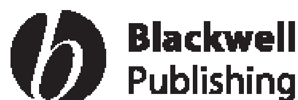
Handbook of
Applied Dog Behavior and Training

Volume Two

Etiology and Assessment of Behavior Problems

Steven R. Lindsay



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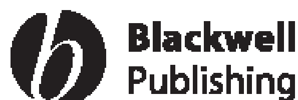

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Preface

IN VOLUME 1, *Adaptation and Learning,* it was argued that the functional epigenesis of behavior takes place under the influence of various environmental and biological constraints, including species-typical tendencies, genetic predispositions, and the alteration of various behavioral thresholds brought about by domestication and selective breeding. Clearly, although extraordinarily flexible and adaptive, dog behavior expresses itself in relatively uniform and consistent ways. The causes of this behavioral regularity are found in both phylogenic and ontogenic influences that continuously act on dogs from their conception to their senescence and death. As the result of selection pressures exerted upon the canine genotype during its evolution or phylogenesis, the dog's behavior has been biologically shaped and prepared to express itself in a limited set of ways. During the dog's development or ontogeny, the environment continues to exert selection pressures on the behavioral phenotype through learning. The dog's behavioral phenotype is the composite of evolutionary mutation and selection (organized in the canine genotype) together with selected refinements and modifications as the result of interaction with the environment and learning. In other words, the dog's behavior is conjointly influenced by both phylogenic and environmental determinants via experience and learning. In addition, the behavioral phenotype at each stage of ontogeny affects subsequent development (prepared and regulated by genes operating on a physiological level) and undergoes further modification by maturational demands and environmental pressures. Finally, it was shown in Volume 1 that successful adaptation and learning depend on the presence of an orderly environment composed of highly predictable and controllable events. Without the presence of a stable and orderly environment, neither natural selection nor selection by learning is possible. Learning is primarily concerned with obtaining predictive information about the environment and refining phenotypic routines and strategies for controlling and exploiting significant events. In the present volume, *Etiology and Assessment of Behavior Problems,* these general theoretical assumptions and principles are applied toward better understanding how adjustment problems develop in dogs. Certainly, whether adaptive or maladaptive, a dog's behavioral adjustment is ever under the dynamic influence of experience and learning operating within the context of biological and environmental constraints. Both learning and biology contribute to a dog's adaptive success or failure.

Borrowing from Tinbergen's terminology, the canine *Merkwelt* or perceptual world significantly differs from the human Merkwelt. As species, we inhabit very different sensory, cognitive, emotional, motivational, and social worlds but still succeed generation upon generation to reach across millions of years of evolutionary divergence to form a profoundly enriching and affectionate bond with one another and to share the same living space cooperatively. Although domestication has helped to bridge the gap, much phylogenic room remains for mutual misunderstanding and interactive tension. Further, as people and dogs live together in closer social arrangements and progressively artificial environments, the likelihood of behavioral tensions and problems is simply bound to increase. In fact, it is nothing short of a biological wonder that we get along together as well as we do. However, not only are we apt to misunderstand one another, dogs are also often exposed to neglect, abuse, detrimental rearing practices, and various other adversarial and environmental pressures, many of which appear capable of disrupting or disorganizing a dog's ability to learn and adjust effectively. Naturally, problems are bound to

occur and do. Every year, thousands of distraught dog owners haul their wayward dogs off to obedience classes or to private animal behavior consultants, seeking advice or training for some puppy or dog behavior problem. Estimates vary, but the vast majority of dogs appear to exhibit at least one undesirable habit that its owner would like to change. Most of these behavior problems are an outcome of inadequate training or socialization and are usually responsive to remedial training and brief counseling. Besides social sources of causation, behavior problems may also develop as the result of chronic mismanagement or neglect of the dog's basic biological needs and requirements for stimulation. Some problems, however, are the result of a more complex etiology, involving cognitive deficiencies, distressing emotional activity, and pervasive behavioral disorganization. Volume 2 is especially concerned with exploring the collective epigenetic causes underlying the development of these more disruptive adjustment problems.

Many behavior problems appear to be strongly influenced by classical and instrumental learning, especially learning strained or disturbed under the adverse influences of stressful anxiety and frustration. Disruptive anxiety and frustration result when a dog's social and physical environment lacks sufficient order and stability in terms of overall predictability and controllability. Social interaction consisting of unpredictable and uncontrollable aversive or attractive exchanges between the owner and the dog is prone to disrupt effective lines of communication, promote stress and distrust, and result in behavioral maladjustment. Other problems appear to stem from trauma and deprivation occurring early in life, resulting in phenotypic disturbances that persist and disrupt the subsequent course of the dog's behavioral development. Finally, some severe behavior problems are under the exacerbating influence of species-typical tendencies and appetites, genetically altered behavioral thresholds, and various physiological and neurobiological sources of causation that may require adjunctive veterinary differential diagnosis and treatment.

A goal of Volume 2 is to examine these and other causes underlying the development of behavior problems. Without accurately identifying and properly assessing the various contributory causes underlying a behavioral adjustment problem, it is not possible to intervene with a truly rational plan of behavior modification and therapy. Despite significant advances in our understanding and treatment of dog behavior problems over the past 20 years, much yet remains to be accomplished in this and related fields of professional activity. Unfortunately, many theories and assumptions in wide public circulation are either dated or unproven. For example, perusing any random selection of dog-care and dog-training books that address dog behavior problems reveals a perplexing and sometimes irritating array of opinions, beliefs, and methods about how such problems ought to be modified or managed. These various texts often espouse conflicting or contradictory information, some encouraging very intrusive or forceful techniques as the necessary prerequisites for controlling undesirable dog behavior, while others admonish the reader to never raise an impatient voice to the errant dog. Much of the contemporary popular literature is confounded by moralistic and ideological agendas that deflect from an honest and rational search for an objective understanding of dog behavior and its effective control and management. Unfortunately, the acceptance of a training system is often based more on an author's personal charisma and fame than on its actual efficacy or scientific merit. The overall result of these influences has been the accumulation of widely divergent and sometimes baffling opinions, theories, and practices performed in the name of companion-dog training and counseling.

An important focus of Volume 2 is to collect and evaluate the relevant applied and scientific literature, with the goal of clarifying what is known about the etiology of dog behavior problems and to highlight what yet remains to be done by way of additional analysis and behavioral research. Although the applied literature is somewhat more consistent and uniform, it also suffers from many of the same maladies found in the popular literature. In spite of an ostensible dedication to the scientific method, many common diagnostic

assumptions and treatment protocols are based largely on anecdotal evidence, isolated impressions, and personal opinions. This state of affairs is compounded by a dearth of confirming evidence that the methods used to treat behavior problems actually function in the ways suggested by the rationales given for their use. Furthermore, notwithstanding the optimistic success rates claimed by some practitioners, no one knows within a reasonable degree of scientific certainty whether the methods work as claimed. The lack of scientific validation is a significant practical and legal concern with respect to the treatment of some potentially dangerous behavior problems such as *dominance* aggression, especially since homologous interspecific models of such aggression remain to be developed and studied under laboratory conditions. Although a few provisional clinical studies have been recently performed to evaluate the efficacy of some behavioral protocols (especially those involving the adjunctive use of drugs), much remains to be done in this important area to place the field of applied dog behavior on a more respectable scientific foundation. In lieu of the needed clinical and laboratory research, it is incumbent upon behavioral practitioners to apply scientifically demonstrated learning and ethological principles for the control and management of dog behavior problems. Most significant progress in the field of applied dog behavior has occurred in the areas of description, classification, and incidence, but even here much confusion remains to be worked out. In addition to challenging conventional wisdom and questioning some widely held (but unproven) assumptions and beliefs, Volume 2 introduces and discusses other ways of understanding dog behavior and adjustment problems in the light of the scientific concepts and principles of ethology and learning covered in Volume 1.

