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OBSERVATION OF PLASTIC HAIRBRUSH BRISTLES IN THE HAYPILE OF AN AMERICAN PIKA (*OCHOTONA PRINCEPS*) IN GLACIER NATIONAL PARK, MONTANA

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ABSTRACT—Plastic pollution is a significant conservation issue and represents a significant threat to wildlife in marine and aquatic systems. Less understood is plastic pollution in terrestrial systems, especially those that are remote and/or protected. Here, we document the surprising discovery of the plastic bristles of a hairbrush embedded in the haypile of an American Pika (*Ochotona princeps*) in a remote area of Glacier National Park, Montana. We hypothesize that the bristles of the hairbrush, given their appearance, may have been perceived by the pika as herbaceous plant material that could potentially serve as a food resource during winter, when pikas rely on their haypiles as a food cache. We discuss the possible origins of the plastic materials and conservation implications for pikas and other animals living in remote protected areas.

Key words: American Pika, Glacier National Park, Leave No Trace, Montana, Northern Rockies, *Ochotona princeps*, plastic pollution

Animals have been known to use human-created materials for various purposes, such as nest-building (James Reynolds and others 2019). Most observations of such materials occur in and around human settlements and cities where animals have become behaviorally adapted to capitalize on novel materials (Gaston 2010). In more "natural" systems, such as in terrestrial protected areas, animals typically have less contact with human-produced materials and are less likely to have developed behaviors to use materials that could be beneficial (e.g., tool use; Shumaker and others 2011) or to avoid materials that could be maladaptive (e.g., plastic ingestion; Puskic and others 2020). Here, we detail the discovery of an American Pika (*Ochotona princeps*; hereafter pika) haypile containing numerous plastic hairbrush bristles in a remote protected area in the northwestern United States.

On 16 June 2024, the authors, along with a team of research technicians, hiked to a southeastern-facing talus patch in west-central Glacier National Park, Montana, approximately 2.75 miles (4.4 km) southeast of the head of Lake McDonald and 3.75 miles (6 km) away from the Sperry Lake trailhead near Lake McDonald Lodge (Fig. 1). At 12:20, the authors began surveying the talus patch following standard protocols (Moyer-Horner and others 2012). At 12:36, the 1st author (GMJ) located an apparently inactive pika haypile (i.e., no fresh green vegetation, but abundant scat) underneath a large flat rock with dimensions of approximately 7 ft 10 inches (2.4 m) long and 4 ft 10 inches (1.5 m) wide at 48.62314°N, 113.81080°W and approximately 5200 ft (1585 m) in elevation (Fig. 2a–b). Upon closer inspection, GMJ noticed small bright-green spherical objects located throughout the haypile (Fig. 2c). Initially, GMJ thought they might be a type of fungal growth and removed several of them for closer inspection. At that point, GMJ ascertained that they were composed of a plastic material, apparently the plastic bristles of a hairbrush.

The authors excavated portions of the haypile to identify as many hairbrush bristles as possible. In total, the authors removed 80 complete hairbrush bristles (Fig. 2d), each approximately 30 mm in length from base to tip. In addition to the 80 complete bristles, we recovered 22 partial bristles. Once out of the field, the authors closely inspected and photographed the bristles, noting any potential evidence of animal sign (e.g., scratches, bite marks). Nearly all bristles appeared to have evidence of chewing activity at the base (Fig. 2e), suggesting that the pika associated with the haypile individually removed bristles from the hairbrush base before adding them to the haypile.

Because pikas do not hibernate, they build haypiles throughout the summer to cure vegetation and remove toxins from plants to serve as their overwintering food supply (Dearing 1997). When pikas collect hay, they often chew plant stalks near their base to collect the greatest volume of vegetation possible in a single foray. We hypothesize that the plastic hairbrush bristles we found in the pika haypile could

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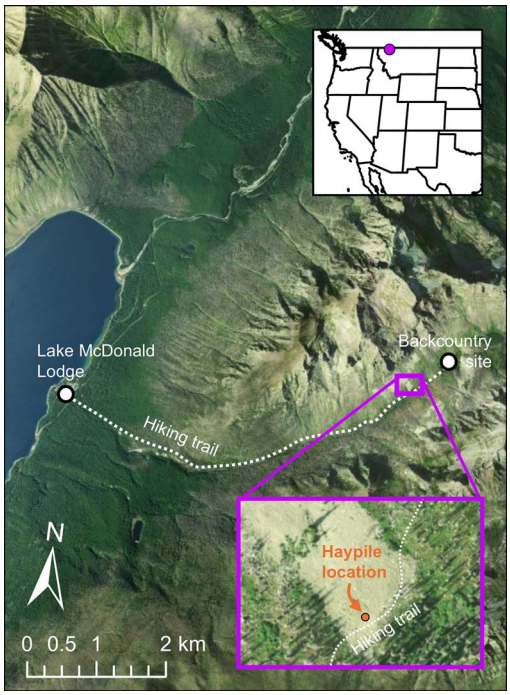


