



# DOG YEARS

Scientists are enlisting our canine companions into the quest for the fountain of youth. By Mara Bovsun

**S**he whirled, she pranced, she sparkled like a debutante at her first cotillion. There was no question that this Soft Coated Wheaten Terrier—Ch. Lontree Laced Kid Glove (Lovey)—was the darling of the 2006 Montgomery County Kennel Club Terrier Show. In a tough 40-dog Best of Breed, Lovey won an Award of Merit, an invitation to Crufts, and the hearts of everyone there.

To the casual observer the only hint that this entrant was not like the others came when owner-handler Willie Rueda tried to catch her attention.

“I called her name louder than I would for a younger dog,” he said. “The judge kind of looked back, and I said, ‘Sorry, she can’t hear very well.’”

So maybe she’s a touch hard of hearing, but at 14, the canine equivalent of a centenarian, what can you expect? Lovey showed those whippersnappers a thing or two, even though she was old enough, many times over, to be the great-grandma of the other dogs in the ring. In fact, she *was* the great-grandma of another one of the Award of Merit winners.

“I really thought she was going to poop out, but she fed off of the applause, the cheers,” says Rueda. “There were like three or four cuts. Every time she came back stronger.”

## Aged to Perfection

That day at Montgomery, Lovey joined a small, select group of dogs who, despite any other achievements, amaze us simply because they’ve lived so long. Some have made headlines celebrating birthdays that would, if they were human, have them blowing out 150 or more candles—20, 22 years old, with a few reports of dogs, hale, hearty, still chasing sheep or rabbits, as they near the three-decade mark.

The reality is, however, that most dogs will be with us for only about a decade, and some half as long.

Heartbreaking it is, but people cope with it, even make light of it. One greeting card, for example, shows the face of an Airedale. “You’re how old? What’s that in dog years?” reads the outside. And inside: “Oh, never mind.”

While the quest for a human fountain of youth stretches back to antiquity, there has been scant scientific

attention paid to the animals who have been the closest to us throughout our evolution.

Now, however, a small group of breeders and researchers are taking the first steps toward finding some clues to how dogs age.

One decade-old effort is the Doberman Pinscher Club of America's (DPCA) Longevity Program, which aims to establish longevity as a marker of good health and identify long-lived lines. Roughly 1,300 dogs had been recognized by the end of 2006, according to Helayne Silver, who has been running the DPCA Longevity Program for more than three years.

The program has two categories. The first is the longevity certificate (LC) for Dobs who are at least 10. Second is the bred-for-longevity certificate (BFL) for long-lived dogs whose ancestors had also passed the decade mark. Within this category, there are two levels—BFL-1, in which a dog, sire, and dam received LCs, and BFL-2, for three-generation LC dogs.

The club has recognized about 140 BFL-1 dogs, and, so far, only two BFL-2.

"The idea of this program is to celebrate those dogs who have longevity, to highlight longevity as a goal and to give potential puppy buyers as well as breeders a place to look for trends for long life in lines," says Silver. "The more information we have the better off we're going to be. But how you take that information and apply it in practice is still very much something that I think we don't know yet."

## Escaping a Killer

In human research, gerontologists are looking at the oldest old people, those who have lived to be 100. The largest of these studies, the New England Centenarian Study, has enrolled more than 1,500 people who have passed the century mark.

Cancer researcher David J. Waters, DVM, Ph.D., is taking the same approach with dogs. Waters is professor and associate director of the Center on Aging and the Life Course at Purdue University and executive director of the Gerald P. Murphy Cancer Foundation, both in West Lafayette, Indiana. His area of interest is comparative oncology, exploring the striking similarities and intriguing differences between the cancers that strike dogs and humans.

In 1999, Waters' research team launched a nationwide study examining more than 700 Rottweilers, looking for risk factors for bone cancer, a common affliction in the breed. But, there was an unexpected bonus.

"It gave us the first glimpse of exceptional longevity in pet dogs," Waters says. Rottweilers were classified as "extreme aged" at 13, compared to the usual life span of about a decade. The research, published in the *Journal of Gerontology* in 2003, remains the only peer-reviewed scientific paper on exceptional longevity in pet dogs.

The work revealed that many traits are shared by the oldest old humans and their canine counterparts. "Extreme longevity is accompanied by profound disease resistance, and this is just like in people," Waters says.

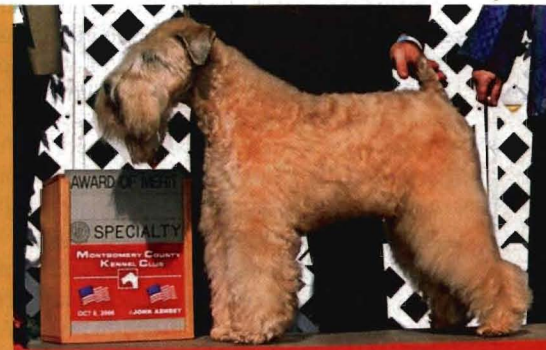
About half of the exceptionally old Rottweilers remained free of all major disease until after they had reached 13 years.

Scientists call these individuals "escapers," because they appear to escape deadly illnesses until they are well beyond an age at which 95 percent of their peer group is dead.

That is especially true of cancer. Only 18 percent of the extremely old Rottweilers died of cancer, compared to 82 percent of the dogs with a normal life span. A similar phenomenon is seen among humans. "If you live to be 100, you die of other stuff, not cancer," says Waters.

