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SIBERIAN HUSKY Update

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Rare Siberian Husky Polyneuropathy

CHALLENGES RESEARCHERS

PHOTO: DEB BLAIR



Tumnatki Siberian Husky breeder Karen Yeargain is shown with “Stetson,” a 5-year-old male from the second litter she bred affected by Siberian Husky polyneuropathy. Although Stetson is the most severely affected dog from his litter, his condition has been stable since adulthood.

A dedicated Siberian Husky enthusiast who enjoys conditioning and working her dogs for sledding sports, Karen Yeargain of Prineville, Oregon, frequently posts pictures of her winning sprint and mid-distance racing dogs. The powerful, muscular dogs stand out against beautiful snowy mountainous scenery. Yeargain’s pride is seen in her smile.

She fell in love with the breed 30 years ago and started breeding Siberians under the Tumnatki prefix in 1994. In 2008, her friend and fellow enthusiast, Sheryl O’Rourke, asked to breed her main leader racing male, “Fisbo” (Tumnatki’s For Sale By Owner), to a leader female, “Shelby” (Tumnatki’s Shelby). Yeargain was excited about the breeding and the puppies that would be owned by O’Rourke.

Although the litter appeared normal in the beginning, two of the six puppies developed an unusual neurological disorder never before seen in the breed. The first puppy affected, “Dade,” had an abnormal gait that began around 5 months of age. He would lose his coordination and had little muscle strength. Despite his condition, the puppy did not appear to be in pain.

“Since Dade was so young, we thought it was because he was still a pup,” Yeargain says.

When the litter was 1 ½ years old, another male puppy, “Tyee,” began to have the same unusual gait and muscle weakness. Tyee would become the most severely affected and die from a massive seizure at age 5 1/2.

O'Rourke of SierraWind Siberians in La Pine, Oregon (formerly Bishop, California), took the male dogs to her local veterinarian, who could not definitively diagnose the condition and referred her to the Veterinary Medicine Teaching Hospital at the University of California-Davis.

The cost for a diagnostic evaluation was estimated at \$4,000. "This was not affordable for us at the time," says Yeargain. "The rest of the litter was unaffected, so we thought some sort of 'event' must have occurred during the dam's pregnancy that caused the abnormality in the two male dogs."

Yeargain avoided breeding the litter's sire and dam as well as the affected dogs and their littermates. Then, in 2012, four and a half years later, a littermate sister to the sire of the first litter, produced a litter in which three puppies showed signs of the unusual neurological condition. Two males and a female were affected in this litter.

"This was disheartening," Yeargain says. "I had to know if any other Siberian breeders had produced this in their litters. I wanted to figure out what was going on."

She used Facebook community pages to reach out to Siberian Husky breeders and owners. Tapping into pages dedicated to conformation, sled dog sports and pet enthusiasts, she received several reports about similar conditions, but none were exactly the same as what the Tumnatki dogs were experiencing.

A Brain Disorder in Alaskan Huskies

As Yeargain and O'Rourke began researching neurological disorders, they came across one causing gait abnormalities in Alaskan Huskies (a general term used to describe sled dogs, not a breed name). Researchers at the University of California-Davis had discovered the mutation for Alaskan Husky encephalopathy (AHE). The genetic analysis, published in 2013 in *PLOS ONE*, detailed a defect in a thiamine transporter protein in the brain responsible for the fatal disease affecting young Alaskan Husky dogs, often occurring in multiple dogs of the same litter.

Dogs affected with AHE may have acute clinical signs or their condition may wax and wane. Besides gait abnormalities, these dogs may have seizures, difficulty swallowing, blindness, difficulty walking, and abnormal mentation (mental reasoning and thinking abilities). The mutation discovery led to the development of a DNA test for the autosomal recessive condition. A condition with similar neuropathological features, Leigh syndrome, occurs in people.

Yeargain reached out to the lead investigator, Karen M. Vernau, DVM, MAS, DACVIM (Neurology), clinical professor of neurology/neurosurgery at the University of California-Davis, telling her about the condition in her Tumnatki dogs. They began working as a team and named the mystery condition Siberian Husky polyneuropathy (SHPN), which describes the multiple (poly) nerve (neuropathy) groups affected.

