



The unique identification of accused individuals from evidence obtained with scent-following dogs is routinely accepted by the criminal courts, yet "[t]he small amount of peer-reviewed research that has been published in this field has documented...that many trained law enforcement dogs cannot perform the tasks that are routinely claimed." Influences on the development of violent behavior in people, and intergroup versus intragroup aggression in primates are two of the topics discussed in response to *Science's* special issue about violence. And two episodes of die-offs of harbor seals, one in 1988 and one this year in the Caspian Sea, have been attributed to morbillivirus infections, but the question of whether pollutants increased the susceptibility of the seals to such infections is not settled.

Canine Detectives: The Nose Knows—Or Does It?

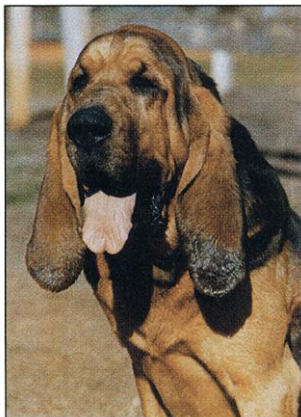
In the field of forensics, scientific experimentation and technological developments can make important contributions in both the prosecution and defense of criminal cases, as Andrew Watson discusses in his News Focus article "A new breed of high-tech detectives" (11 Aug., p. 850). There is, however, one area of criminal investigation that is still accepted by many courts of law with little or no underlying body of scientific evidence affirming the validity of its use. That area is the use of bloodhounds and other scent-following dogs to identify individual people or their scent trails in the environment on the basis of a previously offered reference scent article such as a handkerchief, hat, or other item of clothing (1).

Canine scent-identification evidence is usually presented in court to suggest the unique identification of an accused individual in the same way that fingerprints are used. DNA evidence, on the other hand, is usually represented only to include or exclude an individual in relation to a group of possible perpetrators with a similar genetic profile; it is not offered for unique identification. DNA evidence is premised on almost universally accepted theories of biochemistry and population genetics, whereas canine scent-identification evidence is premised on the alleged factuality of the "individual odor theory," which holds that each person has a unique

scent that can be identified by the dog and related back to a specific individual.

In fact, our research suggests that either the individual odor theory is incorrect or that trained dogs do not automatically generalize certain features of scent (for example, that imparted by the palm of the hand in touching an object) to other scents from the same individual (2). Nevertheless, courts have accepted the performance of such dogs, even when it is claimed that they are detecting the scent of a specific individual at the scene of a crime nearly 2 years after the crime was committed (3). In that juries have found individuals guilty almost solely on the basis of dog evidence subsequently shown to be unreliable, if not fraudulent (4), it would seem imperative for organizations such as the National Institute of Justice or the Forensic Science Service to support studies of the abilities of such scenting dogs.

The small amount of peer-reviewed research that has been published in this field has documented, contrary to much "popular wisdom," that many trained law enforcement dogs cannot perform the tasks that are routinely claimed. These include the ability to enter a scent trail at right angles and automatically determine the direction of quarry movement (5) and the ability to scent-match odors from individuals to handled objects, under controlled laboratory conditions (6). Although in some of these studies dogs have proved capable of performing such scent-matching tasks at levels greater than chance, their error rates are seldom better than 10 to 20% (7), levels substantially above those expected of scientifically validated forensic evidence. The U.S.



The stuff that legends are made of—but is there much science to back up such legend status?

Supreme Court has stated that "known or potential rate of error" is a significant factor a court should consider in the admission of scientific evidence (8).

Well-trained bloodhounds and other scenting dogs certainly are capable of performing important tasks in law enforcement: when properly controlled double-blind testing shows the ability of individual dogs to perform specific tasks at acceptable levels of correctness, their performance in such tasks might be considered as valid evidence in a court of law. Perhaps now, in an age of sophisticated forensic technology in such fields as physics and biochemistry, some careful, controlled research in the area of animal behavior could shed light on the acceptance of what is still the almost mythological ability of scenting dogs to provide forensic evidence.

I. Lehr Brisbin Jr.

Savannah River Ecology Laboratory, Aiken, SC 29802, USA. E-mail: brisbin@srel.edu

Steven Austad

Department of Biological Sciences, University of Idaho, Moscow, ID 83844-3051, USA. E-mail: austad@uidaho.edu

Steven K. Jacobson

Deputy State Public Defender, State of Colorado Office of the State Public Defender, Boulder, CO 80301, USA. E-mail: steve.jacobson@state.co.us

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Ideas About the Development of Violent Behavior

Any meaningful discussion of violence research or violence policy must include a biological perspective and take into account that behavior cannot be divorced from its origins in the brain. As Steven Hyman of the National Institute of Mental Health points out in Eliot Marshall's News article "The shots heard 'round the world'" ("Violence" special issue, 28 Jul., p. 570), the study of violence has moved beyond determinism. In a review of the available data on the neurobiological origins and consequences of violent behavior, I have collected evidence that this is as true for biological studies in particular as it is for the field of violence research in general (1).

As Klaus Miczek, a psychopharmacol-