasia 1	*COL9A3*	WT/WT	Normal (clear)
Skeletal Dysplasia 2	*COL11A2*	WT/WT	Normal (clear)

WT, wild type (normal); M, mutant; Y, Y chromosome (male)

Interpretation:

Molecular genetic analysis was performed for 18 specific mutations reported to be associated with disease in dogs (17 deleterious mutations and one protective mutation). We identified two normal copies of the DNA sequences in the17 deleterious mutations tested. Thus, this dog is not at an increased risk for the diseases associated with these 17 mutations. We identified one normal copy and one mutant copy of the DNA sequences for *ATP7A* on the X chromosome. Thus, this dog carries one copy of the protective mutation for Copper Toxicosis (Labrador Retriever Type) ATP7A.

Recommendations:

No deleterious mutations were identified. Thus, this dog is not at an increased risk for the diseases caused by or associated with the mutations tested. This dog was also tested for a genetic mutation of the canine *ATP7A* gene which partially protects against copper toxicosis in dogs that have inherited the *ATP7B* mutation described above. This dog carries one copy of the *ATP7A* gene mutation. The *ATP7A* gene mutation is more effective at decreasing the risk of copper toxicosis in male dogs than females. However, since multiple factors (both genetic and environmental) play a role in causing copper toxicosis, the *ATP7A* mutation is not completely protective in either sex. Note: The *ATP7A* mutation is located on the X chromosome. Since males only have a single X chromosome they can only inherit a single copy of this mutation.

Paw Print Genetics® has genetic counseling available to you at no additional charge to answer any questions about these test results, their implications and potential outcomes in breeding this dog.

Helen F Smith, PhD
Assistant Laboratory Director

Christina J Ramirez, PhD, DVM, DACVP
Medical Director

Coat Color and Trait Certificate

Call Name:	Callie	**Laboratory #:**	111004
Registered Name:	Loremar Black Quetzalli of Cedar Key	**Registration #:**	SS05799102
Breed:	Labrador Retriever	**Microchip #:**	956000010156832
Sex:	Female	**Certificate Date:**	Nov. 30, 2018
DOB:	Feb. 2018		

This canine's DNA showed the following genotype(s):

Coat Color/Trait Test	Gene	Genotype	Interpretation
B Locus (Brown)	*TYRP1*	B/b	Black coat, nose and foot pads (carries brown)
D Locus (Dilute)	*MLPH*	D/D	Non dilute
E Locus (Yellow/Red)	*MC1R*	E/E	Black
L Locus (Long Hair/Fluffy)	*FGF5*	Sh/Sh	Shorthaired

Interpretation:

This dog carries one copy of **B** and at least one copy of **b** at the b^c, b^d or b^s locus making the overall B locus genotype of this dog **B/b**. The overall B locus genotype for a dog is determined by the combination of the genotypes at the b^c, b^d, and b^s loci. The b^c, b^d, and b^s variants confer brown coat, nose, and foot pads when at least one of these DNA changes is present on both genes of the dog at the B locus. If the dog has one or no copies of **b** then the dog will have a black coat, nose, and foot pads. However, this dog's coat color is also dependent on the E, K, and A genes. This dog will pass on **B** to 50% of its offspring and **b** to 50% of its offspring.

This dog carries two copies of **D** which does not result in the "dilution" or lightening of the black and yellow/red pigments that produce the dog's coat color. The base coat color of this dog will be primarily determined by the E, K, A, and B genes. This dog will pass on **D** to 100% of its offspring.

This dog carries two copies of **E** which allows for the production of black pigment. However, this dog's coat color is also dependent on the K, A, and B genes. This dog will pass on **E** to 100% of its offspring.

This dog carries two copies of **Sh** which results in short hair. However, the overall coat type of this dog is dependent on the combination of this dog's genotypes at the L, Cu, and IC loci. This dog will pass **Sh** on to 100% of its offspring.

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