In addition to the various causes discussed above, behavior adjustment problems often reflect an underlying failure of the owner and the dog to connect and bond with each other harmoniously. Such problems may require diligent cynopraxic counseling to resolve. Ultimately, a dog's domestic success depends on the formation of a harmonious and satisfying relationship with human companions and other animals sharing the same home and life experience. Consequently, intervention should always include efforts that simultaneously address social, environmental, and quality of life concerns. At the minimum, a healthy and successful human-dog relationship depends on the establishment of clear lines of communication, interspecies appreciation and understanding, leader-follower cooperation, playfulness, and the lifelong nurturance of mutual affection and trust.

Volume 2 begins with a brief history of applied dog behavior and training. Selecting the content for this chapter was difficult and, admittedly, much of importance has been regretfully omitted for sake of brevity and focus. In general, areas of historical significance for applied dog behavior are emphasized that have been neglected in the past. In Chapter 2, various methods for collecting and assessing behavioral information are introduced, together with a general discussion of etiological factors believed to underlie the development of many behavior problems. The remainder of the text includes reviews, analyses, and criticism of the scientific and applied literature insofar as it is relevant to the etiology, assessment, and treatment of fear, separation anxiety, aggression, behavioral excesses (compulsions and hyperactivity), and appetitive and elimination problems. The volume concludes with a chapter devoted to the cynopraxic counseling process and the role of interactive dynamics and social bonding on the etiology of behavior problems. Although treatment strategies are occasionally discussed, behavior modification and therapy protocols are the subject of a forthcoming text: *Dog Behavior Modification and Therapy: Procedures and Protocols* (Ames: Iowa State University Press, 2001).

Acknowledgments

OVER THE years, I have had the good fortune to benefit from the knowledge of many of the world's most prominent and respected authorities working in the field of applied dog behavior and training. However, special appreciation and recognition are due Drs. Peter Borchelt, Mary Burch, Jaak Panksepp, Barbara Simpson, Victoria Voith, and John Wright for critically reading and commenting on various chapters or portions of the book. Their advice and guidance have been invaluable. Much appreciation is due to Christina Cole for her help in collecting research materials and sundry other forms of assistance that helped keep the loose ends together. The expert editorial guidance of John Flukas has been consistently constructive and sincerely appreciated. I also wish to thank the wonderful staff at Iowa State University Press. I am very grateful for their patience and confidence in the project and deeply appreciative for their care and professionalism.

Handbook of Applied Dog Behavior and Training

Volume Two

Etiology and Assessment of Behavior Problems

1

History of Applied Dog Behavior and Training

To his master he flies with alacrity, and submissively lays at his feet all his courage, strength, and talent. A glance of the eye is sufficient; for he understands the smallest indications of the will. He has all the ardour of friendship, and fidelity and constancy in his affections, which man can have. Neither interest nor desire of revenge can corrupt him, and he has no fear but that of displeasing. He is all zeal and obedience. He speedily forgets ill-usage, or only recollects it to make returning attachment the stronger. He licks the hand which causes pain, and subdues his anger by submission. The training of the dog seems to have been the first art invented by man, and the fruit of that art was the conquest and peaceable possession of the earth.

G. L. L. Comte de Buffon, *quoted in* Jackson (1997)

Social Parallelism, Domestication, and Training
- Cave Art and the Control of Nature
- Evolution of Altruism and Empathy

Dogs and the Ancient World

Roots of Modern Training
- European Influences
- Famous Dogs
- American Field Training

Organized Competitive Obedience

Dogs and Defense
- War Dogs
- After the War
- Vietnam and Dog Training

The Monks of New Skete

New York and the North American Society of Dog Trainers

Science and Behavior

Applied Dog Behavior

Contemporary Trends in Dog Training

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Our species is the only one that keeps and purposefully modifies the behavior of another species to make it a more compatible and cooperative companion and helper. The process of domestication involves at least three interdependent elements: (1) selective breeding for conducive traits, (2) controlled socialization with their keepers, and (3) systematic training to obtain desirable habits. In addition to the effects of selective breeding, socialization, and training, a dog's basic needs are largely provided by a human caregiver. The overall effect of domestication is to perpetuate paedomorphic characteristics into adulthood and to enhance a dog's dependency on its keeper for the satisfaction of its biological and psychological needs, including affection and a sense of belonging to a group. The origins of this process began far back into prehistoric times.

Social Parallelism, Domestication, and Training

Close social interaction between early humans and dogs was probably facilitated by the evolution of parallel social structures, especially the tendency to form cooperative hunting groups and extended families. Both

wolves and early humans shared sufficient similarity of social custom to communicate well enough to lay a foundation and bridge for the development of a lasting relationship. One possible scenario is that early humans coming out of Africa approximately 140,000 years ago encountered wolves dispersed throughout the Eurasian land mass. These early humans, perhaps numbering only a few hundred individuals, are believed to have beeen the direct ancestors of contemporary humans. Over a relatively short period, these migrant humans were able to supplant indigenous humans already living in Eurasia. In *Evolving Brains,* John Allman (1999) speculates that the primary advantage needed to achieve this biological precedence and hegemony may have been the domestication of wolves. According to this view, the two species were preadapted to fit each other's ecology and family structure, thus making the transition to domestication relatively easy and natural. By cooperating, the two species may have attained an enormous competitive advantage over other species competing for the same resources. Interestingly, the migration out of Africa by this small group of humans roughly coincides with the first evidence of domestication as indicated by the analysis of mitochondrial DNA sequences. These studies indicate that the domestication of dogs was probably initiated approximately 135,000 years ago (Wayne and Ostrander, 1999). To fully exploit the advantages presented by domestication, early humans must have developed relatively sophisticated means of behavioral control and training. Undoubtedly, our ancestors engaged in activities aimed at limiting some sorts of dog behavior while encouraging other forms as opportunities and needs may have presented themselves. The obvious necessity of training as an integral part of the domestication process prompted Comte de Buffon to conclude that dog training was *the* first art invented by humans (see the introductory epigraph). Whether dog training was the first art will remain the subject of debate; however, one can safely assume that dog training, in one form or another, emerged long before the advent of recorded history.