In May 2006 the Murphy Foundation's Center for Exceptional Longevity Studies launched a program to track the oldest dogs in America. The "Exceptional Longevity Database," which has received funding from The Iams Company, is starting with Rottweilers, but Waters expects to later include other breeds. Waters

*Getting Better: Being twice as old as her competitors didn't stop Lovey from capturing an Award of Merit at one of the nation's most prestigious dog shows. Studies of long-lived dogs, like this 14-year-old, may someday shed light on the secrets of longevity in both canines and humans.*



calls the project "Lucky #13: Rottweilers as Guide Dogs to the Fountain of Youth." In addition to detailed life-history information from questionnaires, his team will be gathering biological samples. "The idea here is to create a national resource for scientists looking into the biology of aging," he says.

So far, the program has identified 125 of these graying muzzles. "We're testing a new idea, and that new idea is that some of the secrets of successful aging in people can be revealed by studying the oldest old dogs."

## Weighty Issue

Science is now poised to embrace pet dogs in the study of aging, in part because of the completion of the canine genome project, says Keith Murphy, Ph.D., professor, department of veterinary pathobiology at Texas A&M University.

Murphy is a co-author, with Kimberly A. Greer and Sarah Canterberry, of one of the most recent studies to examine the question of canine size and life span. The study, which appears in the June 2006 issue of *Research in Veterinary Science*, analyzed data on 718 dogs representing 77 breeds. Participants were recruited at

AKC dog shows.

His group confirmed what dog people have known for years. Little dogs live longer than big ones. The shortest-lived breed in the data set was the tallest and heaviest, the Irish Wolfhound, with a median age of 7. The longest lived, the Papillon, had a median age of 16.

"The dog is actually a very good mammalian model because the dog is second in medical surveillance only to the human," says Murphy, who became involved in the study of canine hereditary disease because of his experience with two pet Golden Retrievers who had severe hip dysplasia.

Another advantage is that dogs naturally have a wide range of life spans, he says. In other laboratory models, scientists sometimes manipulate genes to develop animals who die young or live to a great old age. "But we already have dogs that die earlier," he says. "And we have dogs that live longer."

Murphy sees his study as a "baby step," but he hopes that it will help lay the groundwork for further research. His lab is currently searching for canine genes that may have a role in increasing longevity based upon candidates identified in other species.

"I hope [our study] spurs other labs, not just us, to say, now let's get at the genetics."

## What Is Aging?

As scientists investigating longevity with other animals will tell you, this is no easy task.

Aging is a complicated process, and many factors—genes, disease, environment, luck—play a role in determining how long an individual will live.

"I've spent the better part of my career trying to sort out what's disease and what is aging," says David E. Harrison, senior staff scientist at the Jackson Laboratory, in Bar Harbor, Maine, and one of the leaders in the field of the genetics of aging. His animal model is the mouse.

"If you are studying aging, you always have this dichotomy of protecting against disease versus increasing life span by retarding aging," he says. "The key thing is if you are retarding aging, you should expect to be retarding a lot of different things—a variety of different diseases, and other biomarker changes of aging."

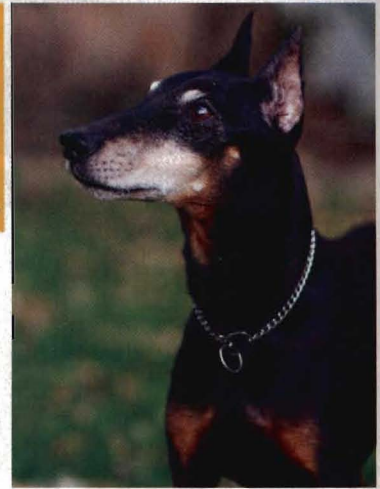
Working with simpler organisms, researchers have identified some genes that have a significant impact on longevity. In fruit flies, for example, genes dubbed *Methuselah* and *Indy*, which stands for *I'm not dead yet*, have increased life span 35 percent and 80 to 100 percent, respectively.

But it is harder, Harrison says, to look for such life-stretching DNA in mammals.

"To test whether you are segregating for longevity genes, you have to have a fairly large, defined population," he explains. "You follow the total life span, with hundreds of animals, then you get hundreds of markers to look for the chromosome regions associ-



*Above: Longevity researcher David J. Waters with Mary Statzer and her dog Buggy, who is expected to join a study of exceptionally old Rottweilers when he turns 13 in March. Right: Doberman Pinschers who reach 10 can receive a longevity certificate from the breed club.*



ated with longer overall life span."

Harrison and other longevity researchers are seeking the mechanism that

controls an individual's molecular clock. And while they have some clues, they don't know how many genes there are, what they are, and if they vary within species.

In one line of investigation, Harrison, as well as other research teams, has shown that lifelong dietary restriction in rodents can delay physical decline, retard development of diseases, especially cancer, and boost life span by about a third.

But this is not a simple matter of cutting calories. It's a drastic reduction, starting as soon as the animals are weaned, with carefully developed, nutrient-dense foods.

"You feed them so little it stunts their growth, about two-thirds the amount you would eat normally," he says. Among other effects, dietary restriction appears to decrease production of certain hormones—growth hormone and insulin-like growth factor (IGF-1), which has been implicated in aging in several animal models. Harrison speculates that this may be at least one reason why small dogs age more slowly. Since their bodies are smaller, they may have less of these hormones. But, he points out, IGF-1 production is not precisely predicted by body size, so it's a theory that would have to be tested.

Although no studies have shown that calorie restriction will have the same life-stretching effect in people, it has been the center of a small movement started by the late Roy L. Walford, MD, a brilliant, eccentric gerontologist whose motto was "Eat Less, Live Longer."

Calorie restriction devotees based their unusual lifestyle choice on studies in mice and other simpler