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CANADA JAY PREDATION OF WINTER TICKS (*DERMACENTOR ALBIPICTUS*)

PAUL HENDRICKS

ABSTRACT—In this note, I report on my observations of a pair of Canada Jays (*Perisoreus canadensis*) gathering live engorged female Winter Ticks (*Dermacentor albipictus*) from the recent bed of a yearling Moose (*Alces alces*) and flying into the adjacent woods to cache the ticks before returning for more. The Moose bed was on snow and contained loose hair and blood-stained snow as well as the engorged ticks. I found 12 additional beds on snow during the next 48 h within 250 m of the original bed, and all contained loose hair and blood-stained snow, but no ticks. Jays may routinely visit Moose beds on snow in spring because they recognize them as a potential source of food. Moose, however, may not be present during spring in many jay territories, so access to engorged ticks at beds is probably opportunistic and unreliable.

Key words: *Alces alces*, Canada Jay, *Dermacentor albipictus*, foraging behavior, Montana, Moose, *Perisoreus canadensis*, predation, snow, Winter Tick

Birds are generally thought to be the main predators of ticks (Mwangi and others 1991; Samish and Rehacek 1999). Many species function as "cleaner-birds" by foraging directly on larger mammals, removing external parasites, including ticks, in a mutually beneficial way to both participants; the cleaner obtains a meal while the host or "client" has its parasite load reduced, perhaps significantly (Dean and MacDonald 1981; Sazima 2011). Among the birds feeding in association with mammals are several species of corvids (jays, magpies, crows, ravens), many of which appear to glean ectoparasites from various species of ungulates (Sazima 2011; Found 2017; Gorman 2023).

One of the better-studied tick-mammal interactions in North America is that of the Winter Tick (*Dermacentor albipictus*) and its cervid hosts, particularly Moose (*Alces alces*). The impact of Winter Ticks on Moose is of special interest because the numbers of ticks on a single Moose during epizootics can exceed 30,000 individuals (Samuel and Welch 1991), leading to extensive hair loss from excessive grooming by the host, which then weakens the host, sometimes fatally. Regional declines in Moose populations have been attributed to Winter Tick infestations interacting with other factors such as severe winter weather (Samuel 2007; Rosenblatt and others 2021).

Canada Jays (*Perisoreus canadensis*), Common Ravens (*Corvus corax*), and Black-billed Magpies (*Pica hudsonia*) are known to feed on engorged Winter Ticks under controlled conditions when given the opportunity to do so (Addison and others 1989; Samuel and Welch 1991; Strickland and Ouellet 2020; Trost 2020). Fewer observations pertain to predation of Winter Ticks by these birds under completely wild conditions (Addison and others 1989), and details of fortuitous interactions are limited. Therefore, the opportunistic observations I made of a pair of Canada Jays removing engorged Winter Ticks from a Moose bed in Montana are of interest and offer insight into the foraging behavior of the jays as they relate to the availability of ticks. Further, although frequently encountered in the mountains of Montana, little has been written about Canada Jay biology in the state (Marks and others 2016), and my observations contribute to what we know about their daily lives.

On 5 April 2023 at 10:12 MDT, I observed a pair of Canada Jays gather live engorged female Winter Ticks from the recent bed of a yearling Moose, which was browsing in a patch of bare ground on a southwest-facing slope 35 m from the bed. Snow depth adjacent to the bed was 0.5 m. The bed was in the middle of a trail in the Pattee Canyon Recreation Area near Missoula, Missoula County, Montana (46.81778°N, 113.91706°W; 1355 m elevation) in a drainage dominated by Douglas-fir (*Pseudotsuga menziesii*), Ponderosa Pine (*Pinus ponderosa*), and Western Larch (*Larix occidentalis*). The bed was on snow and contained loose hair and blood-stained snow as well as live, engorged ticks (Fig. 1A). The jays appeared silently on the scene after I had inspected the bed and was standing about 8 m from it. They immediately began to remove all ($n = 10$) ticks from the bed, completing the task within 120 s. Each jay flew 3 times into the adjacent woods to cache a load of 1–3 ticks before returning after absences of 20–25 s, carrying 1–2 ticks in the throat and no more than a single tick in the bill.

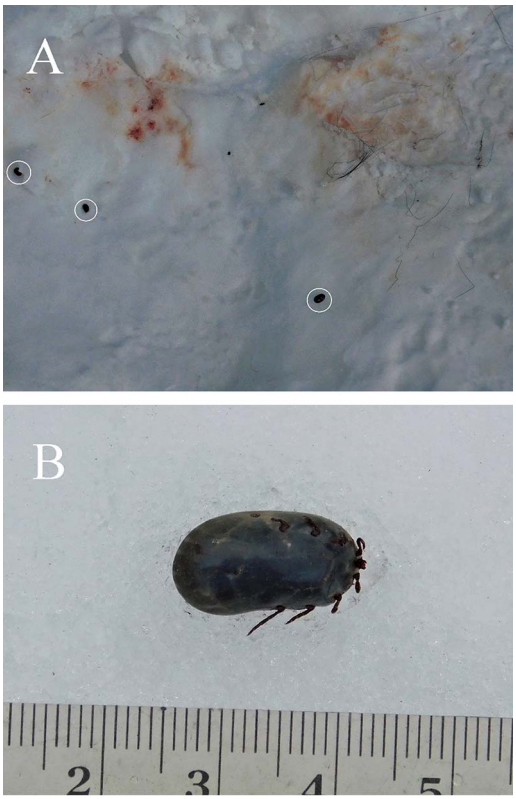

FIGURE 1. (A) Moose bed near Missoula, Montana on 5 April 2023 showing loose Moose hair, blood-stained snow, and 3 live engorged Winter Ticks (dark spots in white circles) shortly before removal by a pair of Canada Jays; (B) A dead engorged female Winter Tick found on 7 April 2023 frozen to the snow surface and away from a Moose bed. The size of all engorged ticks, live or dead, is represented by the inset ruler (scale marks in mm, numerals in cm).