The disorder, which develops between 3 months and 1 1/2 years of age, affects the peripheral nerves that send sensory information to the brain and spinal cord and carries signals from the brain and spinal cord to the muscles to generate movement. Peripheral neuropathy distorts and sometimes interrupts messages between the brain and spinal cord and the rest of the body.

Funding was needed to support the research. Yeargain began promoting the effort on social media, where it was noticed by Mary Uhler, head of the Siberian Husky Club of America Trust. Yeargain and Uhler went to Dr. Sheila Morrissey, chair of the Siberian Husky Club of America Genetics Committee, to make sure she was aware of SHPN. The Trust provided a \$400 grant to help start the research and developed a flier with the University of California-Davis to explain SHPN and encourage donations.

Yeargain also created a [Facebook Group page](#) where she could post photos, videos and information that could be shared. The page currently has about 100 members. Yeargain and O'Rourke began a [GoFundMe campaign](#) to raise money for the research.



"Tyee," one of the first dogs affected by Siberian Husky polyneuropathy, eventually needed a wheelchair to walk.

"Although this is a serious problem for Siberian Huskies with this disorder, it is uncommon."

Karen M. Vernau, DVM, MAS, DACVIM (Neurology), clinical professor of neurology/neurosurgery at the University of California-Davis

Polyneuropathy/Encephalopathy Disorders of Northern Breeds of Dog

Disorder	Gene Mutation	Clinical Signs
Siberian Husky Polyneuropathy (SHPN)	Unknown	Progressive, debilitating nerve disease in which dogs eventually are unable to walk, causes unsteady gait, muscle atrophy, loss of coordination
Alaskan Husky Encephalopathy (AHE)	<i>SLC19A3.1</i> mutation in the thiamine transporter 2 gene (autosomal recessive)	Gait abnormalities, seizures, difficulty swallowing, blindness, difficulty walking, abnormal mentation
Alaskan Malamute Polyneuropathy (AMPN)	<i>Gly98Val</i> mutation in the N-myc downstream regulated gene 1 (autosomal recessive)	Slowly worsening exercise intolerance, gait abnormalities, hind-limb muscle weakness, noisy and difficulty breathing, changes in their bark
Alaskan Husky Polyneuropathy, Ocular Abnormalities and Neuronal Vacuolation (POANV)	218-bp SINE insertion into exon 7 of the <i>RAB3GAP1</i> gene (autosomal recessive)	Visual problems, altered voice, regurgitation, gait abnormalities progressing to severe loss of muscle control, dogs are often euthanized between 8 and 16 months of age

In May 2013, Yeargain and O'Rourke took four of the five dogs affected by SHPN to be examined by Dr. Vernau at the University of California-Davis. Dr. Vernau reviewed their medical histories. She performed electrophysiological testing and tissue biopsies on two dogs and gathered physical and neurological information on the other two dogs. The University of California-Davis provided funding for this work.

The rarity of SHPN-affected dogs made it challenging to examine and do diagnostic testing from affected dogs outside Yeargain's kennel. "Although this is a serious problem for Siberian Huskies with this disorder, it is uncommon," Dr. Vernau says.

"My dogs are the only ones we know that are affected by this condition," Yeargain says.

Sadly, she produced another affected litter in 2015. Of the six puppies in the litter, all showed signs of SHPN before they were 4 months old. This litter made 10 Siberians in total affected by polyneuropathy. Tyee from the first litter passed away in 2014 at 5 ½ years old. Fortunately, none others have been affected since this litter.

A Look at Alaskan Malamute Polyneuropathy

Meanwhile, a collaborative study at the University of Minnesota with research groups in Norway, Finland, Sweden, Switzerland, and the University of California-San Diego, led to the discovery of the gene mutation for Alaskan Malamute polyneuropathy (AMPN). First recognized in Norway in the 1980s, this condition is depicted by slowly worsening exercise intolerance, gait abnormalities, and hind-limb muscle wasting. Noisy breathing, changes in a dog's bark and difficulty breathing occur due to involvement of the larynx and laryngeal folds in the throat. The study included Alaskan Malamutes from Denmark, Norway, Sweden, Finland, and the U.S.