Cave Art and the Control of Nature

Clearly, early humans were acute observers and sensitive social organizers, living in close-knit and cooperative hunting-gatherer groups. That they were interested in animal habits and their control is attested to by the masterful cave paintings found at Altamira (Spain) and Lascaux (France). These artworks were produced at about the same time that dogs began to appear in the archeological record, between 12,000 to 17,000 years ago (Jansen, 1974). The paintings depict with extraordinary sensitivity and realism a procession of various prey animals (e.g., bison, and deer) captured in line and color and transfixed in time to await rediscovery after many millennia shrouded in darkness. The animals are beautifully rendered in moments of flight or after falling from mortal wounds inflicted on them by the artist-hunter. The purpose of this early art was presumably to exert magical control over the prey animal by capturing its image and "killing" it, thereby giving the hunter success during the chase. One can hardly imagine that the Magdalenian people responsible for cave painting had not also discovered other means of control besides sympathetic magic, just as they had certainly learned how to use many natural forces long before they had names or adequate means to describe them.

Evolution of Altruism and Empathy

The ancient emergence of dog keeping appears to coincide with the evolutionary appearance of altruism and empathy among humans. According to Eccles (1989), the likely foundation of human altruism is the emergence of food sharing, followed closely by the development of the nuclear family and extended family groups. As humans evolved into food-sharing communities composed of individuals cooperating with one another, the emerging tendency toward altruism may have been extended to semidomesticated canids living at the outermost perimeter of their encampments. These early canids also appear to have evolved significant altruistic tendencies and social structures, perhaps sufficient to

attract empathic interest by early humans, if not to mediate symmetrical altruistic reciprocation and exchange. Eccles characterizes *altruistic actions* as purposeful efforts intended to benefit others without regard to how they might benefit oneself. He rejects Dawkins's (1976) more severe definition in which *altruism* denotes actions that benefit another at some expense or sacrifice to the altruistic actor. Eccles appears to assume that the advent of human altruism entailed an awareness of self and empathy for others. As a result of such evolutionary elaborations and social developments, altruistic humans may have been prompted to feel sympathy and pity for dogs living and suffering in their midst, thereby facilitating a growing sense of commonality and responsibility toward dogs.

Early training activities probably included the contingent sharing of food based on dogs behaving in some particular way (e.g., begging). The power of empathy would have offered early humans the ability to consider how their actions might influence dogs. In fact, the development of human empathy and its extension to dogs provides a viable means for understanding how the evolutionary gap between our two species was narrowed sufficiently to enable close interspecies cohabitation and domestication. Human altruism, coupled with empathy for others (especially those belonging to a common group that are acted toward altruistically), may have provided the foundation for the dog's domestication and behavioral incorporation. Human altruism and empathy seem to be especially strong toward the young, perhaps explaining the evolutionary trend toward paedomorphosis in dogs (see *Paedomorphosis* in Volume 1, Chapter 1). Paedomorphic dog types may have enjoyed a significant survival advantage by evoking altruistic caregiving and protective behavior in human captors.

DOGS AND THE ANCIENT WORLD

The earliest historical records of dogs come mainly from the art of Egypt and Assyria (Merlin, 1971). Archeological findings suggest that at least a dozen different breeds existed in ancient Egypt, ranging from the greyhound-like coursing hound and mastifflike hunting dogs to dogs resembling the modern dachshund. Egyptian hunters primarily used coursing hounds that were slipped to chase down fleeing game. Egyptian breeders selected for traits and structural attributes conducive to this sort of hunting activity, as well as short-legged dogs, perhaps, used for digging into burrows after fleeing animals (Figure 1.1). As such, all breeding is a form of antecedent control over behavior that is subsequently refined and brought into practical expression by the agency of training. As remains common today, the breeding and training of dogs were probably overseen by the same person.

FIG. 1.1 Egyptian hunters developed a variety of breeds for different tasks, ranging from the sleek coursing hounds to short-legged dogs that may have been used for chasing prey to earth. (Detail from an Egyptian tomb painting, Beni Hasan, 1900 B.C.)

By the time Herodotus visited Egypt in the mid-5th century B.C., the dog was found living in homes as companions. When house dogs and cats died, the household experienced a period of mourning. The dead animals were mummified and given ritual burials. Other evidence of highly developed breeding and

FIG. 1.2 Large mastiff-type dogs were used by Assyrian hunters to hunt large prey. Note the early use of slip collars. Assyrian dogs also wore bronze collars shaped in the form of a spiralling ring (Assyrian bas-relief, 7th-century BC).

training practices comes from Assyrian bas-relief depictions of powerful mastiffs used for various hunting purposes (Figure 1.2). Unfortunately, details from this period are lacking with respect to the methods of training used, but there can be little doubt that training played an important role in the way such dogs were prepared for the hunt and to live in close contact and harmony with humans.

As suggested by Homer's verses describing the sorrow felt by Odysseus for his dying dog Argos ("Swift"), Greek dogs were held as objects of sincere affection and symbols of devotion and faithfulness (see *Dog Devotion and Faithfulness* in Volume 1, Chapter 10). However, the Greek attitude toward dogs was complex, with many common expressions of contempt and personal insult involving reference to dogs. By the 5th century B.C., various dog breeds had been developed for specific hunting tasks and other purposes, such as guarding and shepherding flocks. In addition to working dogs, the Greeks also kept household or "table" dogs and small Melitean lapdogs as pets (Halliday, 1922). The breeding and training of hunting dogs appear to have been significant pastimes for ancient Greeks. Xenophon (circa 380 B.C.), a student of Socrates, wrote a valuable tract on dog husbandry and training entitled *Cynegeticus* (Hull, 1964; Merchant, 1984; see Xenophon, 1925/1984a), which gives the reader a rare glimpse into the breeding and management of Greek hunting dogs. For hunting hare, Xenophon recommends the Castorian and vulpine breeds, the latter of which was believed to be the result of an admixture of dog and fox lineage—a false belief that was widely accepted at the time. Aristotle perpetuated the vulpine-cross belief in his *History of Animals* and further suggested that the Indian hound (a particularly aggressive variety) was the result of crossing a male tiger with a female dog. These Indian hounds (mastiff-type dogs) were used for deer hunting and other pursuits that required bigger and stronger breeds. For wild boar, a variety of dogs were employed in a mixed pack, including the Indian, Cretan, Locrian, and Laconian breeds. Apparently, great care was taken to keep these breeds unadulterated. Control over undesirable matings was discouraged by the use of a spiked *surcingle,* or girth strap, that was wrapped around the female dog's body (Hull, 1964). However, Merlin (1971) has suggested that another possible function of this piece of equipment was to protect the dog from injury when hunting dangerous game like wild boar.

Xenophon recognized the value of early training and recommended that a dog's education be started while it was still young and most eager to learn. During the early stages of

training, hare-hunting dogs were trained to drive fleeing prey into snag nets by feeding the dogs near the location of the nets, at least until they developed a sufficient appetite for the hunt itself to perform the task of coming to the nets without such aid. Young trailing dogs were placed on long leashes and paired up with more experienced dogs to hunt hare. As their training progressed, novice dogs were restrained until the hare was out of sight and then released to ensure that they relied on scent rather than sight to follow and locate the fleeing prey. If a puppy failed to trail an animal in the correct direction, the puppy was recalled and the procedure repeated until the behavior was mastered (Hull, 1964).

