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Report of white-nosed coati (*Nasua narica*) rubbing itself with feces of tayra (*Eira barbara*) in Costa Rica

Reporte de coatí de nariz blanca (*Nasua narica*) que se frota con heces de tayra (*Eira barbara*) en Costa Rica

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Captive coatis (*Nasua* sp.) have been known to fur-rub with various anthropogenic materials, such as manufactured chemicals and soaps, and non-native plants. However, little is known of their anointing behavior or of the anointing materials they use in nature. We recorded the activities of free-ranging mammals in a forest clearing in Costa Rica using a ScoutGuard SG565F trail camera equipped for long-range incandescent white flash to record night images. We observed a male tayra (*Eira barbara*), an omnivorous mustelid, defecate on a fallen tree in a forest clearing. After that, 4.3 days later, an adult male white-nosed coati (*Nasua narica*) approached and nudged the tayra droppings with its snout and forepaws. It then bit a fecal bolus, conveyed it in its mouth to the base of its tail, and rubbed it on its tail using rapid alternating movements of its forepaws. This is a rare documentation of fur-rubbing by a free-ranging procyonid with naturally occurring materials, and of the use of feces for anointing by a mammal.

Key words: Anointing; behavior; chemical ecology; fur-rubbing; scent-rubbing.

Se sabe que los coatis cautivos (*Nasua* sp.) frotan su pelaje con diversos materiales antropogénicos, como productos químicos manufacturados como jabones y plantas no nativas. Sin embargo, poco se sabe de su comportamiento de unción o de los materiales de unción que utilizan en la naturaleza. Registramos las actividades de los mamíferos en libertad en un claro del bosque en Costa Rica utilizando una cámara automática ScoutGuard SG565F equipada con un flash blanco incandescente de largo alcance para grabar imágenes nocturnas. Obtuvimos un registro de un macho de tayra (*Eira barbara*), un mustélido omnívoro, que defecó en un árbol caído en un claro del bosque. Posteriormente, 4.3 días después, un coatí de nariz blanca (*Nasua narica*) macho adulto se acercó y tocó las heces de tayra con su hocico y sus patas delanteras. Luego mordió un bolo fecal, lo llevó en su boca a la base de su cola y lo frotó en su cola usando rápidos movimientos alternos de sus patas delanteras. Ésta es una documentación poco común del frotamiento del pelaje por un prociónido con materiales naturales y del uso de heces para la unción por parte de un mamífero.

Palabras clave: Comportamiento; ecología química; frotar la piel; frotar olor; unción.

Many mammals are known to rub and roll in aromatic plant- and/or animal-derived materials (Reiger 1979; Weldon and Carroll 2007). Various functions for these anointing behaviors have been suggested, such as the use of topically applied chemicals to signal home-range occupancy or to deter ectoparasites (see Charlton *et al.* 2020 for recent discussion). Identifications of the natural materials that elicit anointing in some cases have contributed to hypotheses on its function, as, for example, when mammals fur-rub with plants known to contain insecticidal phytochemicals (*e.g.*, Baker 1996).

Among the various anointing materials used by some mammals are the feces of heterospecifics (Reiger 1979; Ryon *et al.* 1986). Based primarily on observations of captive individuals, Reiger (1979) stated that canids, viverrids, and felids tend to scent-rub with the urine or feces of prey animals. Zhou *et al.* (2020), who recently reported that free-ranging giant pandas (*Ailuropoda melanoleuca*) in China rub and roll in horse manure, stated that attraction to feces for anointing by wild mammals is extremely rare. Here, we report an observation of a free-ranging white-nosed coati (*Nasua narica*) in Costa Rica anointing with the feces of a tayra (*Eira barbara*), an omnivorous mustelid that chiefly consumes fruits, carrion, small vertebrates, and invertebrates (Presley 2000).

Observations were made during 2015 in a humid, lowland, old growth secondary forest in the southwestern corner of Costa Rica near Golfito, Puntarenas province. A site with an open canopy created by fallen trees was monitored using a ScoutGuard SG565F trail camera

(HCO Outdoor Products, Norcross, Georgia) 8MP equipped with a long-range incandescent white flash to record night images. The camera was mounted 1.8 m above ground on a vertical branch facing the trunk of a large fallen tree and was programed to re-set after 30 sec of filming. A variety of vertebrates, including greater grison (*Galictis vittata*), ocelot (*Leopardus pardalis*), Panamanian white-faced capuchin monkey (*Cebus imitator*), agouti (*Dasyprocta punctata*), hog-nosed skunk (*Conepatus leuconotus*), northern tamandua (*Tamandua mexicana*), Tomes spiny rat (*Proechimys semispinosus*), and red-tailed (*Sciurus granatensis*) and Alfaro's pygmy squirrels (*Microsciurus alfari*), were recorded at the site over a period of approximately 4 months.

On December 14, 2015 at 13:12 hr, a male tayra was recorded walking on the fallen tree trunk, lowering its hindquarters, elevating its tail, and depositing at least five light-colored fecal boli (Figure 1a). On December 19 at 10:01 hr, 4.3 days later**,** an adult male white-nosed coati approached and nudged the tayra droppings with its snout and forepaws. It then bit a fecal bolus (Figure 1b), conveyed it in its mouth to the base of its tail, and rubbed it on its tail using rapid alternating movements of its forepaws (Figure 1c), a typical anointing behavior for coatis. The coati fur-rubbed for 20 s before filming was interrupted when the camera re-set. When recording resumed, the coati was out of the activation area.

Reiger (1979), who reviewed scent-rubbing among carnivores, stated that the more arboreal procyonids never scent-rub or do so only under exceptional circumstances, *e.g.*, with artificial scent sources. Historical accounts describe coatis (*Nasua* sp.) in zoos anointing with manufactured chemicals, including benezene, and valerian (*Valeriana officinalis*), a medicinal herb native to Europe and Asia (Schneider 1932; Schneider 1952). More recently, captive white-nosed coatis were reported to fur-rub with lemons and other citrus fruits (Weldon *et al.* 2011). *Citrus* spp. originated in Asia and were transported to the New World during the early 1500s by Portuguese and Spanish conquistadores. Citrus trees are now widespread in America, but it is not known whether free-ranging coatis use their fruits for anointing. Curiously, a group of free-ranging ring-tailed coatis (*Nasua nasua*) on Ilha do Campeche, a resort island in Brazil, self- and allo-anointed with soaps brought by tourists (Gasco *et al.* 2016).

Documentations of fur-rubbing with manufactured substances or non-native plants ultimately may enhance appreciation for the range of chemicals that elicit anointing behaviors. Such observations also may provide preliminary evidence for a species' propensity to anoint. Ryon *et al.* (1986), for example, observed that wolves (*Canis lupus*) exhibited their strongest fur-rubbing responses to manufactured odors, including motor oil and perfume. However, it is unclear whether the reported use of anthropogenic materials can elucidate the origin or function of anointing (see Weldon 2021).

Aside from the use of tayra feces reported here, free-ranging white-nosed coatis in Panamá self- and allo-anoint with tree (*Trattinnickia*) resin, possibly to deter ectoparasites (Gompper and Hoylman 1993). Further observations of free-ranging animals may provide clues on the functional significance of anointing behavior among coatis and other procyonids.

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Figure 1. a) A tayra (*Eira barbara*) defecates on a fallen tree, leaving a fecal pile, b) 4.3 days later, a white-nosed coati (*Nasua narica*) bites a fecal bolus and c) rubs it on its tail.

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