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it would be helpful if the next cross-discipline animal communication conference would address these questions instead of serving as a showplace for its organizers' prejudices.

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Dogs of many different breeds competing in the show-ring are routinely subjected to amputation of the vibrissae, organs that are commonly and incorrectly called "whiskers." This procedure is thought to give the animal's head a cleaner look, which in turn supposedly increases its chances of winning. There are several tricks involved in "whisker trimming" since the animals can retract each vibrissa at least one-quarter inch. Furthermore, they often object strenuously to the operation.

Research in the area of animal behavior has shown that we can be terribly ignorant regarding the sensory capacities of animals, capacities that can sometimes far exceed those of our own species. Consider for example the extension of the hearing range of many animals into the "ultrasonic;" the fact that bees can perceive ultraviolet radiation that is beyond our limits; and the remarkable capacity of bats and porpoises to find their way about by means of echo-

location. But beyond the extension of familiar sense modalities, animals possess senses that are completely absent in humans. There are fishes that produce an electric current and then detect objects that alter the electrical field that surrounds their bodies. It has recently been determined that pigeons, and probably other birds, can sense the earth's magnetic field. New discoveries in the area of animal sensory processes are occurring all the time, but progress is sometimes slow since it is difficult for us to hypothesize and then investigate sources of stimulation that we are incapable of perceiving. It is possible that vibrissae act to detect some as yet unknown stimulus. It seems more probable that they function to extend some aspect of the animal's tactile sensitivity.

A literature search was undertaken to determine what is known of the functions of vibrissae, organs that humans and most other primates do not possess, but which are universal in the carnivores and several other mammalian orders. Unfortunately, definitive research on the functions of these organs in common domesticated animals appears to be lacking, although many interesting speculations exist. As might be expected, we know considerably more about their functions in the familiar laboratory rodents. Therefore, in the following paragraphs I cite some of the research findings for rodents and certain other species, followed by presumptive evidence as to the importance of these organs in species as yet unstudied, particularly the dog.

Behavioral and neural approaches to the functions of the vibrissae have been summarized in an excellent review article (*Psychol Bull 84:*477, 1977). Amputation of vibrissae in rats affects locomotor activity, depth perception, swimming ability, shock-induced fighting, emotionality, tactile maze learning, equilibrium, and discrimination of surfaces. Removal of the vibrissae lowers general activity level in cats. The vibrissae of seals are sensitive to vibrations from 50 to 1000 Hz, and it is thought that the animals use these organs to detect prey in dark waters (*J Zool 188:*443, 1979).

The length of the vibrissae appears to be correlated with the ecology of the animals. Burrowing mice have vibrissae that are shorter than arboreal species. Among carnivores, the vibrissae of bears are considerably shorter than those of the hunting canines and felines. It is also interesting to note that whales, having forsaken the land for an aquatic environment, lost all body hair except the vibrissae.

While firm evidence of the importance of these organs in dogs is lacking, there is presumptive evidence of their potential significance: 1. The very ubiquity of vibrissae in carnivores suggests important sensory functions. Evolutionary theorists agree that nature is conservative and does not expend energy on the maintenance of useless organs. 2. Vibrissae are constructed differently and are much more heavily innervated than other body hair. 3. The vibrissae in dogs are served by the largest of the twelve pairs of cranial nerves. 4. It is generally recognized that the amount of sensory cerebral cortex devoted to a particular body area is in direct proportion to the importance of that area in the sensory world of the animal. In plotting the sensory areas of the cerebral cortex of the dog it has been determined that "face representation clearly accounts for at least 50 percent of somatic area 1 and for a third or more of somatic area 2" (*J Neurophysiol 19:*485, 1956). The upper jaw occupies a disproportionately large amount of the face area.

We may presume, then, that vibrissae are important sense organs in dogs. But what is the effect of their removal? As noted above, behavioral data are lacking. Similarly, appropriate neurophysiological studies have not been conducted. But again, we can speculate on the basis of studies done with rodents. If vibrissal papillae are damaged in newborn mice, the fourth layer of the cerebral cortex exhibits permanent abnormal development (*Neurosci Lett 6*:151, 1977). If the damage occurs later in life, the brain is less severely affected (*J Comp Neurol 170*:53, 1976). Of particular interest is a study using adult rats (*J Comp Neurol 178*:629, 1978). The investigators cut off some of the animals' vibrissae. The next day they injected a radioactive sugar and allowed the rats 15 minutes to explore a strange environment. The animals were then killed and the radioactivity levels in various parts of the brain were determined. Their findings indicated reduced metabolic activity (cellular uptake of the radioactive sugar) in those areas of the brain associated with amputated vibrissae. If similar results occur in dogs, one wonders what the effects are in animals subjected to chronic, weekly amputations when the animals are "on the show circuit."

From anatomical data on dogs themselves, and from behavioral and neurophysiological data on other mammalian species which may apply to dogs, one can hypothesize that the vibrissae are sense organs of some importance to the animal. With this possibility in mind, we may question the moral legitimacy of vibrissal amputation. Why is it done? The answer is simply for cosmetic purposes in order to compete; to have one's dog placed above others in terms of conformation. But since the practice is so common, in effect it is performed to avoid losing an advantage rather than in hopes of gaining one. Many owners and handlers would be happy not to use this particular procedure if others abstained. No one claims that vibrissal amputation helps the dog in any way. It is simply viewed as a harmless technique that is thought to improve the animal's appearance. But the research literature suggests that it may not be harmless; instead it may be damaging. At best it is unnecessary, and at worst it may be a form of sensory deprivation, the effects of which are beyond the current state of our knowledge.

The solution to the problem is simple in conception but will doubtless prove difficult in implementation. Ideally, the American Kennel Club and governing bodies in other countries should recognize the potential importance of vibrissae as sense organs and instruct judges to excuse from the ring animals whose vibrissae have been trimmed. Competition would be equalized by the universal prohibition of this entirely unnecessary procedure. At the very least, the national kennel clubs and/or the individual breed clubs should explicitly state that vibrissal amputation is optional, and no dog with these organs intact should be penalized.