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Hunting and hallucinogens: The use psychoactive and other plants to improve the hunting ability of dogs

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ABSTRACT

Ethnopharmacological relevance: Cultures throughout the world give plants to their dogs in order to improve hunting success. These practices are best developed in lowland Ecuador and Peru. There is no experimental evidence for the efficacy of these practices nor critical reviews that consider possible pharmacological effects on dogs based on the chemistry of the ethnoverterinary plants.
Aim: This review has three specific aims: (1) determine what plants the Ecuadorian Shuar and Quichua give to dogs to improve their hunting abilities, (2) determine what plants other cultures give to dogs for the same purpose, and (3) assess the possible pharmacological basis for the use of these plants, particularly the psychoactive ones.
Methods: We gathered Shuar (Province of Morona-Santiago) and Quichua (Napo and Orellano Provinces) data from our previous publications and field notes. All specimens were vouchered and deposited in QCNE with duplicates sent to NY and MO. Data presented from other cultures derived from published studies on ethnoveterinary medicine. Species names were updated, when necessary, and family assignments follow APG III (Angiosperm Phylogeny Group, 2009. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG III. Bot. J. Linn. Soc. 161, 105–121). Chemical data were found using PubMed and SciFinder.
Results: The Shuar and Quichua of Ecuador use at least 22 species for ethnoveterinary purposes, including all but one of their principal hallucinogens. Literature surveys identified 43 species used in other cultures to improve hunting ability. No published studies have examined the pharmacological active of these plant species in dogs. We, thus, combined phytochemical data with the ethnobotanical reports of each plant and then classified each species into a likely pharmacological category: depuratives/deodorant, olfactory sensitizer, ophthalmic, or psychoactive.
Conclusions: The use of psychoactive substances to improve a dog's hunting ability seems counter-intuitive, yet its prevalence suggests that it is both adaptive and that it has an underlying pharmacological explanation. We hypothesize that hallucinogenic plants alter perception in hunting dogs by diminishing extraneous signals and by enhancing sensory perception (most likely olfaction) that is directly involved in the detection and capture of game. If this is true, plant substances also might enhance the ability of dogs to detect explosives, drugs, human remains, or other targets for which they are valued.

1. Introduction

Dogs (*Canis lupus familiaris*) in the New World originated from multiple Old World lineages that migrated with late Pleistocene humans across the Bering Strait (Leonard et al., 2002). They entered South America with the early human colonists and also were re-introduced by European explorers. Dogs were apparently absent in the Amazon Basin (until the historical period) but present in the Guyanas and the Orinoco River Basin. Following European contact, genetic evidence suggests that newly introduced European dog races began to replace native dogs throughout the America (Koster, 2009). Hunting dogs are now common throughout much of the Amazon region (Fig. 1).

The role of dogs in human societies is diverse. They assist in warfare, detect odors, deter pest and predatory animals, guard property and people, guide the blind and deaf, protect other domesticated animals, provide human companionship, pull sleds, rescue lost and injured humans, and track and retrieve game animals. They also provide food and fur, serve as living blankets, and function in symbolic

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Fig. 1. Hunting dog in a Quichua village in Ecuador.

Fig. 2. Spotted paca (*Cuniculus paca*) in Ecuador.

rituals (Diamond, 1997; Coppinger and Schneider, 1995; Hart, 1995). Dogs play an important role in religions and rituals throughout the world. Ecuadorian Shuar believe that dogs are a gift from Nunkui, the earth mother (Bennett et al., 2002). According to the Quichua, dogs are gifts from sachahuarmi or sacharuna (forest spirits). They believe the canines protect hunters and family members from malevolent forest spirits called mal aire (bad air) and mal ojo (evil eye). They also believe that dogs dream and that they have souls (Kohn, 2007). The Egyptian god Anbu (or Anubis) is often portrayed as a man with the head of a dog or jackal (Gadalla, 2001). Xolotl, twin of the Aztec god Quetzalcoatl, was the dog god and served as a guide to the dead (Fernández, 1992). As part of a burial ritual, Aztec inhabitants of Anahuac killed a dog and laid it beside a human corpse. They believed that four years after death, the dog carried human soul to Chicunauhapan, the ultimate resting place of the dead (Beyer, 1908). Dogs possess social-cognitive traits that allow them to communicate with humans in ways unlike any other animal (Hare et al., 2002).