Xenophon (1925/1984b) also anticipates with surprising accuracy a number of modern training theories and techniques. Although Thorndike has been credited with the discovery of the *law of effect,* stating that behavior is strengthened (stamped in) by reward and weakened (stamped out) by punishment (see *Basic Mechanisms of Behavioral Change: Stamping In and Stamping Out* in Volume 1, Chapter 7), Xenophon enunciated this basic rule of animal training well over 2000 years ago in his essay *On the Art of Horsemanship:*

> Now, whereas the gods have given to men the power of instructing one another in their duty by word of mouth, it is obvious that you can teach a horse nothing by word of mouth. If, however, you reward him when he behaves as you wish, and punish him when he is disobedient, he will best learn to do his duty. This rule can be stated in few words, but it applies to the whole art of horsemanship. (341)

It is easy to recognize how closely this dictum anticipates Thorndike's formulation. In addition to possessing a clear understanding of the value of behavioral consequences for the control of behavior, Xenophon also appreciated the usefulness of presenting rewards and punishers in a timely manner, stressing the importance of a close temporal connection between the action to be influenced and the consequences used to achieve that effect:

> He [the horse] will receive the bit, for example, more willingly if something good happens to him as soon as he takes it. (341)

He then continues:

> He will also leap over and jump out of anything, and perform all his actions duly if he can expect a rest as soon as he has done what is required of him. (341)

This latter passage describes a practice anticipating the *Premack Principle,* which states "for any pair of responses, the independently more probable one will reinforce the less probable one" (Premack, 1962:255). In addition to appreciating the usefulness of reward training, Xenophon was also fully aware of the methods for establishing escape, avoidance behavior, successive approximation, fading, and stimulus control:

> When a man has a raw horse quite ignorant of leaping, he must get over the ditch himself first, holding him loosely by the leading-rein, and then give him a pull with the rein to make him leap over. If he refuses, let someone strike him as hard as he can with a whip or a stick: whereupon he will leap, and not only the necessary distance, but much further than was required. In future there will be no need to beat him, for if he merely sees a man approaching behind him, he will leap. As soon as he has grown accustomed to leap in this way, let him be mounted and tried first at narrow, and then at wider ditches. Just as he is on the point of springing touch him with the spur. (337)

This list of parallels between ancient training methods and modern learning theory could go on to include many other examples demonstrating the existence of a sophisticated understanding of training methodology already current during Xenophon's time and probably in existence long before. In addition, Xenophon was aware of the value of such modern techniques as direct exposure (habituation), counterconditioning, and modeling for modifying fears. All of these methods are implied in the following passages:

> One should also handle those parts in which the horse likes most to be cherished, that is to say the hairiest parts and those where the horse has least power of helping himself, if anything worries him. Let the groom be under orders also to lead him through crowds, and accustom him to all sorts of sights and all sorts of noises. If the colt shies at any of them, he must teach

> him, by quieting him and without impatience, that there is nothing to be afraid of. (307, 309)

A few pages later, he continues on the subject of fear and its management:

> The one best rule and practice in dealing with a horse is never to approach him in anger; for anger is a reckless thing, so that it often makes a man do what he must regret. Moreover, when the horse is shy of anything and will not come near it, you should teach him that there is nothing to be afraid of, either with the help of a plucky horse—which is the surest way—or else by touching the object that looks alarming yourself, and gently leading the horse up to it. To force him with blows only increases his terror; for when horses feel pain in such a predicament; they think that this too is caused by the thing at which they shy. (325, 327)

Animal training has been operating at a fairly sophisticated level over the ensuing centuries since the appearance of Xenophon's *Cynegeticus* in the 4th century B.C. Like the Greeks, the Romans also appear to have been well versed in the art of dog training. In addition to companionship, several practical uses were made of dogs, such as hunting, pulling carts and chariots, guarding, and military work (Figure 1.3). Dogs were trained to perform in Roman circuses and on the stage. During one of these performances, a dog reportedly walked on two feet, danced, and feigned death after eating a bit of "poisoned" food (Griffith, 1952; Riddle, 1987). Immediately upon taking the food, the dissimulating dog appeared to become sick, thereupon staggering about the stage, until at last it fell down and remained perfectly still on the floor, as though dead. Actors then proceeded to grab and abuse the "corpse," dragging the dog around the stage, thereby making the illusion even more convincing. Throughout the performance, the dog remained motionless. At last, the trainer signaled the dog to break the trance, and it suddenly jumped up and rushed affectionately toward the trainer as the crowd looked on with amazed delight at the training feat.

Although Romans often lived in close association with dogs as domestic protectors and companions, affectionate care and treatment of pet animals were looked upon with some degree of official contempt by Roman leaders.

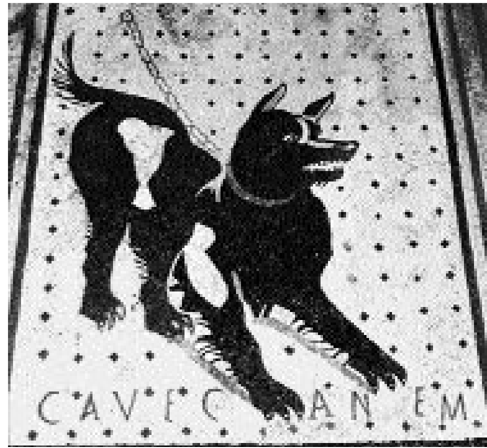

FIG. 1.3 The Romans used guard dogs to watch over their homes. This ancient warning inscribed is *Cave Canem,* "Beware of the Dog" (Pompeii mosaic).

Plutarch, for example, recorded an anecdote revealing Caesar's apparent disdain for the public display of such affection for pet animals, suggesting that such behavior was neither accepted nor considered natural by the Roman elite:

> On seeing certain wealthy foreigners in Rome carrying puppies and young monkeys about in their bosoms and fondling them, Caesar asked, we are told, if the women in their country did not bear children, thus in right princely fashion rebuking those who squander on animals that proneness to love and loving affection which is ours by nature, and which is due only to our fellow-men. (Plutarch, 1914: Pericles 1.1)

In China, merchants made use of messenger dogs to communicate over long distances (Humprey and Warner, 1934). These canine messengers carried valuable advance information about cargo and progress from camel caravans approaching remote population centers. In addition to shepherds and guards, the presence of such messenger dogs 1000 years ago in China makes it certain that a fairly sophisticated level of understanding about dog behavior and training was widely dispersed throughout the ancient world. Over the centuries, animal training has provided the means to conform the dog's behavior to utilitarian purposes and the amusement of crowds (Figure 1.4).

