

First documented predation of a Baird's tapir by a jaguar in the Calakmul region, Mexico

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Abstract

To date, records of predation on Baird's tapir (*Tapirus bairdii*) by jaguars (*Panthera onca*) were anecdotal and did not allow for differentiation regarding whether the animal had been preyed upon or scavenged. Here, we present the first documented event of predation on a Baird's tapir by a jaguar in the Calakmul region, Campeche, Mexico. In August 2017, we observed a jaguar eating a juvenile female Baird's tapir; when we analysed the skull, we observed the characteristic “lethal bite” with which jaguars kill their prey by piercing the temporal and parietal bones with their canine teeth. Jaguars select to attack tapirs when they are most vulnerable (young or sick). Records of these type of events are important for understanding the food webs and ecology of these iconic Neotropical species that inhabit the Mesoamerican forests.

Keywords

Greater Calakmul Region, keystone species, *Panthera onca*, prey-predator relationship, *Tapirus bairdii*, trophic web

Baird's tapir (*Tapirus bairdii*) is the largest terrestrial mammal in the forests of Mesoamerica and has been categorized as endangered by the International Union for Conservation of Nature (IUCN) (García et al. 2016). Baird's tapir occurs from southern Mexico to northern Colombia, inhabiting well conserved tropical rainforests, mountain cloud forests, swamp forests and coastal wetlands (Hershkovitz 1954; Nolasco et al. 2007). In Mexico, this species is still present in the states of Campeche, Chiapas, Oaxaca, Quintana Roo, Tabasco and Veracruz (Naranjo 2019). Baird's tapir populations have declined in the last 40 years in approximately 50% (Naranjo et al. 2015) due to illegal hunting, fires, droughts, habitat loss and fragmentation (García et al. 2016).

Due to its large size (180–250 cm body length), weight (150–300 kg), strength and fast movements, Baird's tapir has few natural predators. Baird's tapir primary predators are humans, crocodylians (*Crocodylus* spp.), pumas (*Puma concolor*) and jaguars (*Panthera onca*) (Eisenberg 1989; Matola 2002; March and Naranjo 2005; Weckel et al. 2006; Naranjo 2009). However, in the case of predation by big cats, most records are anecdotal and the few studies that have been conducted in other species of tapirs have used classical techniques (e.g., scat analyses) that do not allow to differentiate whether the tapir was preyed upon or scavenged (Taber et al. 1997; Garla et al. 2001; Astete et al. 2008; Cavalcanti and Gese 2010).

The Calakmul region hosts presumably the largest population of Baird's tapir (Naranjo 2009) and of jaguars (Ceballos et al. 2002) in Mexico. At Calakmul, temporal activity and spatial distribution of tapirs and jaguars overlap, generating physical interactions (Pérez-Flores unpub. data). Both species are highly associated with water bodies to cool down, drink water, defecate (tapirs) and find prey (jaguars) (Owen-Smith 1992; Pérez-Flores 2018). Therefore, the encounter rates between these species may be higher around small streams, lagoons or in the waterholes locally known as "aguadas", which are the only source of water for wildlife consumption in this region (O'Farrill et al. 2014).

On 24 August 2017, one of the authors (HAD) was exploring with his dogs near a small stream called "El chorro" (18°35'57.32"N, 89°17'06.0"W), in the ejido (communal shared land) Nuevo Becal in the municipality of Calakmul (Fig. 1). In the distance (15 m), he observed a jaguar eating a prey without being able to identify the species. Once the dogs detected the jaguar, they chased it away. On the way to the prey he observed broken branches and vines, and tracks of prey dragging. As he approached the prey, he noticed that it was a female juvenile Baird's tapir of approximately 150 cm total length and weighing between 80–100 kg (Fig. 2). The tapir carcass was found in the right lateral recumbent position with the left forelimb fractured, multiple scratches on the body, and was already being devoured through the lateral and ventral part of the chest (Fig. 3A). In addition, some head wounds and blood flow from the left ear were observed. The next day the tapir's skull was collected and taken to the Colegio de la Frontera Sur to be cleaned and analysed. Once the skull was processed, we observed two perforations, one of irregular shape located in the right parietal of 1.8 × 1.6 cm above the squamous suture (Fig. 4A) and the other was circular of 0.5 cm located between the left parietal and the occipital

