

March 23, 2023

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R2: MIGHTY STRIPES

Okapi (1) vs. Giant Striped Mongoose (9) -Okapis (Okapi johnstoni) share many similarities with their giraffe relatives & are often referred to as forest giraffes. One notable similarity: both are herbivores with an extra-long, prehensile bluish-gray tongue to grasp vegetation. Although Actual Living Scientist WHAPA Lab at Virginia Tech members, including MMM scientist-narrator Dr. Asia detected Murphy, have Striped (Galidictis fasciata) Mongooses and other carnivorans with camera traps...Very little is known about the behavior of Striped Mongooses and other Madagascar meso-carnivorans (family Eupleridae). Consensus is that Striped Mongooses are nocturnal, generally solitary, and eat small vertebrates and large invertebrates.

Our two striped combatants are both from Africa! Home habitat advantage goes to Okapi and tonight's battle is back in Maiko National Park, Democratic Republic of Congo. Okapi is ruminating, literally. Herbivorous Okapi have fore-gut digestion: bacteria are in their stomach to help digest cellulose, the structural components of plant cells. As part of rumination, Okapi "cough" up food boluses, rechew, and swallow again to break down cellulose and get lots of nutrition. There are no native artiodactyl mammals on Madagascar where Striped Mongoose has been MMMagicked from, but there are a few introduced & naturalized species (goats, zebu, sheep, pigs, & deer). Striped Mongoose is on the move & detects the vague smell of artiodactyl but is not overly concerned. Stripes as camouflage work both ways, to hide the predator AND the prey... Striped Mongoose continues his hunt and... stumbles into ruminating Okapi. Striped Mongoose is rather catlike in some of his movements, and Okapi does not like cats! Leopards are predators of Okapi, attacking adults from above. Okapi sounds off a distress whistle. This female Okapi is big- 300kg,



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nearly 2m tall, and 2.5m in length, and a bit smaller than an asteroid the size of half a giraffe. Striped Mongoose is, uh, substantially smaller: ~900g and 70cm. Craning his neck upward and taking in the full size of Okapi, Striped Mongoose weighs his options, spins on his heels, fluffs his tail, and takes his hunt elsewhere. OKAPI INTIMIDATES GIANT STRIPED MONGOOSE! Narrated by Prof. Jessica Light.

Greater Kudu (2) vs. Sumatran Striped Rabbit (7) – Rabbits, hares, and pikas are globally widespread. They are important as ecosystem engineers, pets, pests and food. In fact, the March Madness name is a hat tip to European rabbit male-male battles during the spring mating season. Animal behavior often changes during the breeding season. Testosterone levels in male European hares peak in March. Males box each other to establish dominance. The Sumatran

Striped Rabbit (Nesolagus netscheri) may be the world's rarest lagomorph. In 31,032 hours of camera trapping it showed itself 2 times for 8 seconds, though camera height may have reduced detection rates. Actual Living Scientist Anh HQ Nguyen from the World Wide Fund for Nature -Vietnam was part of a team that used invertebrate-derived DNA (blood collected from leeches!) to assess the genetic diversity of one of Sumatran Striped Rabbit's closest relatives, Annamite striped rabbit. Remember that leech iDNA paper the genetics team tweeted about in R1? Actual Living Scientists from World Wide Fund for Nature - Vietnam performed that research! Animal behavior also changes in response to disease. For example, Kudu, like people, reduce their activity and rest when they have a fever. Some kudu populations are highly vulnerable to rabies, though disease dynamics are



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still being studied. All mammals are susceptible to rabies but bats, dogs, foxes, and other canids are the typical host. Diseases like rabies change host behavior to promote its spread. Hosts may foam at the mouth, snarl, and bite. In Namibia, rabies outbreaks in kudu have claimed up to 40% of a kudu population. How do scientists obtain population estimates? Actual Living Scientist Nauyoma, PhD Lineekela student at the University of Namibia is using non-invasive methods like camera traps to assess the conservation status of roan and sable (antelope related to kudu) in Mudumu National Park.