In lowland areas of the Neotropics, the primary role of canines is to assist in hunting wild game. Hunting efficiency using dogs compares favorably to other forms of hunting (Koster, 2009). The percentage of hunting trips that included dogs varies widely across cultures from a high of 83% (Mayangna and Miskito of Nicaragua) to 3% (Piro of Peru). Hunting success with dogs depends in large part on the targeted species. Although canines can be employed for any terrestrial species, they are particularly effective against pacas (*Cuniculus paca*, Fig. 2), agoutis (*Dasyprocta* spp.), and other animals that thrive in anthropogenic environments. The absence of dogs among some lowland cultures may be due to high mortality rates of dogs, rather than a canine aversion.

Mortality in Neotropical dogs results from the interaction of factors including hunting-induced wounds, malnutrition, microbial pathogens, and parasitic infections. Owing to their importance in hunting, it is not surprising that many cultures have a robust pharmacopoeia especially for dogs (e.g., Bennett et al., 2002; Lans et al., 2000, 2001; Leonard et al., 2002; Jernigan, 2009). Nonetheless, ethnoveterinary medicinal research is incipient (Nobrega Alves et al., 2010). Within many cultures, hunting dogs receive particularly good care (Koster, 2009). A Shuar woman, for example, may nurse a pup along with her own children (Bennett et al., 2002). In training dogs, both the Shuar and Quichua maintain the animals with a minimal diet supplemented with wild plants. While many plant species are employed to target canine illnesses, the majority are used to enhance the hunting ability of dogs. In a study that focused exclusively on ethnoveterinary practices, Jernigan (2009) identified 34 plants, that the Peruvian Aguaruna give to their dogs, most often to improve their hunting prowess. Plants are employed in baths to reduce their scent or to mask odors and thus decreasing their detectability by the targeted prey. Plants also function to clean buccal and nasal cavities to enhance olfaction (e.g., Lans et al., 2001; Sanz-Biset et al., 2009) or to enhance night vision (Wilbert, 1987).

Neotropical hunters employ magic, rituals, and charms to improve their hunting success and similar methods are used on dogs (Koster, 2009; Shepard, 2002). Koster (2009) notes the "occasional" use of hallucinogens, but the use psychoactive plants is actually frequent and widespread in many parts of the Old and, especially, the New World tropics (e.g., Bennett et al., 2002). The employment of psychoactive substances to enhance hunting ability seems to be counterintuitive, yet its prevalence suggests that it is both adaptive and that it has an underlying pharmacological explanation. In this paper, we address three questions:

1. What plants do the Ecuadorian Shuar and Quichua give to dogs to improve their hunting abilities?
2. What plants do other cultures give to dogs?
3. What is the likely pharmacological basis for the use of these plants, particularly the psychoactive ones?

The Shuar and Quichua are the largest indigenous groups in lowland Ecuador. They mostly reside at elevations from 300 to 1200 m in terra firme forests. This territory spans two of Holdridge's (1967) life zones, tropical moist forest and premontane tropical wet forest. Study sites were located in the Provinces of Morona-Santiago and Napo (Fig. 3). Both groups are horticulturists, growing manioc (*Manihot esculenta*) and plantains (*Musa* × *paradisiaca* L.) as their principle starches. Hunting (Fig. 4) and fishing supplement animal sources of protein from domesticated chickens and pigs. More data on the research sites and the two cultures can be found in Bennett et al. (2002) and Bennett and Alarcón (1994).

2. Methods

The Shuar data analyzed here was published in Bennett (1992a, 1992b, 1994) and Bennett et al. (2002). The Quichua data comes from Alarcón (1988), Bennett and Alarcón (1994) and our unpublished field notes. Voucher specimens are deposited in QCNE in Ecuador with duplicates in NY and MO in the U.S. We located data on ethnoveterinary medicine from other tropical cultures from ethnobotanical monographs, JEP publications, and searches using Web of Science and Google Scholar. Family circumscriptions and species names have changed since many of the data sources were first published.