See No, Smell No, Taste No Evil: How Sage-Grouse Detect Toxic Sagebrush

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See

• Some toxins, like phenolics, reflect light in the UV and visible spectrum (Fig. 1, “see” activity)¹

![Fig 1. The electromagnetic spectrum showing the ranges of visible light and ultra-violet (UV) light.](image1)

• Grouse and other birds can see in the UV spectrum²,³

• Species of sagebrush selected and avoided by sage-grouse differ in spectral profiles (Fig. 2)

![Fig 2. Average spectral profile of a sagebrush species (Artemisia nova) preferred (n=144) and a species avoided (Artemisia tridentata wyomingensis) (n=22) by sage-grouse.](image2)

We propose that sage-grouse could select less toxic plants by sight

Smell

• Monoterpenes are a class of small volatile, aromatic chemicals found in sagebrush (“smell” activity)

• Gas chromatography allows us to visualize these smells

• Sagebrush species differ in their monoterpane profile (Fig. 3)

![Fig 3. Gas chromatogram showing the different retention times of monoterpenes in three species of sagebrush, Artemisia tridentata ssp. Wyomingensis (green), Artemisia tripartita (red), and Artemisia arbuscula (blue).](image3)

We propose that sage-grouse could select less toxic plants by smell

Taste

• Birds have approximately 100 oral taste buds (Fig. 5), vs. 9000 in humans⁴

• Birds have a diversity of taste receptors⁵

• Bitter taste influences diet selection in birds⁶,⁷

• Chemicals in sagebrush have a bitter taste (“taste” activity)⁸

![Fig 5. A. Map of taste buds (black dots) in the upper and lower beak and tongue of domestic chickens⁹. B. Bird tongue showing fold and wings and C. Pictomicrograph of taste bud¹⁰.](image5)

We propose that sage-grouse could select less toxic plants by taste

Literature Cited

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