The autosomal recessive mutation was found in a gene known as NDRG1 (N-myc downstream regulated gene 1). The research, published in 2013 in [PLOS ONE](#), yielded a DNA test to help breeders selectively breed against AMPN. This disorder is one of several canine inherited neuropathies described in 22 breeds of dog that share features with the Charcot-Marie-Tooth group of diseases in people causing motor weakness and sensory loss.



A member of the Alaskan Malamute Club of America knew about Yeargain and O'Rourke's work to learn about SHPN. She helped connect them with the University of Minnesota AMPN research team, which included James Mickelson, PhD, professor in the Department of Veterinary and Biomedical Sciences, and Katie Minor, the Canine Genetics Laboratory manager. Dr. Vernau also joined the efforts, sharing her information in hopes of helping to advance the research.

Testing was done to see if the polyneuropathy in Siberian Huskies was the same genetically as the one in Alaskan Malamutes. The Siberian dogs tested negative for AMPN.

Little progress has been made in understanding SHPN since the testing at the University of California-Davis. The limited number of affected dogs and funding shortage have contributed to delays.

Grassroot Efforts to Advance Research

Reflecting on the three litters she has bred over the past nine years affected by SHPN, Yeargain says, "This has been

devastating and truly heartbreaking. From the beginning as a breeder, I always tried to do the right things and carefully choose the dogs I bred."

"Karen (Yeargain) is to be applauded for being open about this disease in her dogs," says Dr. Morrissey, the SHCA genetics chair. "This makes it possible to discuss the disease openly and to try and prevent it from spreading through the breed."

"My goals in going public have been to increase awareness in the breed and to look for past unrecognized cases and resources for future cases," Yeargain says. "Hopefully, this will generate a study of this mutation that can be compared to human neuromuscular disorders and potentially benefit both species."

As a public health nurse, Yeargain finds the science of genetics and rare mutations to be fascinating. As a breeder of these dogs, it has been heartbreaking. "If research can identify the DNA mutation so this disease never occurs again, I will be very happy," she says. ■

Tumnatki's Blue is the only male from the third litter of six puppies in which all are affected by SHPN. Yeargain describes her 3-year-old house dog as charismatic and mischievous.

Purina appreciates the support of the Siberian Husky Club of America and particularly Sheila E. (Blanker) Morrissey, DVM, SHCA genetics chair, in helping to identify topics for the *Purina Pro Club Siberian Husky Update* newsletter.

Purina Pro Plan Incorporates NATURAL Formulas Into Existing Platforms

Purina Pro Plan is integrating existing NATURAL formulas, as well as adding new formulas, to the already strong FOCUS, SPORT and SAVOR platforms. Containing no artificial colors, flavors or preservatives and no poultry byproduct meal, the formulas are made without corn, wheat or soy, and include grain-free options. Additionally, two new formulas made without corn, wheat, soy, artificial colors or flavors, or poultry byproduct meal will be added to the BRIGHT MIND platform. Look for the formulas this summer.

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Handlers stack Standard Poodles during judging at the Poodle Club of America National Specialty in April at the Purina Event Center in Gray Summit, Missouri.

Purina Event Center Adds Amenities

Record-setting entries at the Poodle Club of America National Specialty, held in April at the Purina Event Center in Gray Summit, Missouri, helped confirm to club officials that holding the event in the Midwest after many years in the East was a good move. Recent upgrades to the classy dog show venue include improved cellphone reception, expanded Internet service to support live streaming, and an enhanced Wi-Fi connection with increased bandwidth that allows for easy photo and video sharing on social media. Video monitors throughout the facility allow exhibitors to watch the action in the show rings in real time. Located about an hour from St. Louis, the Purina Event Center, which was custom built to support the dog fancy, opened in 2010.

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Upcoming Events

Check out upcoming Purina-sponsored show and sporting events at venues across the country. These events are great opportunities to meet dog enthusiasts, canine experts and Purina representatives who can answer questions about *Purina Pro Plan* dog food and *Purina Pro Club*.

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