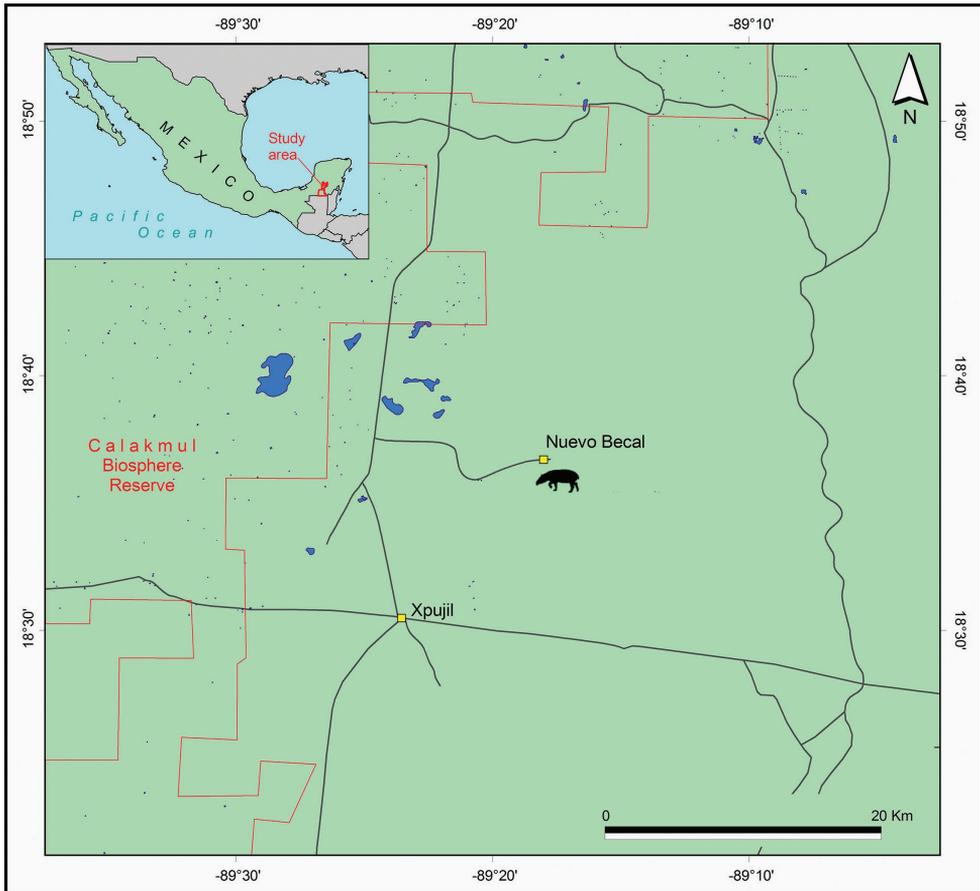


Figure 1. Location of the communal land (ejido) Nuevo Becal in the Calakmul region, Campeche, Mexico, where the predation event was recorded.

on the lambdoid suture (Fig. 4B). We also observed several marks of the fangs in the parietal bones (Fig. 4C, D) and the right lacrimal bone fractured.

A few days later, we deployed a camera trap (Cuddeback Black Flash E3, Non-Typical Inc., Green Bay, WI, USA, www.cuddeback.com) on the site to identify the jaguar, and finally a month later we obtained two photographic records. The first was a jaguar passing by (27 September 2017) and the second was a jaguar with the remains of a prey (29 September 2017). Unfortunately, we do not know if it is the same individual, but at least we recorded that jaguars are constantly hunting at this site (Fig. 5A, B).

Since 2008, we have observed several tapirs injured by jaguars; most of these tapirs were adults and had a low body condition (Pérez-Flores unpub. data). The health status and weight (between 100 to 120 kg) of these tapirs influence the decision of jaguars to attack them. Tapirs are able to escape from jaguars because they have a large muscle mass, thick and hard skin around their neck, which is where big cats usually grab and kill their prey (Medici 2010). Unfortunately, some injured tapirs die of septicemia a few days later as a result of the bacteria present in the



Figure 2. Dead female juvenile Baird's tapir (*Tapirus bairdii*) found in the communal land (ejido) Nuevo Becal in the Calakmul region, Campeche, Mexico.

mouth and claws of jaguars (Pérez-Flores pers. obs.). There are about 200 species of bacteria present in the oral cavity of domestic cats (*Felis catus*); some of them are highly pathogenic (Dewhirst et al. 2015), so there could be many more in wild felids due to their feeding habits (eat prey and scavenging). For these reasons, we suggest that when Baird's tapir remains are found in jaguars' scats, it is most likely from eating carrion or preying on a calf or a juvenile tapir as in this case.

To our knowledge this is the first documented event of predation of a Baird's tapir by a jaguar. This juvenile tapir exhibits the characteristic "lethal bite" of jaguars,



Figure 3. Female juvenile Baird's tapir (*Tapirus bairdii*) beginning to be eaten by a jaguar in a similar way to other prey (A). Picture of the carcass of a sheep showing how a jaguar attacks and devours its prey (B).

in which they directly pierce the skull through the parietal or temporal bones with their canine teeth (Hejna 2010). Jaguars can bite with their canine teeth with a force of 4,939 kN (503.57 kg-force) (Hartstone-Rose et al. 2012), breaking bones and turtle shells up to 2 cm width (Schaller and Vasconcelos 1978, Emmons 1989). Apparently, the marks of the fangs that we observed above both perforations are from jaguar's attempts to penetrate the bones. In this case, the bite was similar in size (1.8×1.6 cm) to that reported on other jaguar prey such as capybara (*Hydrochoerus hydrochaeris*) (Schaller and Vasconcelos 1978). The canine teeth penetrated the thinnest portion of the right parietal bone (width = 0.38 cm) but could not completely penetrate the base of the occipital which is wider (1.16 cm).

