

## DISTINCTIONS BETWEEN THE SKULLS OF COYOTES AND DOGS

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Archaeological sites in the United States frequently yield the bones of coyotes and domestic dogs. These two canines are very similar both in size and in detailed morphology. As there is a vast difference between them in their relations with man, it is important to identify their remains correctly.

The ethnographic distribution of dogs in California has been well documented (Kroeber, 1941), and it was found that dogs were absent only from the area bordering San Francisco Bay on the north and east. Heizer and Hewes (1940) noted this absence of dogs at all archaeological levels in the Sacramento-San Joaquin delta region, showing great antiquity to the pattern for this area. The time depth of dog distribution in other parts of California remains unknown.

Archaeologists and museum preparators are often unable to obtain detailed information on how to distinguish coyotes from dogs, especially when broken and incomplete specimens are encountered. To fill this rather specialized need, this paper presents a check list of traits which should serve to provide correct identification of most canine cranial remains.

The initial study was made in 1949 with a comparison between the skulls of 11 coyotes from Utah and 35 domestic dogs of various breeds. Subsequently, I have examined several hundred additional specimens from various collections including coyotes from Montana, New Mexico, and California. Coyotes of the western states proved to be remarkably homogeneous, and domestic dogs, while differing widely in a number of proportions, are quite constant in significant characteristics.

The coyote skull is distinguished by several general characteristics which can be best observed by direct comparison with the dog's skull:

- (1) The coyote has a longer, narrower muzzle.
- (2) The teeth of the coyote tend to be longer, sharper-edged and more complex in cusp pattern.
- (3) The bones of the coyote skull are thinner, crests sharper and the whole skull lighter than that of a comparably sized dog skull.
- (4) The lower teeth of the coyote form a nearly straight row on each side of the jaw, while the dog's tooth row bends more outwards, as though to make room for a larger tongue.
- (5) Coyote teeth are rarely worn down or missing, and cranial sutures are rarely fused. These traits are common among dogs, but may reflect more frequent attainment of greater age.

In addition to the above, fourteen specific characteristics were found, described below, which are fairly consistent in differentiating the two species. These are all observable on single specimens without the need for comparative material.

To each of the following traits there are occasional exceptions in that a given dog skull may show the coyote trait (though rarely the reverse). A skull fragment should show at least two of these traits, and preferably more, for positive identification.

1. The coyote has a much smaller frontal sinus than the dog. This is most apparent in the profile (see Fig. 1) where the top of the coyote skull forms an almost even convex curve from the rear of the skull to the middle of the nasal bones. The dog skull has a pronounced bulge over the optical orbits where the sinuses are located.

2. The suture between the zygomatic and maxillary bones has an extra irregularity in the coyote; the lower half of this suture is "S" shaped, while in the dog it is more nearly straight (see Fig. 1).

3. On the lower jaw, the posterior border of the coronoid process is vertical in the coyote, while the dog's coronoid extends backwards at the tip (see Fig. 2).

4. The adult coyote has a sagittal crest about one cm. tall over the posterior third of the braincase, while over the forward part, the lines of attachment of the temporal muscles do not meet at the mid-line. The sagittal crest of the dog varies greatly, but a posterior crest of one cm. would have an anterior part at least half this tall (see Fig. 1).

5. In the coyote, the plane of the palate, if extended rearwards, would miss the base of the skull. The dog's palate, extended rearwards, would meet the base of the braincase (see Fig. 3). Dogs with very short muzzles show the coyote trait.

6. The auditory bullae, on the base of the braincase, are much larger in the coyote than in the dog (see Fig. 4). In the coyote, the space between them is narrower than either bulla; in the dog, the intervening space is wider than either bulla.

7. The posterior end of the hard palate (internal nares) of the coyote is in line with the centers of the second molars or slightly farther forward. The hard palate of the dog usually extends to a point behind the second molars (see Fig. 4).

8. The anterior palatine foramen of the coyote is 3 to 4 times as long as it is wide. In the dog, the foramen's length is just twice its' width (see Fig. 4).

