

Cummings School of Veterinary Medicine at Tufts University



**CATNIP**



The Newsletter for Caring Cat Owners

*MANY MANY TOES*



*As a veterinarian who specializes in cats, I frequently come across felines in need of good homes. Fortunately, my hospital is located in a fairly residential part of Manhattan in New York City, and the adoptees draw lots of interest. In the past three years, more than 100 kittens and cats in our window display have landed good homes.*

*For years, I resisted with great difficulty taking home one of these adorable felines for fear of upsetting Crispy, my high-maintenance diva cat. Recently, though, I succumbed to the charms of Mittens, a 14-week-old calico. What won me over wasn't her cute face, winning personality or sweet meow. I confess - it was her freaky feet!*

## **MANY TOES IS GENETIC BASED**

Mitten is a polydactyl cat. Polydactyl comes from the Greek words, poly (many) and daktulos (fingers). In the case of cats, it refers to many toes. Polydactylism is a naturally-occurring genetic variation that occurs in many animals as well as in humans. Although the trait had been observed earlier, the first official scientific recording of polydactylism was noted in 1868.

The lore behind polydactyl cats is intriguing. It is believed that English Puritans may have taken polydactyl cats on their ships to Boston during the mid-1600s, although it is also possible that the mutation developed in cats already residing in the Boston area. The offspring of these cats are believed to have then traveled on trading ships from Boston to Yarmouth, Massachusetts and Halifax, Nova Scotia, which might explain why these areas have a higher than normal incidence of polydactyl cats.

In Norway, polydactyl cats are known as “ship’s cats” because the extra toes supposedly give them better balance on ships during stormy weather. In fact, polydactyl cats were considered to be lucky by sailors, including those heading from Europe to America. These sea-farers also viewed extra-toed cats as better mice hunters. It has been said that there are less polydactyl cats in Europe because many of these cats were destroyed due to witchcraft superstitions.

Polydactyl cats are occasionally referred to as “mitten cats,” (explaining my cat’s corny name), “thumb cats,” and “Hemingway cats.” The latter name refers to the late writer Ernest Hemingway, who made his home on the small island of Key West, Florida. Hemingway shared this island retreat with almost 50 cats, including a six-toed polydactyl named Snowball (or possibly Princess) given to him by a ship captain and drinking buddy named Stanley Dexter. For nearly the next 100 years, unrestrained breeding between this cat’s descendents and the local cats (Alas, they weren’t as keen on spaying and neutering as we are today) led to a high percentage (almost 50 percent) of polydactylism in the local population.

Hemingway isn’t the only famous person linked to polydactyl cats. President Theodore Roosevelt had a polydactyl cat named Slippers, who reigned as one of the first feline residents of the White House.

Historically, the original unregistered Maine Coon cats had a high incidence of polydactylism - around 40 percent. It has been written that the extra toes evolved as a “snow-shoe foot” to help Maine Coons walk in the snow. Local folk tales claimed that these cats

used their big mitts to catch live fish right out of the streams, taking them home to feed their owners.

These stories may sound charming, however, there is no evidence that polydactylism confers any natural selective advantage to affected cats. Breed standards required a normal foot configuration, and did not allow polydactylism in Maine Coons. As a result, this trait was deliberately bred out of this breed. In the Netherlands and Belgium, there is currently a move to restore the polydactyl form of Maine Coons.

Although polydactylism is alluring, breeding cats deliberately for polydactylism is controversial. Some cat enthusiasts fear that unscrupulous breeders would try to produce cats with excessive and disabling numbers of toes on each paw.

Fortunately, polydactyl genetics doesn't work this way. You can only fit so many toes on a cat's foot. Even so, a good compromise would be to write breed standards to define the maximum number of toes allowed, to discourage such attempts.

## **MOST CATS HAVE 18 TOTAL TOES**

Normally, a cat has 18 digits. The front paw has five toes - four toes and one dewclaw (the small toe on the medial side of the foot). Most polydactyl cats have one or two extra toes on each foot, with the extra toes appearing on the thumb side of the foot. Each normal rear paw has four toes.

The polydactylism gene can give rise to either extra toes or extra dewclaws. Each toe has its own "terminal pad" (the fingertip pad) and often an extension of the palmar pad (the larger pad on the front foot) or plantar pad (the larger pad on the rear foot). Cats can have different numbers of toes on each of its front feet. Most cases of polydactylism affect the front feet only. The hind feet are less often affected. It is quite rare to find a cat with polydactyl rear paws and normal front paws. When polydactylism does occur on the hind paws, it tends to cause extra toes rather than a dewclaw. My mutant Mittens, however, has a dewclaw on each of her rear feet.

Variations exist regarding the number of extra toes and how well formed they are. The most common form of polydactylism results in cats with well-formed extra toes. Others display an enlargement of the inside digit to a degree that it looks like a "thumb." This is conventional "thumb cat" polydactyl. And then there's my freaky little Mittens, who has the other form.

While most expressions of polydactylism are harmless, a gene can cause a wide range of defects, ranging from extra toes (no big deal) to missing or abnormal bones (a potentially disabling deformity). Examples include a "twisty" mutation - a genetic defect that causes hypoplasia (underdevelopment) or agenesis (absence) of the radius, a major bone of the forearm. One striking result of this gene is the "triphangeal pollex" - a thumb with an extra joint (a "three-boned" thumb), making it look more like an extra finger than the usual little dewclaw.

Cats with these three-boned thumbs, like my Mittens, carry the gene that could put their offspring at risk of producing kittens with underdevelopment or absence of forearm deformities. Of course, we don't need to worry about Mittens. I spayed her myself when she was six months old. Genetically, polydactylism is a simple autosomal (not related to gender) dominant trait. Cats with extra toes have the dominant gene, Pd. A cat needs

only one copy of this gene from either parent to have the trait.

## **EITHER PARENT CAN PASS ON GENE**

If one parent has this gene, between 40 to 50 percent of the kittens will inherit this gene. However, the kittens do not always inherit extra toes in the same configuration as their extra-toed parent.

Because many polydactyl cats carry the gene for normal toes, the trait is never “fixed.” In other words, even breeding two polydactyls doesn’t guarantee all the kittens will be polydactyl. In-breeding would increase the percentage of polydactyl offspring, but there will always be a few normal-toed kittens in the litter, because of that recessive gene. Polydactylism doesn’t affect cats adversely. It yields no advantages or disadvantages. It is simply an enchanting quirk, an anomaly - rather than a deformity.

While people often worry about cats catching the extra toes on furnishings, this is rarely a problem. The toenails associated with the extra toes tend to be normal nails, although occasionally, the extra toe is incompletely formed, and the nail bed is deformed, leading to claw problems like ingrown or overgrown claws. Like all feline toenails, the extra ones require regular trimming. In case you were wondering, the most toes ever found on a cat is 32 - eight on each paw - as reported in October 1974.

I’ve shared pictures of my Mittens with Catnip readers. Now it’s your turn. If any of our readers has a polydactyl cat, we’d love to see photos. Please include the toe count along with your photo. If your kitty has more than 27 toes, then please allow us to forward the photo to the Guinness Book of World Records, because the current verified record holder is Tiger, a 27-toed cat residing in Alberta, Canada. Tiger has seven toes on each front foot, seven on her left hind foot, but only six on her right hind. Mittens, with her 22 toes, has a long way to go.