All ticks were about 1.5 cm in body length (Fig. 1B). Once all ticks were removed from the bed the jays flew toward me then out of view into the adjacent woods but did not visit the nearby Moose.

During the next 2 d I saw the Moose in the general area where originally observed and found 12 additional beds on snow, all within 250 m of the original bed and each containing loose hair and blood-stained snow, but no ticks. I did not detect any Canada Jays in the vicinity on these visits. However, visible bird tracks at 3 new beds on 6 April signaled recent visitation by birds, either jays (consistent with tracks at the original bed) or once by a Common Raven, a pair of which were nesting about 150 m downslope from the original bed. All beds may have been visited by birds, but snow melt by morning of 7 April eliminated any detectable tracks at the remaining beds. On 7 April, between 09:15 and 10:15 MDT, I found 3 solitary engorged but dead ticks on snow 17–25 m from the nearest beds. These ticks were frozen to the surface of the snow and had probably been present up to 24 h after detachment without being disturbed.

Loose hair and blood-stained snow in the Moose beds I found in Montana are evidence of heavy Winter Tick loads (Ritcey and Edwards 1958; Drew and Samuel 1986; Mooring and Samuel 1999; Samuel 2007). The presence of engorged female Winter Ticks in the bed I found on 5 April occurred during the period when ticks most often detach from hosts, typically March to early May (Ritcey and Edwards 1958; Addison and others 2021), and my discovery of solitary ticks on the snow between Moose beds is also most likely to occur during this time of year. Engorged ticks usually move <60 cm on snow-free ground once detached from their host (Drew and Samuel 1986). Any engorged female tick that falls on a snow cover instead of snow-free ground will likely remain nearby on the snow and die or be depredated. Thus, a heavy load of ticks on a yearling Moose remaining for several days in a Canada Jay territory undoubtedly contributed to the harvest of engorged ticks by the pair of jays I observed, by repeatedly exposing the jays to ticks at the Moose beds.

Canada Jays are well-known for being territorial throughout the year and consuming a wide variety of foods captured through use of various foraging behaviors. Food is scatter-hoarded in small caches throughout the territory during autumn and winter for use in periods of food shortages (Rutter 1969; Strickland and Ouellet 2020; Swift and others 2022). Prior reports in the literature of Canada Jays feeding on Winter Ticks include those of Hardy (1869) from Nova Scotia, who noted that the jays often picked up ticks (presumably Winter Ticks) from Moose beds on the snow during winter and early spring, and the more detailed observations of Addison and others (1989) from Ontario, which include: (1) a territorial pair and possibly an offspring from the previous year collecting engorged ticks in early April from the beds of a captive infested Moose; (2) a pair of jays landing on a Moose in mid-April and pecking at body regions where ticks concentrate (although no ticks were seen

eaten); (3) a pair of jays presented with bread and 11 engorged ticks placed on a white sheet in early May (ticks were rapidly removed, carried up to 3 at a time in the throat while flying, and cached in the nearby forest); and (4) an active nest of jays in late April which contained 3 small nestlings and 3 engorged ticks, one of the ticks still alive.

My observations of tick predation by Canada Jays in Montana are similar in detail and timing to those from Nova Scotia and southern Ontario, suggesting that the behavioral methods and cues used by the jays to procure ticks are general and wide-spread, and correspond to the period of time when engorged female Winter Ticks detach and are generally most available (Hardy 1869; Ritcey and Edwards 1958; Addison and others 2021). Engorged ticks may also be especially desirable at the time when they are most available (spring) because this period corresponds to when the jays are nesting and the demand for food increases (Rutter 1969; Addison and others 1989; Strickland and Ouellet 2020). Engorged ticks may be too large for small nestlings to consume (Addison and others 1989) but could provide adult jays with a food rich in protein at a time when they are most reliant on cached food.

Winter Ticks are probably unavailable as food for many Canada Jays most times of the year. Tick availability depends, among other things, on Moose (or other ungulate host) presence within the territory of a pair of jays when female ticks are engorged and detach from their host. Further, if the ground is not snow-covered when and where Moose are bedding, then tick detectability probably greatly diminishes (Ritcey and Edwards 1958). My observations are consistent with this contention and suggest that jays may visit Moose beds on snow in spring because they recognize them as potential locations where engorged ticks, a most nutritionally profitable food, are concentrated and easiest to find (Addison and others 1989). Engorged ticks that fall to the snow between beds may be overlooked by the jays because their presence is unpredictable, the locations scattered, and they are not worth the effort to discover through systematic foraging.

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Montana Bird Advocacy, 909 Locust Street, Missoula, MT 59802 USA; pipitpaul@gmail.com. Submitted 11 April 2023, accepted 5 June 2023. Corresponding Editor: Robert Hoffman.