Tonight's battle is in the far southern edge of the Rift Valley in Malawi, Africa, where Kudu (Tragelaphus strepiceros) has Home Habitat Advantage. The sound of drumming is faint in the distance. Kudu strolls down a dry stream bed that has lots of shrubby cover on the edges. He's going toward the aroma of Camel Thorn Tree seed pods (Acacia eriolobia), his favorite food. The trees are short and bushy, suggesting frequent, low level disturbance. MMMagic has transported Sumatran Rabbit into the scene. Sumatran Striped Rabbit spies Kudu from its hidey-hole in the brush. The drumming can now be patterned heard downstream too. Drumming is a way villages in pass information to each Malawi other. KA-CLICK! A monitoring camera-trap snaps pics of Kudu eating the bait; Camel Thorn Tree pod flour combined with a rabies vaccine. The drumming from the village upstream becomes more urgent. What was a trickle of water in the stream had risen to become a churning, muddy with large branches being carried flow downstream. Rabbit remains motionless except for its nose twitching at the smell of water. WHOOSH! Water fills the stream channel! Drumming from the upstream village was warning those downstream about the coming flood so people went to safety. Kudu gracefully steps up on the bank chewing seed pods while Rabbit is swept downstream, KUDU SWEEPS **SUMATRAN** STRIPED RABBIT! Narrated by Dr. Tara Chestnut.

Striped Hyena (3) vs. Highland Streaked Tenrec (11) – The Striped Hyena (*Hyaena hyaena*) is an omnivorous scavenger, content to eat all sorts of edible items- the remains of large-bodied prey like wildebeests or smaller insects of the invertebrate variety or even the occasional fruit. Like their Hyaenidae bretheren,



Striped Hyena is known to ingest and digest bones, usually when other food is scarce. We know a lot about Striped Hyena diet, but we don't know much about their current distribution. Paolo Strampelli and colleagues recently surveyed large African carnivores and found Striped Hyena data particularly lacking. Like other small-bodied Streaked Tenrecs (*Hemicentetes* mammals. *nigriceps*) enter periods of torpor to save energy similar to turning the heat down in your home when you're not there- these small mammals turn down the heat when food is scarce and they can't access the calories it takes to keep themselves warm when active. Tenrecs will sleep like a dormouse, curled up with their forelimbs held



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close and their hind legs further away, usually from May-October. They may wake up briefly to re-adjust their position and scratch an itch.

But it's not Tenrec torpor season yet - tonight, we find both combatants within the Serengeti National Park of Tanzania, stomping grounds of Striped Hyena. Striped Hyena has found leftover zebra from a lion kill, disarticulated bones scattered about the Serengeti. Tenrec is again transported with MMMagic away from Madagascar and finds the dry savanna of the Serengeti less than pleasant. In an attempt to find its family members, Tenrec starts rubbing together special spines on its rump and creates a sound somewhere between a scratch and a chirp. Striped Hyena pauses bone crunching a tibia, raises its head and listens motionless... Striped Hyena isn't concerned by Tenrec spine chirping. Striped Hyena hears spotted hyenas chattering as they triangulate in on the aromatic zebra carcass! Striped Hyena is a loner and does not want to tussle with the cousins, so grabs zebra tibia to-go, trotting at a good clip (8-10 km/hr, 5-6 mph). CLONK-PALUNK! The zebra tibia hanging from Striped Hyena's jaws strikes Highland Streaked Tenrec skull! Tenric's scratch-chirping attempt to phone home to his family is silenced... forever. STRIPED HYENA ENDS HIGHLAND STREAKED TENREC! Narrated by Prof. Patrice Connors.







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Striped Dolphin (4) vs. Side-striped Jackal (5) -Striped Dolphins (Stenella coeruleoalba) are highly acrobatic and frequently jump into the air. One unique behavior to Striped Dolphins is called "roto-tailing" where they rapidly circle their tails while arcing through the air. When feeding, Striped Dolphins will regularly dive to depths of 700m. At these depths the water pressure can squeeze their thorax and compress lungs and trachea. Striped Dolphins have special trachea which can fill with blood to resist this pressure. Side-Striped Jackals (Lupulella adustus) are very vocal. They regularly communicate with other individuals or when threatened with unusual hooting-sounds rather than barks or howls. Side-Striped Jackals often occupy territories w/other canids, such as black-backed and golden jackals. The larger canid is usually competitively dominant, but Side-Striped Jackals will always be displaced, even if encountering a smaller species. Because they are so easily dominated by other carnivores, Side-Striped Jackals are highly adapted to opportunistic foraging and will habituate quickly in highly varied habitats.