9. On the mid-line of the palate, the premaxillary bone extends backwards between and slightly beyond the anterior palatine foramina (see Fig. 4). The coyote's premaxilla here tapers to a long, narrow point, ending

about 7 or 8 mm. beyond the foramina. The dog's premaxilla usually ends in a blunt point no more than 5 mm. beyond the foramina.

10. As seen from the front of the skull, the opening for the nose (anterior nares) of the coyote is taller than it is wide. In the dog it is roughly circular.

11. On the upper molars, the medial cusps are notably more prominent in the coyote than in the dog (see Fig. 5). This appears to be the most reliable single trait, as the writer has seen no exceptions to it.

12. There is a corresponding difference in the lower first molars--the largest tooth in the mandible. In the coyote, the rear third of this tooth consists of two low cusps, of equal size, placed side by side (see Fig. 6). In the dog, the same is true, except that the medial one of these cusps is only half as large as the lateral one.

13. The lower fourth premolar of the coyote has three distinguishable cusps in addition to the basal ridge or cingulum. In the dog, only the larger two of these cusps are developed (see Fig. 7).

14. The second, third, and fourth lower premolars, as viewed from above, are three times as long as they are wide in the coyote, and twice as long as wide in the dog. (See Fig. 2 for location of these teeth.)

#### REFERENCES CITED

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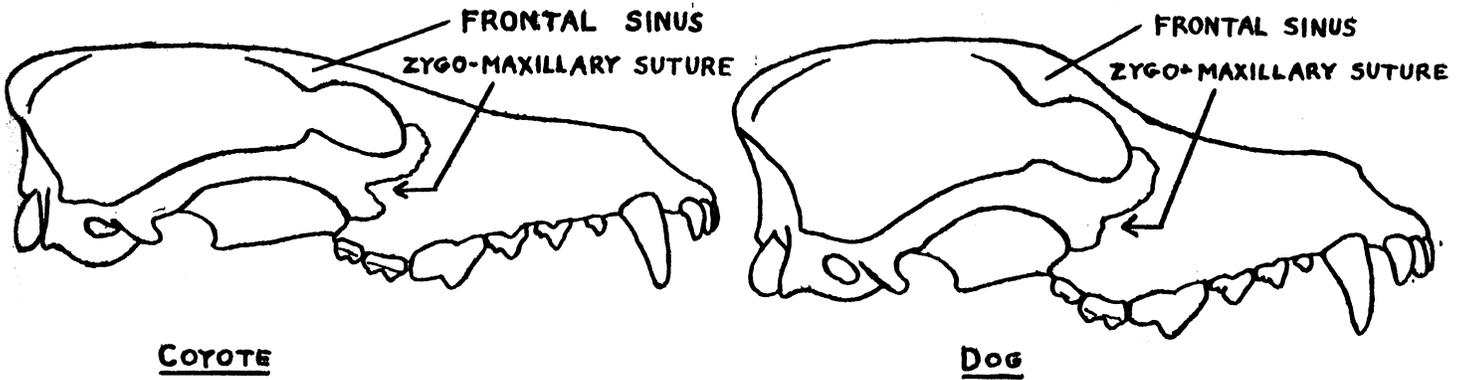