FIGURE 1. Location of talus patch (purple inset map) and the haypile (orange dot within inset) in relation to nearby topographic features. Shown as a white dashed line is the hiking trail connecting Lake McDonald Lodge to the backcountry campsite located adjacent to Sperry Lake (not visible). The inset map in the upper right shows the general location of the study area in Glacier National Park, Montana, USA.

have been mistaken by the pika for a potential food source. The bristles, although short (~30 mm in length), stand vertically on the hairbrush and have bright green components at the distal end, possibly giving the appearance of a plant stalk. Several of the bristles were missing the green rubberized tip (Fig. 2f), which could possibly have been removed and/or consumed by a pika, given that we were able to easily remove the tips.

How did plastic hairbrush bristles end up in a pika haypile in such a remote terrestrial location? There are 2 likely factors we think contributed to this occurrence. First, a backcountry campsite was located approximately 0.3 miles (0.5 km) from the talus patch we surveyed, and second, the trail to the backcountry site ran directly through the talus patch and was located <10 m from the haypile in question. It is possible that a visitor dropped their hairbrush nearby, and the bristles were subsequently collected by the pika. An alternative explanation is that the hairbrush was taken from the campsite by a Hoary Marmot (*Marmota caligata*), Bushy-tailed Woodrat (*Neotoma cinerea*), or another small mammal, transported to the talus, and eventually collected and added to the haypile by the pika.

Although we do not have evidence that the pika attempted to consume any of the hairbrush bristles, pika haypiles are meant for consumption (Dearing 1997), and therefore there is a possibility that this pika may have consumed plastic materials. Microplastic pollution and consumption by animals is a significant conservation problem (Susanti and others 2020) that can lead to hormonal disruption, starvation, and damage to internal organs. Our observation suggests that animals may be exposed to possible plastic pollution even in extremely remote protected areas (Brahney and others 2020; Rubiano A 2020; Branca and others 2025). Pikas expend significant caloric energy storing enough vegetation in their haypiles to survive the winter months, and the time spent cutting and storing plastic materials with no caloric value could contribute to reduced survival.

Leave No Trace and similar efforts to educate visitors of protected areas have been highly successful in reducing human impacts on sensitive and culturally important environments. Our observations show, however, that continued education and reinforcement may be needed to minimize exposure of wild animals to microplastics, and the potential negative effects of plastic consumption on animal fitness (Prokić and others 2021). Protected area managers may also need to expand beyond Leave No Trace efforts to enlist help from the public in removing lost items and litter they encounter to help protect wildlife from exposure to plastics. Campaigns focused on asking beach visitors to track and pick up marine debris have been highly successful (e.g., Marine Debris Tracker and 5-minute Beach Clean-up) at reducing exposure of marine wildlife to harmful man-made materials, but such efforts have not been emphasized in protected areas away from coastlines.

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FIGURE 2. Discovery of hairbrush bristles in an American Pika haypile: (a) talus site where the hairbrush bristles were discovered; (b) rock under which the haypile was located; (c) in-situ view of hairbrush bristles mixed in with dried vegetation and diagnostic spherical "peppercorn" pika scat in the haypile; (d) photograph of all 102 full or fragmented hairbrush bristles with Chap-Stick for scale; (e) close-up of hairbrush bristle with apparent chewing marks on the central shaft and base; (f) close-up showing that the green rubberized tip can be easily removed.

The problem of human-caused pollution in remote protected areas extends beyond plastics. For example, at another location in Glacier National Park, soiled toilet paper was found in an active pika haypile and remote camera installation demonstrated that the pika collected toilet paper intentionally on multiple occasions (J Belt, unpubl. data). It is unclear whether the pika collected the toilet paper as a potential food source or for some other reason (e.g., bedding material, novel object curiosity). The resulting contact with human feces has strong potential for introducing pikas to pathogens and zoonotic disease vectors that could lead to serious conservation implications; ramifications for wildlife health are not yet well understood. Further observations and continued systematic studies should be conducted to help better understand the extent of plastic pollution and other human waste products in remote protected areas.

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