Tonight's battle takes place in and around the Mani peninsula, in the southern Peloponnesus region of Greece. Here the narrow shelf gives way to deep waters of the Ionian Sea very close to shore. Here, where the cool, deep water meets warmer currents, there is an abundance of marine life. Striped Dolphins frequently hunt these waters, taking advantage of large numbers of squid and small fish. Out for a hunt in the forests of coastal Africa, our Side-Striped Jackal has suddenly been transported into the surf of the Mediterranean. From the coastal region of Gabon, Jackal is somewhat familiar with the scent of the ocean. But jackals are not really the swimming type, and this Jackal starts doggy-paddling towards the siren scent of land. When something brushes against its fur... Under the water below Side-Striped Jackal, Striped Dolphin grabs a mouthful of squishy food. Slurp! Dolphin swallows several squid, its favorite food. Unfortunately, those shrimp are filled with chemicals run off the land! The Mediterranean is among the world's most polluted oceans. The United Nations estimates that 650 million tons of sewage, >120,000 tons of oil, 60,000 tons of mercury, almost 4,000 tons of lead, and 36,000 tons of phosphate are dumped into the Mediterranean... annually! Ocean health improves with both personal & political actions. Cleaning the Mediterranean is ongoing. Research from PEW Charitable Trusts shows it takes multiple avenues to curb pollution. One of the best ways is to stop the source.





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Years of eating contaminated prey has resulted in bioaccumulation of many toxins in the body of Side-Striped Dolphin. However, the levels of toxins are not causing any adverse physical effects... for now.

But what was tickling at Jackal's fur? Paddling toward shore, Side-Striped Jackal has accidentally swam into the drifting tendrils of a Portuguese Man O' War!! These siphonophores have 30 meter-long tentacles made of stinging polyps. Stings are normally multiple, painful, and severe, usually stunning & killing fish. The tentacles wrap around the tail & back of our Jackal! Hydrozoan and jellyfish stings are quite common in the world's oceans (> 150 million jellyfish stings per year!). But it doesn't take much (pantyhose, diving suits, etc.) to protect oneself against irritating and painful stings. But tentacles also drape across the Jackal's belly, where the fur is less thick to help shed heat and more skin is exposed. Here the Man O' War tentacles penetrate canid skin and stinging nematocysts deliver powerful jolts of venom to the Jackal! The venom is evolved to kill small fish, not a 14kg Jackal. But the stings are enough to cause our Jackal to yelp with pain and panic! Seawater & tentacles rush into Jackal's open nose and mouth, delivering more venom to those sensitive areas. Wracked with intense pain, the airway of Side-Striped Jackal swells and he goes into shock. Unable to breathe and struggling for air, Jackal slips beneath the waves. STRIPED DOLPHIN **OUT-SURVIVES** SIDE-STRIPED JACKAL! Narrated by Prof. Brian Tanis.



Learn from the Jackal folks: Never go far from shore without a personal flotation device, and if you are swimming in regions of high jellyfish activity, be sure to wear a rash guard, stinger suit, & bring reef-safe sting lotion and sunblock!



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Greater Rhea (2) vs. Dayak Fruit Bat (10) –Our Greater Rhea (*Rhea americana*) dad, hanging with his chicks, is making sure they don't get into too much trouble, but glad they're finally off his back (literally!). These chicks sometimes like to burrow themselves into their dad's plumage. Rhea Dad-life is energetically EXHAUSTING! Fewer than 20% of all males even attempt to nest during breeding season and then have to spend >20% of the day in vigilance until chicks are 4 months old. While there aren't too many natural predators for Greater Rheas as adults, crested and Chimango caracaras, foxes, and even ferrets are happy to make a quick snack of the chicks. Our Dayak Fruit Bat (*Dyacopterus spadiceus*) dad was left circling the





skies of Spain. Besides seeing the world from a different point of view, flight might be linked to lifespan in mammals and birds, with shorter lifespans in those who lost the ability to fly. Dayak fruit bats don't echolocate, instead relying on their large eyes and sharp noses to help them find food and get around the rainforest canopy.



TONIGHT'S BATTLE is again in marshy grasslands of Argentina, Rhea Dad walks with his chicks, vigilantly scanning the horizon for predators. Head held high, Rhea keeps a sharp eye out for slinky, sneaky sneaks in the grass and in the sky and is on high alert. Dayak Fruit Bat is far from the sacred forests of Northern Indonesia he prefers and where he serves an important role in seed dispersing in the ficus-forward forest. Rhea seems to be straining where his throat meets his body, maybe slightly swollen in the area of the gizzard. The rhea chicks are foraging in the grass, moving toward a small shrub tree, and the Dayak Fruit Bat swoops with wide wings a bit. The Dayak Fruit Bat would prefer a much taller tree, but the small shrub tree is the only arboreal-ish option to make a roost. Greater Rhea Dad seems to be regurgitating while strolling in the wake of his chicks. Dayak Fruit Bat has settled into a sleep arrangement in the low shrub tree, only a bit out of Greater Rhea Dad's beak reach... The Greater Rhea stretches its neck, opens its beak and PROJECTILE VOMITS ALL OVER THE BAT!!! Dayak Fruit Bat crawls to a further branch, shakes out its wings and head, and takes off to fly far away from the Greater Rhea, abandoning the field of battle while the greater rhea opens and closes his beak. GREATER RHEA OUTLASTS THE DAYAK FRUIT BAT! Narrated by Dr. Alyson Brokaw and Dr. Mal Sarma.