FIG. 1, SIDE VIEW OF SKULL



FIG. 2, SIDE VIEW OF MANDIBLE

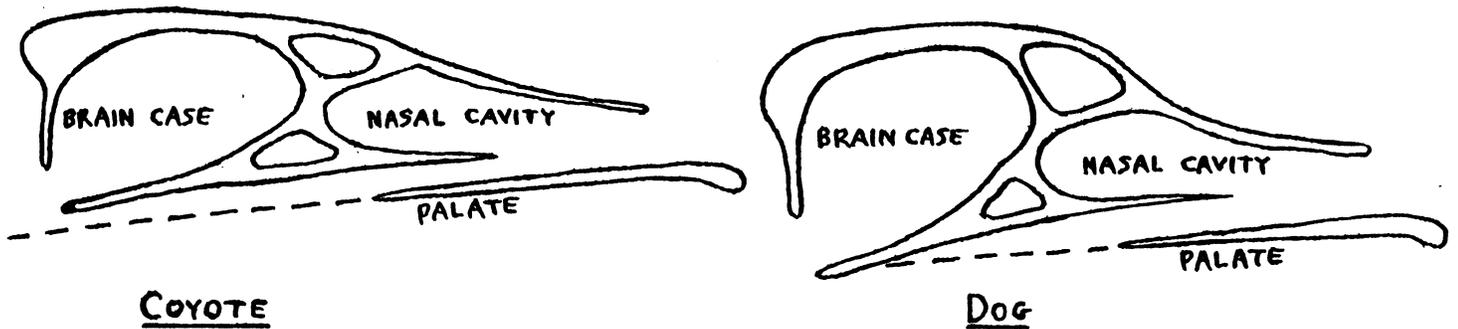


FIG. 3, APPROXIMATE SAGITTAL SECTION

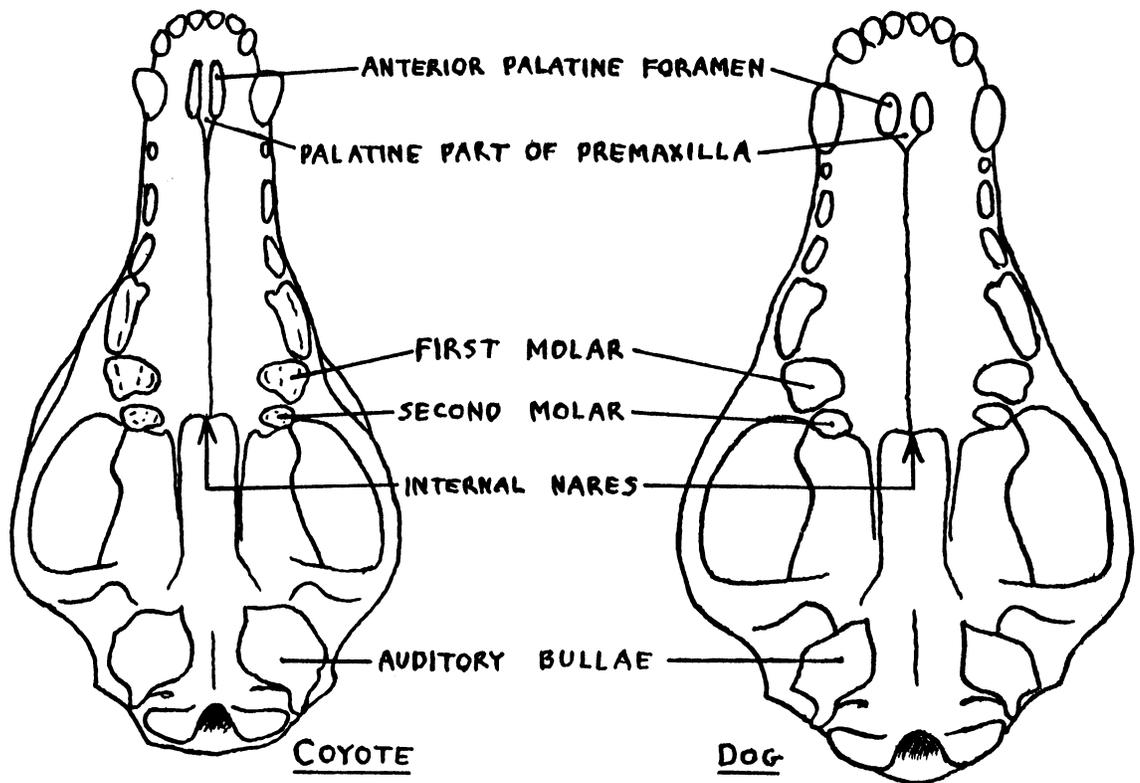


FIG. 4, BASAL VIEW OF SKULL