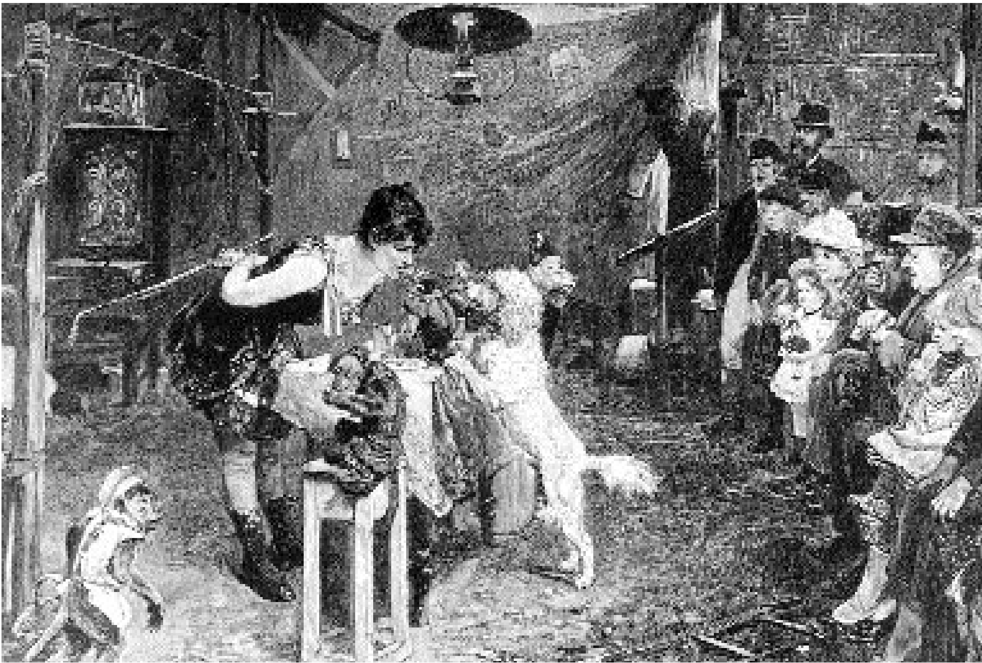

FIG. 1.4 A 19th-century German animal trainer performing with monkeys and a poodle. (Detail from *Ein Bravourstück,* an etching by Paul Meyerheim.)

ROOTS OF MODERN TRAINING

From the earliest times onward, countless conflicts between the dog's behavior and our expectations of it have tested and tempered our relationship. Even today—as any dog owner will testify—a dog's adjustment to family life rarely occurs without some tension and conflict. Little is known about how problem dogs were handled in the ancient past, but the methods employed were probably not much different from those used at the time to educate and discipline children. Corporal punishment certainly played an important role, with whipping being a very popular form of punishment until very recent times (Blaine, 1858; Hammond, 1894).

Although whipping was widely accepted and used to control unwanted dog behavior, it would be unfair to paint the picture of historical dog training with an overly broad brush. For example, H. W. Horlock (1852), a leading authority on the subject, wrote at length in his *Letters on the Management of Hounds* praising the virtues of reward and gentle training methods. Horlock clearly recognized the incendiary effect of corporal punishment on aggression, describing several cases in which whipping resulted in attacks against the "whipper-in." In one of his letters, he described a telling incident involving a highly aggressive hound that he attempted to punish for fighting:

> There was one [hound] particularly cross and savage with the other hounds, and, catching him one day fighting and quarrelling, I called the other hounds out of the kennel, and resolved to make him know better. I laid the whip upon him sharply; but, at every cut I gave him, he jumped at me, with his bristles up, as savage as a lion. Seeing I might kill but could not subdue him, I threw the whip down on the floor, and, holding out my hand, called him to me by name. He immediately approached, with his bristles and stern well up still, and licked the hand held out to him. The lesson was never forgotten by me. (211)

Following this insight, Horlock goes on to describe a rather contemporary-sounding

management strategy for controlling disruptive and injurious fighting that was occurring in his kennels nightly:

> I adopted afterwards the plan of separating at night the most quarrelsome, but in the summer it was difficult to keep them from fighting without constant and long exercise. More, however, was done by the voice than the whip, which I found only made them more irritable. With kind words they would do anything, and, as I always made pets of them, their tractability was shown in various ways. (211–212)

Horlock also emphasized the use of rewards for establishing control, describing the following steps for training the dog to come to its name:

> First give them names, and make them understand them. If you can find time to feed them yourself, do so, calling them by name to their food; if not take them out walking with you every day for an hour or two; put some hard biscuits in your pocket, give the dog a few bits at starting [establishing operation], call him by name occasionally when running forward, and every time he returns to you when called, give him a piece of biscuit; pat him and caress him the while. Follow this lesson for a week or ten days, and the dog will soon begin not only to know but to love his master. (223)

His emphasis on kindness and *connecting* with the dog for promoting cooperative behavior is further underscored by the following insightful passage:

> There are some persons to whom dogs become more readily attached than to others. The eye and the voice are a terror to some, as they are also an attraction to other animals. A soft eye, beaming with gentleness and good temper, is a point to which the instinct of the canine race naturally directs them, nor are they often deceived in its expression. Kind and benevolent looks have as great an influence over the animal as they have over the human species. They are, moreover, a sure criterion of temper. (223)

European Influences

Konrad Most is considered by many authorities to be the "father of modern dog training." As a captain in the German army, he was responsible for the formation of the German military-dog service during World War I, and from 1919 to 1937 he served as the director of the Canine Research Department of the Army High Command. Originally published in 1910, his book *Training Dogs* (1955, English) anticipates the articulation of many behavioral concepts and principles (e.g., shaping, primary and secondary reinforcement, stimulus control, punishment, and extinction) subsequently developed and refined by experimental analysis (Burch and Pickel, 1990). Although Most's work had its greatest influence in Europe, many American trainers have also benefited from his insights. Despite being dated and containing some problematic content, *Training Dogs* remains a "must read" for professional trainers and a useful resource for those interested in the history of dog training.

The reports of heroic dogs used during World War I led to heightened public interest in dog training, with high demand for dogs capable of performing specialized tasks such as police work and guiding the blind. The first official police dogs were reportedly trained and deployed in 1886 by Captain Schoenherr to control criminal activity in Hildesheim, Germany (Humphrey and Warner, 1934), although some evidence suggests that police-type dogs had been trained for police work long beforehand. Systematic efforts to train "police" dogs appears to have been already under way by the 15th century and probably much earlier. A description of such training appears in the writings of Heinrich Mynsinger published in 1473 (Von Stephanitz, 1925). These early police dogs were trained to stand ground against a human agitator (protected by a cloak of heavy hides) and to "track out the thief and the knave" (Figure 1.5). The brutal deployment of dogs by the Spaniards during the conquest of the Caribbean reveals that the Spanish already had a fairly advanced understanding of such matters by the 15th century (Varner and Varner, 1983).

By 1903 in Germany, various tests and efficiency trials were developed for evaluating police service dogs (Von Stephanitz, 1925) and, by 1914, as many as 6000 dogs were ready for military use (Griffith, 1952), with approximately 28,000 being requisitioned during World War I by the German

FIG. 1.5 A 15th-century tracker using a hound to trail a thief. (From *Treatise on Hunting* by Gaston Phébus. Bibliothèque Nationale, Paris.)

army (Von Stephanitz, 1925). Such police dogs gradually became a prominent feature of law enforcement in Europe. In England, Col. E. H. Richardson (1910) promoted the use of military rescue and ambulance dogs at around this date, and in 1916 established the War Dog Training School. Guide dogs appeared in Germany in 1917, primarily trained to assist soldiers blinded during the war, but strong evidence suggests that guide dogs were trained and used by the blind long before this date (Coon, 1959). In 1927, Dorothy Harrison Eustis, a Philadelphian living in Switzerland, enthusiastically described the training of guide dogs taking place at the Potsdam School for the Blind. The article, printed in the October 1927 issue of the *Saturday Evening Post,* caught the attention of a blind man, Morris Frank, who wrote a letter to Eustis expressing his appreciation and desire to come to Fortunate Fields (see below) to receive a guide dog of his own. Eustis agreed and, by 1928, Frank was back in America with a female German Shepherd guide dog named Buddy. Frank and Buddy rapidly became a media sensation and, in 1929, together with the financial support of Eustis, The Seeing Eye was founded in Morristown, New Jersey, where it has operated continuously up to the present. Canine guides for the blind were such a success that by the early 1930s several thousand guide dogs were already in use throughout Europe and the United States (Humphrey and Warner, 1934).