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Siamang (4) vs. Pacific Spiny Lumpsucker (5) – Siamang (Symphalangus syndactylus) dad takes over caring for the offspring once the infant is about 1yr old. Dads carry juvenile siamangs, share sleeping sites with them, and play with them. As Siamang dads provide more care, siamang moms recover quicker from the high body costs of pregnancy and lactation (i.e., physiological and





energetic). Siamang moms with more help from dad can can have another baby sooner (shorter interbirth intervals). The Pacific Spiny Lumpsucker (*Eumicrotremus orbis*). He's round. He's sticky. And he glows. Males are usually a deep red color under the visible spectrum, but fluoresce bright red under UV and blue light. While the green females don't glow the same way, the Dad's glow does match the red glow of algae found around their nesting areas.



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We're back in the tropical rainforest of Gunung Leuser National Park, Indonesia, which is the only place left on earth where tigers, elephants, orangutans, and rhinos still live together in the wild. The Leuser ecosystem is 6 million acres (~3x the size of Yellowstone). It's one of the last remaining intact rainforests and is becoming

fragmented due to deforestation fires. But organizations like The Orangutan Information Center and the ASEAN Centre for Biodiversity are informing management in this fragile forest. Our siamang competitor is hot off an unwitting battle of the throat sacs with Darwin's frog taking the fall, and Siamang is showing his kiddo the ropes to foraging. Foraging ha become a little harder since the recent fires, but siamang groups don't really have the option to change their territory like other primates might due to their range needs in an ever shrinking forest. The siamang family are seeking out their favorite foods when dad sees something promising in a puddle below! Dad, kiddo on back, swoops down to investigate... Our Lumpsucker is not having a great time. MMMagic has put him in a swampy pool in the middle of the forest. The muddy silty pool bottom is impossible for Lumpsucker to stick his bottom to! Bright reddish-purple Lumpsucker bobs pathetically. Looking so much like a ripe... round... FIG! Siamang carefully dips his hand into the water... Siamang's hand comes up with sticky fish! A brief sniff & yuck! and Siamang begins shaking his hand to dislodge the sticky fake fig... and launches Lumpsucker INTO THE AIR! Pacific Spiny Lumpsucker plops back into the puddle and Siamang returns to the canopy to follow his frugivorous family to a richer foraging location off the field of battle! LUMPSUCKER DEFEATS SIAMANG!!! Narrated by Dr. Mauna Dasari.

Emperor Penguin (1) v. Owl Monkey (8) -Emperor penguins (Aptenodytes forsteri) live in the coldest environment of any bird species withstanding the -40°C air temperatures and 89 mph winds due to a combination of dense, downy feathers that trap air close to their body and a sub-dermal fat layer that provides baseline insulation. While taking care of their eggs during May and June, Emperor Penguin Dads group together into huddles that can raise the ambient temp to over 20°C inside the huddle with up to 10 birds per square meter! Huddles make movement nearly impossible but "Emperor Penguins move collectively in a highly coordinated manner to ensure mobility while at the same time keeping the huddle packed" (Zitterbart et al 2011).



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Owl monkeys (*Aotus azarae*) don't have feathers or a sub-dermal fat layer, but they do sometimes huddle while sleeping, which typically occurs at sites 6-25 meters above the ground. Both male and female owl monkeys have scent glands on their chest (pectoral) and beneath their tail (subcaudal), which they use for territorial marking and other communication. Although male and female owl monkeys look the same, their vocalizations can be different with only the males producing "graff hoots" and only females producing "tonal hoots" (sexually dimorphic calls) (Garcia et al., 2020).