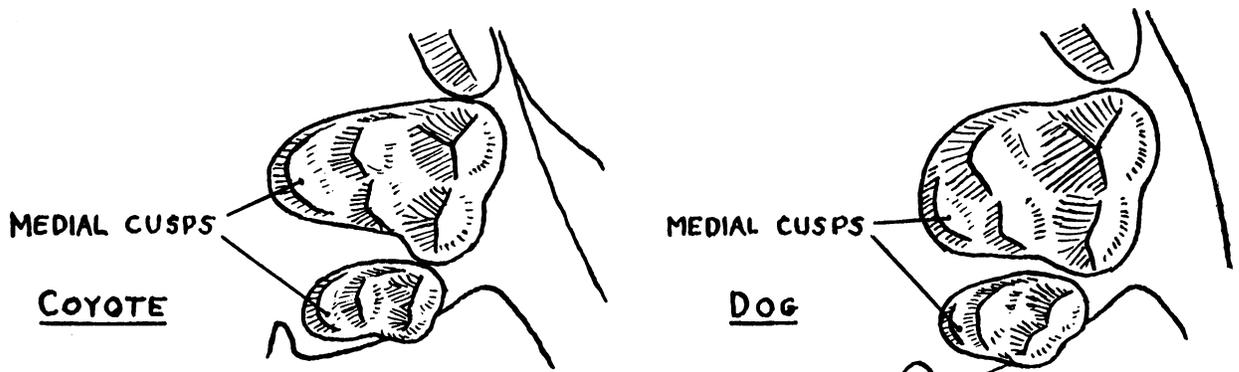


FIG. 5, UPPER MOLARS

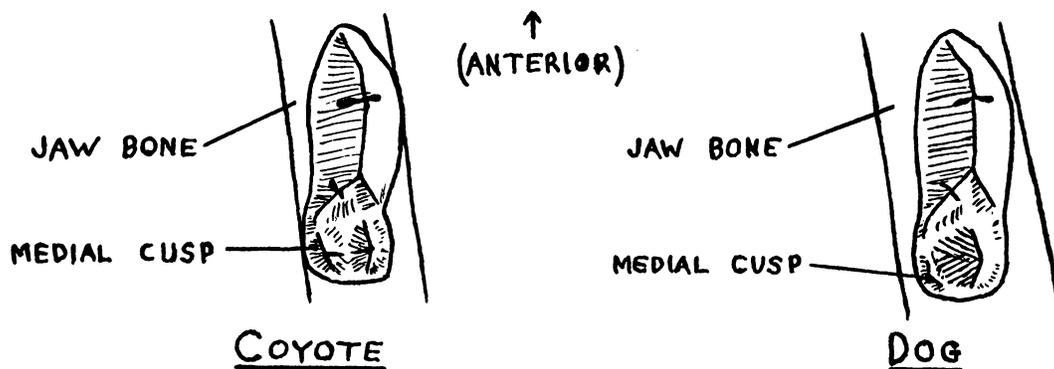


FIG. 6, LOWER FIRST MOLAR

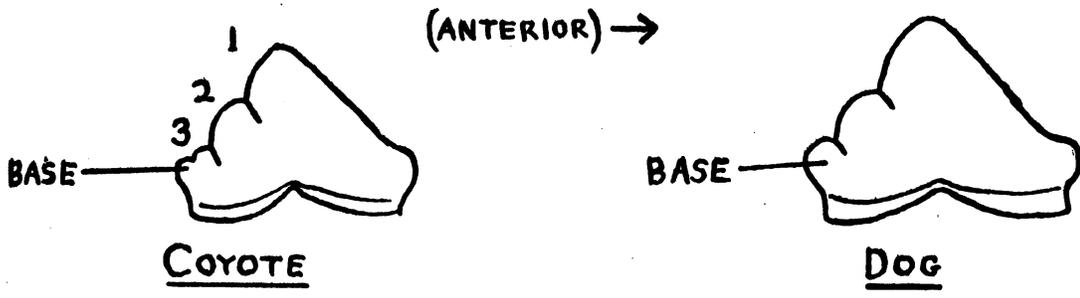


FIG. 7, LOWER FOURTH PREMOLAR