At about this time, several trainers schooled in German training techniques came to the United States to establish various dog-training schools. Especially prominent in this regard was Carl Spitz (1938), Hans Tossutti (1942), and Joseph Weber (1939). Spitz, who had been trained as a military-police dog handler in Germany, immigrated to Chicago in 1926. After 2 years in Chicago, he relocated to Southern California, where he established a training kennel. Although most famous for his work with dog actors (e.g., Buck, in *The Call of the Wild* with Clark Gable), Spitz strongly emphasized the importance of training for family pets, specifically, for the improvement of a dog's character and adaptation to life with humans: "Only a well-behaved dog can possibly be 'man's best friend'" (101). On the East Coast, Weber, an experienced German trainer who had been schooled at the Berlin Police School and Potsdam School for the Blind, established a dog-training school in Princeton and made significant contributions to the development of competitive obedience training (see below). Like Weber, Tossutti was associated with the Potsdam School for the Blind and the Berlin Police School, where he was an instructor. Tossutti established a successful dog-training school in Boston.

Famous Dogs

Enthusiastic public interest in dog training was propelled by the sensational appearance of highly trained, intelligent, and well-behaved canine actors like Fellow, Rin-Tin-Tin, and Strongheart. The appearance of these dogs in motion pictures set the stage for a growing awareness of dogs' capabilities to learn. For example, Fellow, a German shepherd dog, was reputed to respond to 400 vocal commands and perform a variety of complex sequences of behavior (see *Nora, Roger, and Fellow: Extraordinary Dogs* in Volume 1, Chapter 4). His fame caught the attention of two prominent psychologists at Columbia University, who subsequently verified many of the dog's unusual abilities by testing them under stringent laboratory conditions (Warden and

FIG. 1.6 The *Science-Newsletter* (now *Science News*) of July 14, 1928, featured a photo of Fellow on its cover, reporting that C. J. Warden, together with J. B. Watson, had set up a "Fellow Fund" in hopes of raising $100,000 in public donations to support continued dog behavior research at Columbia Univeresity.

FIG. 1.7 Strongheart exerted a tremendous fascination on the public, both as the result of his film work and the inspired literary efforts of J. Allen Boone. (Trimble-Murphin Productions, 1924.)

Warden, 1928) (Figure 1.6). The trainer-owner (J. Herbert) attributed his success with Fellow to a habit of talking to the dog "constantly almost from birth." The trainer also stressed the importance of avoiding corporal punishment.

The original Rin-Tin-Tin (named after a good-luck doll given to soldiers by French girls) was one of five puppies found by Lee Duncan that had been abandoned with their mother in a shelled German bunker in 1918 at Metz, France (Duncan, 1958). Rinty made his first film debut in *The Man from Hell's River* in 1922. Until his death in 1932, the canine film star made a total of 24 movies for Warner Brothers, followed by numerous other movie and television appearances by a long line of Rin-Tin-Tin descendants. Rinty's sensational success on the screen was certainly influenced by a craze sparked earlier by another famous German shepherd dog actor named Strongheart, whose film debut occurred 7 months earlier in *The Silent Call.* Strongheart was a highly trained police dog obtained when he was 3 years old from an impoverished German breeder at the end of World War I (Trimble, 1926). Strongheart (aka Etzel von Oeringen) made a dramatic impression on silent-film enthusiasts, rapidly acquiring international fame for his sagacity and physical prowess on the silver screen (Figure 1.7). Strongheart's lasting fame, however, comes primarily from the profound effect he had on J. Allen Boone, a Hollywood publicity writer, whose life was indelibly changed by the dog's companionship (see *Mysticism* in Volume 1, Chapter 10). Boone carefully recorded how this unique relationship transformed his life in *Letters to Strongheart* and *Kinship with All Life.* Together, Fellow, Rin-Tin-Tin, and Strongheart raised the public image of dogs to a new level of respect and appreciation, while underscoring the value of training for actualizing a dog's potential.

American Field Training

Until the 1930s, dog training in the United States had its largest following of enthusiasts among hunters. Among trainers of field dogs, Hammond (1894), Lytle (1927), and Whitford (1928) stand out as prominent and well-respected authorities. Although writing primarily for hunters, they provided their readership with many tips and methods for general obedience training and problem solving. Carlton (1915), writing at this time on the subject of hunting dogs, made an early effort to bridge the gap between science and the practice of dog training:

> Few breakers are aware that the dog's mind, in common with that of other animals, has been scientifically studied and that many patient observations and careful experiments are recorded in an extensive literature on the subject of "Animal Psychology." It is remarkable that the accepted principles of dog-breaking—which in most cases have been arrived at empirically and handed down by tradition—are to a great extent in accord with the scientist. This chapter is a first attempt to interest breakers in the subject. . .. Although the scientist abhors mere anecdote, he is at the same time conscious of the great disadvantages accompanying test conditions, and recognizes the value of observations and suggestions of the breaker when founded on a careful record of fact. (173–175)

Carlton goes on to interpret and summarize Thorndike's various laws and rules of learning in terms relevant to efficient dog training (see *Thorndike's Basic Laws* in Volume 1, Chapter 7):

1. The association in the dog's mind of satisfaction with the response we desire to encourage, and discomfort with the response we desire to inhibit.
2. The amount of satisfaction or discomfort.
3. The closeness in point of time and the preciseness of the connection between the response and the satisfaction or discomfort.
4. The frequency with which the response we desire is connected with the given situation and the duration of each such connection.
5. The readiness of the response to be connected with the situation.
6. The fact that to your dog a "situation" is at first a complex matter consisting of many elements in addition to the one element to which you are teaching him to give the desired response.
7. It is easier to obtain the response you desire de novo, than to get rid of a response already established and form a new one (184–185).

Books also began to appear during this period that were expressly written for average dog owners. For example, Lemmon (1914) published an interesting little book for dog owners detailing the various benefits of dog training and other germane topics, ranging from parlor tricks to the proper care and selection of a family dog.

An early and enthusiastic dog-training authority and editor of *Dog World Magazine,* Will Judy (1927), published a book sold under the same title as Lemmon's tract, viz., *Training the Dog.* Judy's very popular version contains numerous illustrations, training tips, and ways to control common behavior problems. Although such books occasionally contain valuable insights, most of the information is passé in comparison to contemporary standards. Nonetheless, this popular dog-training literature provides a valuable cultural and historical backdrop for studying and appreciating subsequent progress in the field.

