Dog breeders face many difficult decisions every time they consider whether a particular individual is worthy of being put into the gene pool. When it's unclear whether certain traits are influenced totally by heredity, totally by environment, or by some mysterious combination of the two, decisions become even more difficult for those who would breed quality animals.

The issue of the undescended testicle in male dogs is certainly a fascinating subject for one who remembers when monorchids were acceptable and could be exhibited at American dog shows, not only gaining their championship titles but going on to establish themselves as sires of merit. It wasn't until January 1956 that the American Kennel Club eliminated monorchids from bench-show competition; indeed, a prominent red and white parti-colored Cocker Spaniel of the late 1940s and early 1950s, Ch. Honey Creek Heirloom (AKC #S333240), was a premier sire of his day in spite of being monorchid.

Similarly, the great Thoroughbred and 1992 Horse of the Year, A.P. Indy, recently was selected as a chef-de-race of the blood-horse world based on his accomplishments on the track and at stud in spite of his status as a ridgling (monorchid) with an undescended testicle. Such a lofty hall-of-fame designation among Thoroughbreds is reserved for those sires who significantly influence their breed. His 2008 stud fee of $300,000 per mare reflects the respect Kentucky breeders have for this sire of sires, whose son Mineshaft is also a Horse of the Year honoree and whose daughter Rags to Riches and son Bernardini are also classic winners. When A.P. Indy sold as a yearling for $2,900,000 at the 1990 Keeneland sales, it was proof that Thoroughbred breeders were not put off by his condition.

But dog breeders are put off because their purebred animals are not able to compete in the very arena that tests canine breeding stock—the show ring. I have faced this dilemma in my own family of dogs. It wasn’t until the late 1990s that I had my first experience with an undescended testicle in my Norwegian Elkhounds, even though I had linebred for decades. (My total of monorchids since I registered my first litter in 1951 has now reached four.) When the second case occurred several years later, I began researching the subject and found a fascinating book, *Our Stolen Future* (E.P. Dutton, 1996). The authors, Theo Colborn, Dianne Dumanoski, and John Peterson Myers, summarized the work of numerous scientists and researchers. These studies indicate that undescended testicles are a known consequence of prenatal hormonal disruption caused by synthetic chemicals (such as pesticides), plastics, and even some edible plants that mimic estrogen. Because I had always believed the problem to be strictly hereditary—even though I did not know the mode of inheritance—the book’s explanation of the prevalence of estrogenic chemicals in our environment raised some serious questions.

According to *Our Stolen Future*, abnormal sexual characteristics are becoming increasingly prevalent among animal populations in the Everglades, Lake Michigan, Lake Ontario, and elsewhere all over the world, wherever synthetic chemicals get into the groundwater or run off into lakes and rivers. But the jury is still out on whether such pollution is a contributing factor to the monorchid condition in our dog population.

**Other Species, Other Studies**

My investigation of numerous live-stock experiments served only to complicate my understanding of the issue. For example, one group of Angora goats with a high incidence of monorchidism became the object of intense inbreeding to see if the mode of inheritance could be determined. In some of the animals a pattern was established that convinced the stock-
men that yes, the condition was hereditary. Yet inbreeding on other affected sires caused these same breeders to conclude that some cases are not truly hereditary, and that the predisposition for the condition can be caused by outside factors having little to do with genetic inheritance. Exactly what effect living on farmland treated with pesticides, using parasite preventives, and just existing in our polluted world may have had is open to inquiry. The goat breeders concluded that some of their incomplete animals were dangerous to their future gene pool and others were not dangerous at all. Of course determining which is which is the big uncertainty.

Swine and cattle breeders have also conducted studies on undescended testicles occurring in their stock. Dr. Yuefu Liu, an early pioneer in the field for the Canadian Centre for Swine Improvement, reported that his work generally ruled out any simple Mendelian mode of inheritance, thus concluding monorchidism must be polygenic.

In January 1956, when the AKC defined conditions that make dogs ineligible for bench-show conformation competition, the list included blind, deaf, altered, and “a male that is a monorchid or cryptorchid” among those who were not welcome. The day came when a lady exhibitor, upon being told by a stately judge that she could no longer compete because her dog was incomplete, reached into the pocket of her enormous skirt and whipped out a jar containing a pickled part, along with a note from her veterinarian stating the dog was normal until an unfortunate encounter with a picket fence forced emergency surgery resulting in the contents of the jar! What to do? The AKC rose to the challenge by changing the description and making the language more specific. The revised rules, which went into effect in March 1957 and still apply today, state that a male dog “which does not have two normal testicles normally located in the scrotum” is ineligible to compete.

When judges find a male who does not comply with the rule, it is their duty to disqualify the exhibit. Yet young male dogs themselves can confuse the issue by pulling up their testicles, especially on cold mornings or when they are stressed. Basenjis are noted for this trait, and fanciers know to exercise dogs with this tendency before bringing them into the show ring. A 6–9 months Bedlington puppy shown under me appeared to have only one testicle until the exhibitor trotted the dog around the ring several times before re-tabling the then-intact dog.

Given that the AKC once allowed monorchids in the show ring, many of our breeds probably have genes for the condition in their backgrounds. In fact, the Kennel Club (England) still allows monorchids to compete in dog shows, possibly ending up in various breeds’ gene pools today. Therefore, when the condition expresses itself, breeders are faced with the question of whether they should use that sire again. But what about the dam who produces the incomplete son? Did she transmit the genes for monorchidism? Or was she exposed to chemical damage that caused her endocrine system to send out improper hormone signals during fetal development?

While geneticists and other experts struggle to provide answers for laymen such as ourselves, we hope that environmentalists can also provide information that will help guide us in our decision-making. It will be of great personal interest to me to see if reducing the exposure of my own family of dogs to various synthetic chemicals will cause a cessation of the monorchid condition.

Patricia Trotter was the 2003 AKC Hound Group Breeder of the Year and is approved to judge more than 80 breeds. She is a regular contributor to the Gazette.