Jaguars usually drag their prey to a thicket or other secluded spot (Schaller and Vasconcelos 1978; Pérez-Flores 2018) at a distance as far as 1.5 km (Pitman et al. 2002). We estimate that this tapir was dragged a few meters since the site was hidden and is not frequently visited by people. Jaguars do not cover their prey with branches, leaves and dirt as puma do (Silveira et al. 2008); this helps us to observe the carcass from a distance. The jaguar had begun to eat the tapir in a similar way to other

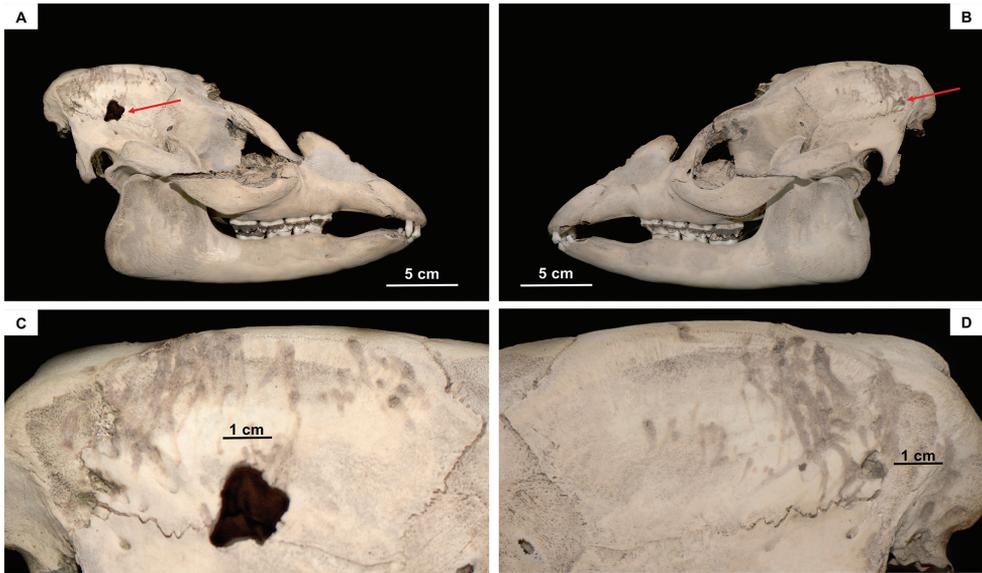


Figure 4. Right lateral view of the skull of the predated Baird's tapir (*Tapirus bairdii*) showing with the red arrow the irregular perforation of the right parietal (1.8×1.6 cm) above the squamous suture (A). Left lateral view of the skull showing with the red arrow the circular perforation between the left parietal and the occipital on the lamboid suture (0.5 cm) (B). Close-up of the perforation of the right side of the skull showing the marks of the fangs (C). Close-up of the perforation of the left side showing the marks of the fangs (D).

prey, first the foreside and later the ribs and the chest (Fig. 3A, 3B) (de Almeida 1976; Schaller and Vasconcelos 1978; Silveira et al. 2008).

Recently, Hayward et al. (2016) in an analysis of jaguar prey preferences found no record of predation of Baird's tapir. Other tapir species have been documented as prey for jaguars, however they are not a primary food source (Polisar et al. 2003; Astete et al. 2008). The largest number of predation records that exists is of the lowland tapir (*Tapirus terrestris*) which occurs from Colombia to northern Argentina (Taber et al. 1997; Garla et al. 2001; Astete et al. 2008; Cavalcanti and Gese 2010; Medici 2010). Probably, the higher population densities of *T. terrestris* ($0.07\text{--}3.5$ ind/km²) compared to *T. bairdii* ($0.03\text{--}2.9$ ind/km²) (Naranjo 2019) causes a greater number of interactions between tapirs and jaguars. In addition, the higher mean body mass (MBM) of jaguars (MBM = 83–105 kg) and the smaller size of tapirs in South America (MBM = 190–230 kg) influence that there are more records of tapir predation. Male jaguars from South America are estimated to have a MBM of 50 kg heavier than those in Central America (MBM = 56.1 kg), while females have a MBM of 35 kg more (Central America MBM = 41.4 kg) (Hoogesteijn and Mondolfi 1996). Therefore, an adult Central American jaguar will hardly prey on a healthy adult Baird's tapir (MBM = 200–220 kg).

Tapirs and jaguars are indicators of healthy ecosystems (Medici 2010; de Thoisy et al. 2016); both play a key ecological role, tapirs as seed predators and dispersers (O'Farrill et al. 2013), and jaguars as apex predators that regulate the abundance of their prey populations (Nuñez et al. 2000). Jaguars choose to attack the most vulnerable tapirs, i.e. the young (< 1 year), senescent, sick or in poor physical



Figure 5. Picture of a jaguar (*Panthera onca*) passing by at the site of the event of predation on 27 September 2017 (A). Jaguar with the remains of a prey at the same site on 29 September 2017 (B).

condition. Little is known about the interaction of tapirs with their predators and the effect they have on the dynamics of their populations. Therefore, records of these type of events are important to understand the food webs and ecology of these iconic Neotropical species in the Greater Calakmul Region, an important biodiversity hotspot for conservation.

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