Organized Competitive Obedience

The appearance of organized obedience training and the sanctioning of competitive trials by the American Kennel Club (AKC) slowly took form during the late 1930s. The person most often attributed with the distinction of bringing obedience competition to America from Europe is Helene Whitehouse-Walker. An avid poodle breeder and exhibitor, Walker discovered that in England the poodle and the German shepherd excelled in competitive obedience work. During an extended stay in England, she studied the various methods in use and subsequently introduced the sport of competitive obedience to the American dog fancy. She was an untiring advocate for the recognition of obedience training as a dog sport. The first American obedience trial took place in 1933 at Mt. Cisco, New York (Burch and Bailey, 1999). Walker petitioned the AKC

for recognition of obedience trials early in the 1930s, with full sanctioning and legitimacy being granted by the AKC in 1936. In collaboration with her assistant, Blanche Saunders (1946), and with Josef Weber, they established the official rules and obedience tests used by the AKC to judge obedience proficiency and to grant appropriate awards. In 1940, Walker and Saunders, traveling across the country in a house trailer, promoted the benefits of dog training and performed numerous obedience demonstrations. By 1941, many obedience clubs had already been organized and had started to offer public obedience classes to meet a growing interest in the new sport.

Dogs and Defense

As it turns out, this series of events was a stroke of good fortune for a country about to go to war. The pioneering efforts of Walker and Saunders provided a ready resource for a volunteer organization that would soon form to procure dogs for the war effort. Dogs for Defense (DFD) was spearheaded by Alene Erlanger, a prominent breeder and fancier, along with numerous other breeders, handlers, and trainers committed to the use of dogs for national defense. The AKC played a prominent facilitatory role in the organization and success of the DFD, which was officially launched in January 1942 and continued to serve a procurement function until March 1945. The activities of the DFD were coordinated by the Quartermaster General's Office. Interestingly, Mrs. Erlanger, a dog fancier, breeder, trainer, and judge, wrote the first major dog-training manual for the army (TM 10-396-War Dogs), as well as numerous technical bulletins and training films (Waller, 1958).

War Dogs

Prior to this time, the U.S. military had made little use of dogs (primarily sled dogs), and the DFD rapidly became the official source of dogs for military use. Although originally charged with the procurement and training of sentry dogs, the civilian instructors proved ill-prepared to train military working dogs and handlers. The responsibility for the procurement and training of sentry-dog teams was transferred to the Remount Branch in the summer of 1942. The DFD was delegated procurement responsibilities by the Remount Branch, setting up several procurement centers across the country for receiving dogs. The Quartermaster General established various training centers, including Front Royal Quartermaster Remount Depot (Virginia), Camp Rimini (Montana), Fort Robinson (Nebraska), San Carlos (California), and Cat Island (Mississippi). From 1942 to 1944, the DFD recruited 40,000 dogs. Of these, 18,000 were distributed among the various training centers. Approximately 8000 were returned to their owners as the result of some physical or temperament shortcoming detected during initial evaluations. Ultimately, some 10,000 dogs were mobilized and trained for military service during World War II. These dogs were trained to perform five primary duties: sentry, sled and pack, messenger, mine detection, and scouting. Dogs provided outstanding service in the war effort, with at least one having been awarded a Silver Star and Purple Heart for heroism—commendations that were subsequently revoked because of an army policy against the issuance of such awards to animals. Approximately 3000 dogs were *demilitarized* at the conclusion of World War II and returned to civilian life as heroes, with very few complaints regarding their behavior upon discharge from service (Waller, 1958).

After the War

At the end of the war, many handlers and trainers (civilian and enlisted) left the military to pursue civilian dog-training careers. One of these civilian trainers was William Koehler. Despite Koehler's fame (known mostly for his work at Walt Disney Studios), credentials, and achievements, no dog trainer inspires quite as much heated controversy as he does. Proponents and ardent apologists [most notably Hearne (1982)] defend his training methods with an almost irrational fervor, whereas detractors vigorously condemn them as being excessively brutal and cruel. In response to his critics, he appeared to be comforted by an apparent haughty self-estimation and an unbridled contempt for their evident

lack of appreciation and understanding, exclaiming "I guess the nicest thing that could happen to you is to enjoy the enmity of the incompetent" [quoted in Lenehan (1986:43)]. Koehler had little tolerance for these "cookie people" and "humaniacs" (terms he was pleased to use when referring to his critics), whose gentle approach he eschewed as "nagging a dog into neurosis." Although many of Koehler's problem-solving methods (hanging, beating, and other abusive practices) have been repudiated, many active dog trainers still use his methods for obedience training, usually in a modified form.

As the popularity of dog training caught on during the 1950s and 1960s, many capable and humane dog trainers appeared on the scene. Of particular note in this regard are Winifred Strickland (1965) and Milo Pearsall (Pearsall and Leedham, 1958), both highly influential and successful competitive obedience trainers. In 1965, Pearsall, together with Earl Traxler, founded the National Association of Dog Obedience Instructors (NADOI) in Manassas, Virginia (Tardif, personal communication, 2000). An important goal of the organization was to encourage greater uniformity in group dog obedience instruction and to disseminate relevant information to foster that end. Pearsall emphasized the need to train dogs from a canine point of view, thereby making training more humane and easy for dogs to understand. In addition, Pearsall is remembered for pioneering puppy group classes or "kindergarten puppy training" (K.P.T.) and stressing the use of guided *play* rather than more adversarial training techniques. NADOI members are primarily group instructors training dogs in close adherence to AKC obedience regulations, often doing so in preparation for AKC-sanctioned obedience competition. Many others deserve mention, but, unfortunately, space severely limits this discussion, and the subject will need to be left for another time. One trainer active during this time, however, deserves special mention for her contributions to modern dog training and dog behavior counseling. Ramona Albert (1953) developed several key advances in our understanding of dog behavior (and misbehavior). She strove in her practice to connect with dogs on a motivational level, but avoided the moralistic and emotionally charged anthropomorphic interpretations of a dog's intentions, a pitfall that snared so many trainers of her time. In addition, she strongly emphasized the importance of *listening* to a dog's behavior as a form of subtle communication revealing its inner state. Finally, she encouraged dog owners to exercise patience and intelligence and advised them to use relatively gentle methods for gaining control. Many of her techniques anticipate more contemporary approaches in vogue today for the management of severe behavior problems, especially her approach to the treatment of aggression and separation-related problems. She appears to be the first trainer-counselor to articulate a distress-anxiety theory of destructive behavior occurring in the owner's absence.