The combatants meet at Pointe Géologie in Antarctica where the emperor penguin colony, which has ~3500 breeding pairs, was featured in the 2005 documentary "March of the Penguins." Emperor Penguin has been filling his belly with



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fish in the Antarctic waters and has turned toward home. Owl Monkey is transported by MMMagic onto the Antarctic ice between the sea and the penguin colony with his 3-month old baby still clinging to his back. Owl monkeys aren't strangers to modulating their behavior and activity levels in response to cold weather, but not the extreme cold of Antarctica. Emperor Penguin is swimming sleekly through the water when suddenly he sees THE OPEN JAWS OF A LEOPARD SEAL CLOSING IN ON HIM! Emperor Penguin "rockets out of the water at high velocity" (Thelen 2021)! Emperor penguins store a layer of air in their feathers before diving into the water. When they ascend toward the surface the penguins release these air microbubbles, allowing them to reduce drag and swim faster! Emperor Penguin "land[s] squarely on a patch of ice and continue[s] sliding toward safety," leaving leopard seal gnashing its jaws in the water (Thelen 2021). Emperor Penguin, now like a launched curling stone, careens into Owl Monkey and sends Owl Monkey skitter-hurling across the slick ice and off the field of battle. EMPEROR PENGUIN COLLISIONS OWL MONKEY! Narrated by Drs. Lara Durgavich, Mauna Dasari, & Katie Hinde.

Wolverine (3) v. Bat-Eared Fox (6) – Evidence is accumulating that Wolverine (*Gulo gulo*) Dads visit the dens of females with young in their territory, with the most visits occurring in March. Whether male wolverines are engaging in direct behavioral care is unknown, but researchers

speculate that increased visits of male may deter predators or stranger wolverines from approaching the dens. In the Pacific Northwest, the Cascades Wolverine Project monitors the population and distribution through elaborate bait, camera-trap, and hair sample set-ups. While mom forages for termites to sustain lactation, Bat-Eared Fox Dad (Otocyon megalotis) stays home to tend the pups, spending time cuddled in the den with young, grooming their ecto-parasites and cleaning their ears. Bat-Eared Fox Dads will carry very young pups gently in their mouths to move pups to new dens if predators encroach too closely. These dads forage near the den, bringing back small birds, rodents, and large insects when the pups begin to consume solid food.



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On the Laikipia Plateau of central Kenya, Bat-Eared Fox Dad is chaperoning his pups on a termite-foraging excursion beyond the den, vigilant for any threats to his kin from black-backed jackals and African wildcats. Bat-Eared Fox Dad has previously co-reared 3

litters of pups in his adulthood. This 4th litter was born last fall, and the time is fast approaching when they will be fully weaned and disperse into "wide open spaces, room to make some big mistakes." One pup, "she trots this home range in the wild, wide-eyed and grinning, she never tired" as she scampers over playfully to Dad just as MMMagic transports Bat-Eared Fox Dad *and* daughter, Dad precedes and puppy will follow, to the Rocky Mountains of Colorado. Scene takes the shape of a place out West, but what it holds for her, she hasn't yet guessed.



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Wolverine has been surveying the landscape of his home range looking for a carcass to scavenge when a new scent drifts on the wind suggesting easy pickings may be near. Wolverine are "opportunistic feeders and respond quickly to temporarily abundant or easily procurable food" including fox (Pasitschniak-Arts & Lariviere, 1995). Bat-Eared Fox Dad spots the Wolverine coming in their direction and utters a soft contact call vocalization to bring his pup closer to him. But the bat-eared fox daughter is scampering after a recently returned fluttering mountain bluebird and doesn't hear her Dad's contact call. Who doesn't know what I'm talking about. With greater urgency, Bat-Eared Fox Dad vocalizes a high-pitched warning call that travels farther than the contact call, to warn his daughter of an approaching predator. She sees new faces. She knows the high stakes. As Wolverine closes in fast, the daughter only has enough time to look up and back up against tumbled rocks with a smattering of pines growing from them on the hillside... A young pup's fears no longer callow.

BAT-EARED FOX DAD RUNS IN SNAPPING AT WOLVERINE, in a valiant solo attempt to mob the mesopredator intent on making daughter fox dinner. Having successfully survived to this age, Bat-Eared Fox Dad is experienced, and is





shaped by adaptations to invest more toward kiddos at this life stage according to life history theory that would suggest older animals increase effort in reproduction. Bat-Eared Fox Dad has successfully distracted Wolverine while the daughter finds a safe den-like hidey hole amongst the jumbled rocks. The Wolverine chases the Bat-Eared Fox Dad, who now rapidly switches directions to increase chances of escape, but the 4-kg Bat-Eared Fox Dad is no match for the massive mustelid Wolverine at 18 kg! Bat-Eared Fox Dad's last sight is daughter scampering back through the MMMagic portal to her siblings, safe from the Wolverine. But now Dad won't be coming back to the rest, if these are life's lessons, she'll do her best. WOLVERINE DEFEATS BAT-EARED FOX! Narrated by Prof. Katie Hinde, with assist from The Chicks.



Jessica Popescu @JessPopescu



Emperor Penguin (1) v. Owl Monkey (8)

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