

EXHUMATION OF FOOD BY TURKEY VULTURE

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The success of Turkey Vultures (*Cathartes aura*) as forest scavengers is largely due to their highly developed sense of smell (Owre and Nothington 1961). Stager (1964) conducted a set of experiments with ethyl mercaptan which confirmed the ability of Turkey Vultures to locate odors when no visible object was associated with them. Turkey Vultures fly low over the forest canopy and can detect carrion on the forest floor entirely by smell. Carcasses that are completely hidden by foliage have been located as readily as visible ones (Houston 1987). Turkey Vultures evidently cannot detect animals that have recently died if hidden from view (probably because such carcasses do not yet emit a detectible smell) but are highly efficient at locating carcasses >1-d old and tend to reject those that are badly decayed (Houston 1986). The ability of Turkey Vultures to locate carrion hidden from view is well documented, though excavation of buried food is not reported in the review by Kirk and Mossman (1998).

On 21 July 1989 near Guilford, Connecticut, a woodchuck (*Marmota monax*) was trapped and then buried at dusk in a 2-ha tilled field that was planted with pumpkins and gourds. On that day at this site, no Turkey Vulture was observed, though people were in the field several hours, including most of the hours between trapping and burial. The carcass of the woodchuck was buried below the reach of cultivator tines and covered with ca. 10–15 cm of soil, tamped down by foot. The burial site was then

tilled with a cultivator, so no visual sign of burial was present.

On 23 July 1989 the weather was clear, and the temperature at nearby Stratford, Connecticut ranged from 18–30°C (NOAA 1989). At about 1400 H the senior author noticed a Turkey Vulture circling the field. When the senior author and two farm workers left the field for a noon break, the vulture descended almost immediately and landed directly on the burial site within 20 m of the three observers. It scratched away the soil until the carcass was exposed, and then proceeded to tear off pieces of flesh. This activity was observed for several minutes; when the observers approached, the vulture left the carcass and soared over the field for several minutes before it left the area. Examination of the exposed carcass showed that the vulture had torn off and eaten the flesh from the chest and rib cage area of the woodchuck.

During the 2 mo prior to this observation, 18 woodchucks, which had been destroying pumpkins, were trapped and buried at various locations in the field. In this period, several other carcasses had been unearthed and fed upon in a similar manner. Neither mammalian scavengers nor their tracks had been observed in the field. It is possible that previous instances of exhumed and partially eaten carcasses were due to foraging Turkey Vultures, which had been observed circling this field at a height of ca. 50–60 m on previous days. The observation of a Turkey Vulture descending and immediately proceeding to unearth a buried woodchuck suggests that this bird had knowledge of the location of the carcass and that it had previous experience in this behavior.

As early as the 1930s, field petroleum engineers made practical use of Turkey Vultures' sense of smell by introducing heavy concentrations of ethyl mercaptan into natural gas pipelines to attract Turkey Vultures to the sites of leaks in the line (Stager 1964). Some obscure literature previously suggested the ability of Turkey Vultures to detect and exhume buried

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carcasses (Coles 1938, Stager 1964). We believe that our observation represents detection by smell, but we cannot totally discount that the Turkey Vulture had watched from a distance as the senior author buried the woodchuck carcass. However, this seems unlikely because Turkey Vultures normally return to their roost 1–3 hr before sunset (Davis 1983), the woodchuck was buried at dusk, and no Turkey Vulture roost existed within several km of the tilled field.

Competition has a profound influence on natural selection. For example, the development of a keen sense of smell in Turkey Vultures likely provides advantage over sympatric avian scavengers for which the sense of smell is relatively unimportant in securing food, such as Black Vultures (*Coragyps atratus*), Common Ravens (*Corvus corax*), and American Crows (*Corvus brachyrhynchos*) (Terres 1982:831). The ability to exhume carcasses enables Turkey Vultures to exploit food resources such as the prey items frequently buried and cached by red foxes (*Vulpes vulpes*) and mountain lions (*Felis concolor*) (Whitaker and Hamilton 1998), or by other large predators.

RESUMEN.—Su bien desarrollado sentido del olfato ha permitido a *Cathartes aura* localizar ítems alimenticios ocultos a la vista, pero la excavación de ítems enterrados no ha sido reportada. El 23 de julio de 1989, una guala descendió hacia un campo de Connecticut donde una marmota (*Marmota monax*) había sido enterrada en la oscuridad dos días antes. El cuerpo fue enterrado bajo 10–15 cm de suelo en un terreno labrado. La guala localizó el sitio precisamente, excavó el suelo, y comió del cuerpo a 20 m de los observadores. *Cathartes aura* tienen presumiblemente la habilidad de explotar presas escondidas por predadores tales como zorros rojos (*Vulpes vulpes*), Pumas (*Felis concolor*), y otros.

[Traducción de César Márquez]

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LITERATURE CITED

- COLES, V.E. 1938. Studies in the life history of the Turkey Vulture (*Cathartes aura septentrionalis*, Wied). Ph.D. dissertation, Cornell Univ., Ithaca, NY U.S.A.
- DAVIS, D. 1983. Maintenance and social behavior of roosting Turkey Vultures. Pages 322–329 in S.R. Wilbur and J.A. Jackson [Eds.], Vulture biology and management. Univ. of California Press, Berkeley, CA U.S.A.
- HOUSTON, D.C. 1986. Scavenging efficiency of Turkey Vultures in tropical forest. *Condor* 88:318–323.
- . 1987. Competition for food between neotropical vultures in forest. *Ibis* 130:402–417.
- KIRK, D.A. AND M.J. MOSSMAN. 1998. Turkey vulture (*Cathartes aura*). In A. Poole and F. Gill [Eds.], The birds of North America, No. 339. The Birds of North America, Inc., Philadelphia, PA U.S.A.
- NOAA. 1989. Climatological data: New England, July 1989: 113(7).
- OWRE, O.T. AND P.O. NOTHINGTON. 1961. Indication of the sense of smell in the Turkey Vulture, *Cathartes aura* (Linnaeus), from feeding tests. *Am. Midl. Nat.* 66: 200–205.
- STAGER, K.E. 1964. The role of olfaction in food location by the Turkey Vulture (*Cathartes aura*). Los Angeles County. *Mus. Contrib. Sci.* 81:1–63.
- TERRES, J.K. 1982. The Audubon Society encyclopedia of North American birds. Alfred A. Knopf, New York, NY U.S.A.
- WHITAKER, J.O., JR. AND W.J. HAMILTON, JR. 1998. Mammals of the eastern United States. Cornell Univ. Press, Ithaca, NY U.S.A.

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