Vietnam and Dog Training

An important influence on training theory and method occurred somewhat surreptitiously as the result of various military studies and dog-training projects contracted by the U.S. Army during the 1960s and early 1970s. Prompted by the Vietnam War, the government poured millions of dollars into basic research and development of various military-dog programs. In addition to selective breeding programs (e.g., the Biosensor Research Team or "Super Dog" Program under the command of Col. M. W. Castleberry), many behavioral studies were performed focusing on complex training objectives and a dog's ability to execute them. Contracted by the Army, Roger W. McIntire (1968) directed the Canine Behavior Laboratory at the University of Maryland, where he performed numerous studies investigating the suitability of dogs for military service. Other research activities were centralized at the U.S. Army Land Warfare Laboratory in Aberdeen, Maryland. Research objectives included the feasibility of employing remote-controlled scout dogs (Romba, 1974), mine and tunnel dogs (Breland and Bailey, 1971), multipurpose dogs (Dean, 1972a), and explosive and narcotic detection (Romba, 1971; Dean, 1972b). Most of these studies were performed by civilian behavioral psychologists in close cooperation with military-dog handlers. Naturally, this meant that many dog

handlers were exposed to various classical and instrumental conditioning procedures used to modify dog behavior. Upon leaving the military, many of these handlers pursued civilian careers, applying this new knowledge of behavioral control to their public dog-training programs. [For an excellent summary of the important services performed by military working dogs in Vietnam, the reader should consult Michael Lemish's *War Dogs: Canines in Combat* (1996)].

The Monks of New Skete

Although many traditional dog trainers have emphasized the importance of training for attaining a satisfying relationship with dogs, the Monks of New Skete (1978, 1991) introduced a unique existential or spiritual significance and appreciation of dogs and training. For the most part, the Monks accommodated conventional dog-training methods and refined them but have also made some significant innovations of their own. An especially valuable contribution was the emphasis they placed on the human-dog relationship as something possessing value in its own right. Traditionally, *how to* books often gave considerable space to practical applications of training, such as competitive obedience and protection training, but neglected to emphasize the relationship-enhancing aspects of obedience training. The Monks specifically stress the value of training as a means for building a relationship through enhanced communication and cooperation. Ultimately, the training process is viewed as a means to intensify one's sensitivity and awareness of the self, the dog, and nature. The essence of this philosophy of training is poignantly expressed by the founder of the New Skete breeding and training project, Brother Thomas Bobush, who wrote,

> Learning the value of silence is learning to listen to, instead of screaming at, reality: opening your mind enough to find what the end of someone else's sentence sounds like, or listening to a dog until you discover what is needed instead of imposing yourself in the name of training. (1978:xiii)

In terms of technical innovations, the incorporation of massage and relaxation techniques into the training and socialization process was, perhaps, the Monks most lasting contribution to modern dog training.

New York and the North American Society of Dog Trainers

In 1972, a youthful Job Michael Evans entered the cloistered environs of the New Skete monastery to became a monk and apprentice dog trainer under the tutelage of Brother Thomas. During the next 11 years, he helped to guide the monastery's breeding and training program and cowrote the highly successful "How to Be Your Dogs Best Friend" (1978). He left the monastery in 1983 and shortly thereafter established a dog-training and counseling service in New York City. Evans rapidly became a highly influential author, professional dog trainer, and speaker. He is credited with authoring the first books written expressly for the instruction of private dog trainers (1985, 1995). Together with other prominent New York dog trainers, he helped to found the Society of North American Dog Trainers (SNADT) in 1987. Charter members included several highly regarded trainers, such as Carol Benjamin, Arthur Haggerty, and Brian Kilcommons. The organization soon established a respected multilevel certification process and a code of ethics. SNADT promoted a positive public image of the dog-training profession and its value for society: "SNADT believes that dog training is an essential service for a humane and rational society that cherishes dogs in the human environment. Dog training is an honorable profession worthy of public respect and esteem" (Evans, 1995:47). SNADT operated out of the American Society for the Prevention of Cruelty to Animals (ASPCA) for several years, until it was brought to an untimely end in 1995.

Science and Behavior

Mountjoy and Lewandowski (1984) have noted that most of the basic concepts and principles of modern behavior modification (e.g., shaping, chaining, positive and negative reinforcement, time-out, stimulus fading, and

response prevention) were in steady use long before they were named and systematically studied in the laboratory. By way of illustrating these observations, they describe an animal act [performed in 1799 and reported by J. Strutt (1876)] consisting of a dozen little birds carrying toy muskets and wearing paper caps on their heads. A soldier bird marched a "deserter" bird up to a toy canon, when

> Another bird was immediately produced, and a lighted match being put into one of his claws, he hopped boldly on the other [to]. . . the cannon, and applying the match to the priming, discharged the piece without the least appearance of fear or agitation. The moment the explosion took place, the deserter fell down, and lay apparently motionless, like a dead bird but at the command of his tutor he rose again; and the cages being brought, the feathered soldiers were stripped of their ornaments, and returned into them in perfect order. (1801/1876:341)

The complexity and sequential order of this performance clearly suggest that the bird trainer was intimately familiar with many of the basic principles of learning (including systematic desensitization) and various sophisticated behavior-organizing procedures (such as shaping and chaining). It was not until animal behavior became the subject of experimental study that the familiar scientific terms would be applied to these practical techniques and procedures.

A pronounced influence on the study of dog behavior and psychology was the publication of the seminal research of the Russian physiologist Ivan Pavlov and his coworkers (1927/1960). Credited with the discovery of classical conditioning (see *Classical Conditioning* in Volume 1, Chapter 6), Pavlov clearly recognized the significance of animal training for a science of behavior:

> It is evident that many striking instances of animal training belong to the same category as some of our phenomena, and they have borne witness for a long time to a constant lawfulness in some of the psychical manifestations in animals. It is to be regretted that science has so long overlooked these facts. (1928:55)

The result of his revolutionary research was a detailed and exhaustive inventory of functional relations controlling the acquisition and extinction of conditioned reflexive behavior. In the wake of Pavlov's discoveries, progress in the science of behavior and learning was extremely energetic and productive, resulting in thousands of studies over the course of the 20th century.

In America, at about the same time Pavlov was making his mark on the history of psychology in Russia, Edward Thorndike (1911/1965) was systematically studying voluntary or instrumental behavior at Columbia University (see *Instrumental Learning* in Volume 1, Chapter 7). Thorndike and coworkers made numerous detailed observations on how animals learned to escape from puzzle boxes by manipulating various ropes and levers. Whereas Pavlov's work focused on the effects of antecedent stimuli on reflexive behavior, Thorndike was more interested in how instrumental behavior was affected by its consequences. In short, Thorndike believed that animals learned how to escape from puzzle boxes through a process of *trial and error* (perhaps more precisely stated as *trial and success* and *trial and failure*) in which successful (rewarded) behaviors are *stamped in,* whereas unsuccessful (punished) behaviors are *stamped out.* Thorndike referred to this general principle as the *law of effect.*

According to Thorndike, all "learning is connecting." Trial-and-error learning is dependent neither on deliberate reasoning (insight) nor on the exercise of some specialized instinct but depends entirely on the selective stamping in or stamping out of relevant stimulus-response connections. Together, Pavlov and Thorndike formed the intellectual and methodological foundations for the experimental study of animal behavior and learning.

Another major contributor to the history of behaviorism was B. F. Skinner, whose efforts resulted in the development of a formal training theory based on the work of Pavlov and Thorndike. In 1951, Skinner wrote an important short article directed toward a lay readership concerning behaviorism and its relevance for animal training, entitled "How to Teach Animals." To my knowledge, this was the first time that the process of explicitly *shaping* dog behavior by using