

Olfactory processing might be one of the most integral senses that influence Coyote behavior.



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## Introduction

Vasopressin is a hormone in the brain. It acts in social bonding, social behavior, aggression and territoriality. Vasopressin signals are received by AVPR1a (Arginine Vasopressin Receptor 1a). Density of vasopressin receptors impacts function in the brain.

Coyotes are socially and sexually monogamous, meaning that they maintain territory and are exclusive to mates. Coyote brains have not yet been fully mapped.

Based on AVPR1a mapping of other mammals, we suspect AVPR1a binding in the cortex.

## Methods

Brain samples (3 females) were sliced at -15C and kept at -80C until analysis. Slices were mounted in 20µm sections onto glass slides. Samples were opportunistically acquired.

Using AVPR1a autoradiography and established procedures<sup>1</sup>, the slides were exposed to <sup>125</sup>I-LVA (Linearized Vasopressin Antagonist). Slides were exposed to radiosensitive film for 7 days before development.

The Beagle Brain Atlas<sup>2</sup> was used to identify brain regions. A digital densitometry system was used to place a pseudocolor spectrum filter on the images.

Images were analysed for structural identification and qualitative vasopressin density analysis.

# Mapping vasopressin binding is important to understanding the social function of Coyotes.

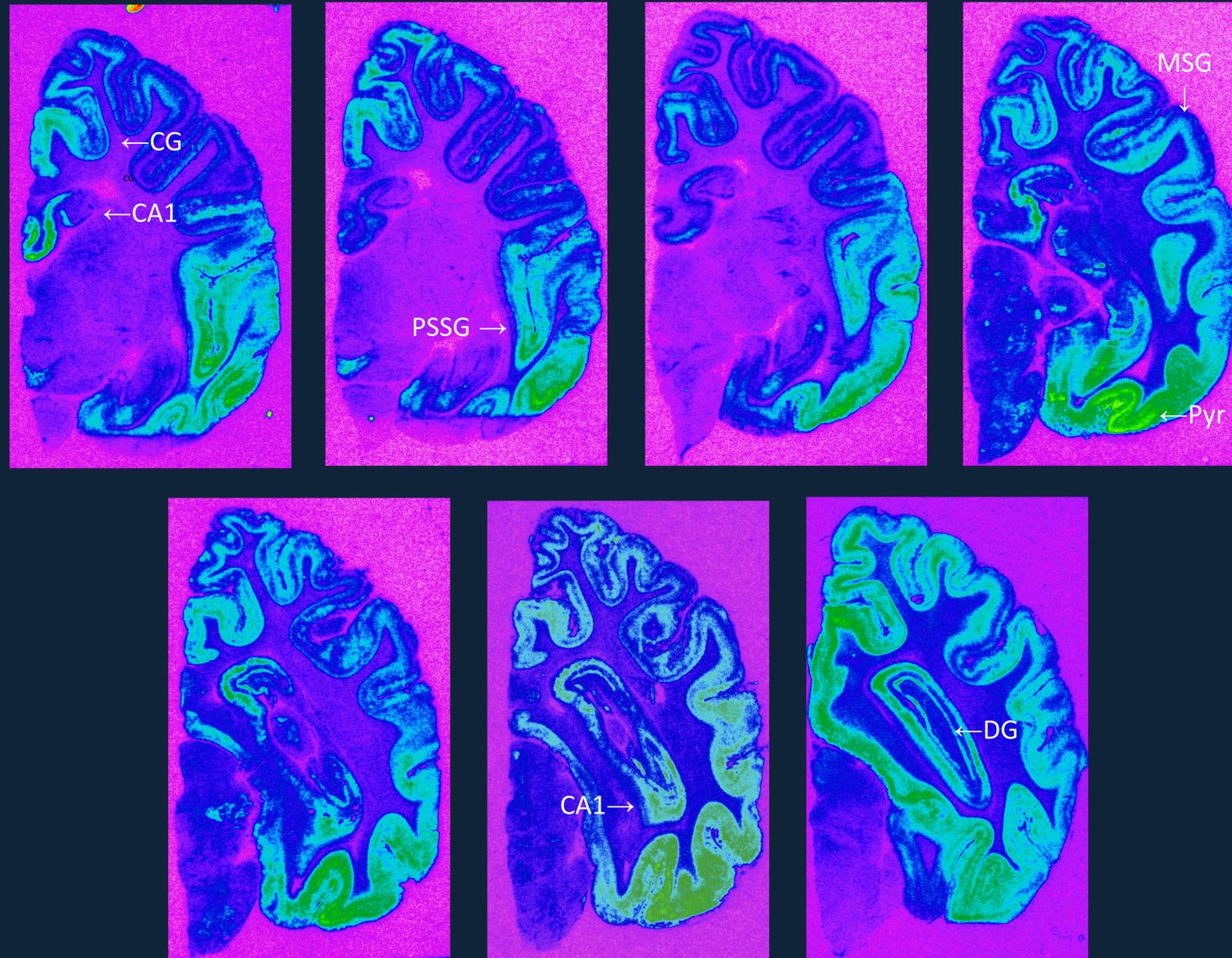


Figure 1. The brighter the green, the more densely the radioligand bound to AVPR1a. This indicates that the brighter areas might be more important in coyote social functions than other regions. Top left: most anterior. Bottom right: most posterior. CA1: Cornu Ammonis, CG: Cingulate Gyrus, DG: Dentate Gyrus, MSG: Medial Suprasylvian Gyrus, PSSG: Posterior Suprasylvian Gyrus, Pyr: Pyriform Lobe

1. Freeman SM, Walum H, Inoue K, et al. Neuroanatomical distribution of oxytocin and vasopressin 1a receptors in the socially monogamous coppery titi monkey (*Callicebus cupreus*). *Neuroscience*. 2014;273:12–23. doi:10.1016/j.neuroscience.2014.04.055

2. Palazzi, Xavier. *The Beagle Brain in Stereotaxic Coordinates*. Springer, 2011.



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## Results

Areas of major binding included:

- Cornu Ammonis of the Hippocampus: Autobiographical memory, sense of self, and time comprehension.
- Cingulate Gyrus: Emotional processing, aggression, and behavioral regulation.
- Dentate Gyrus of the Hippocampus: Sensory input and processing, exploration of novel environments, learning, and memory.
- Medial Suprasylvian Gyrus and the Posterior Suprasylvian Gyrus: Controls head and cervical muscle function.
- Pyriform Lobe: Olfactory (smell) processing, memory, and discrimination.

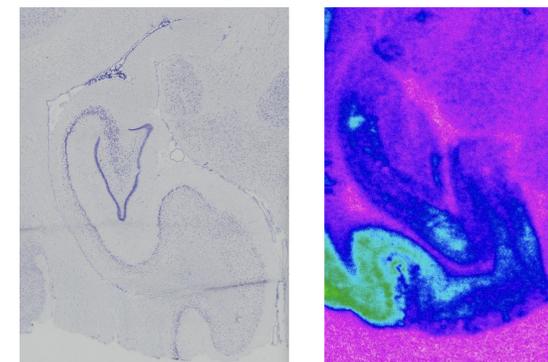


Figure 2. A Nissl Stain (left) shows cell density in the hippocampal region. The vasopressin receptor binding (right) is opposite the cell densities.

## Future Directions

We hope to finish the mapping of the coyote brain as well as quantify the differences in vasopressin binding among:

- individuals of the same sex
- Male and female coyotes
- Widowed and paired female coyotes (effects of grief on vasopressin binding structure)

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