TOUR: NOCTURNAL BEHAVIORS

OBJECTIVES

Identify nocturnal animals, their specific nocturnal behaviors and adaptations that enable animals to be nocturnal.

TERMS

Nocturnal, crepuscular, diurnal

CONCEPTS

Nocturnality is an animal behavior characterized by activity during the night and sleeping during the day. Many nocturnal animals have specially adapted eyesight that can adapt to both low (night) and bright (day) levels of light. What are the benefits of being nocturnal? One benefit is resource competition. Being active at night is a form of niche differentiation, or niche switching, where a environment is partitioned by time instead of resources or season. For example, hawks and owls can hunt the same meadow for the same rodents without conflict because hawks are diurnal and owls are nocturnal. This means they are not in competition for each other's prey.

Another benefit to noctunality to avoid or enhance predation. One of the reasons that lions prefer to hunt at night is that many of their prey species have poor night vision. Many species of small rodents are active at night because most of the dozen or so birds of prey that hunt them are diurnal. There are also many diurnal species that exhibit some nocturnal behaviors. For example, many seabirds and sea turtles only gather at breeding sites or colonies at night to reduce the risk of daytime predation to themselves and/or their offspring.

Another reason for nocturnality is avoiding the heat of the day (conversely, being diurnal can be a way of avoiding the extreme cold of night for many Arctic animals.) This is especially true in deserts, where nocturnal behavior prevents creatures from losing precious water during the extreme heat of the day. Another reason lions prefer to hunt at night is to conserve water. Many plant species native to hot climates have adapted so that their flowers only open at night when the sun's intense heat cannot wither and destroy their moist, delicate blossoms. These flowers are pollinated by bats, another creature of the night.

KEY ADAPTATIONS:

Tapetum lucidum: a layer of reflective tissue in the eye of many vertebrates. It reflects visible light back through the retina, increasing the light available to the eye. "Eyeshine" is a visible effect of the tapetum lucidum. When light shines into the eye of an animal having a tapetum lucidum, the pupil appears to glow. Eyeshine occurs in a wide variety of colors including white, blue, green, yellow, pink and red. This effect shouldn't be confused with "red-eye," which occurs when a flash of light occurs too fast for the pupil to close, the light then reflects off the back of the eyeball and appears red due to the large number of blood vessels.

Whiskers: Play an important role in tactile sensory reception.

Silent flight: Nocturnal birds have a comb-like leading edge on the primary wing feathers that allowsthem to fly silently. This enables them to hear their prey as they fly, and prevents their prey from hearing them as they attack.

Echolocation: Echolocating animals, such as insect-eating bats, emit calls out to the environment and listen to the echoes of those calls that return from various objects near them. They use these echoes to locate and identify the objects. Echolocation is used for navigation and for foraging (or hunting) in various environments.

ANIMALS TO HIGHLIGHT

Gray wolf: During the winter months, wolves can be found moving around during the day. The rest of the year they are usually nocturnal. Since their eyesight is not specially adapted for low light constions, wolves use their sense of smell and hearing to locate prey when they hunt at night.

Barred owl: The barred owl is the only typical owl of the eastern United States which has brown eyes; all others have yellow eyes. Without exception, barred owls hunt prey that can be swallowed whole. Eyes have a large cornea and pupil for collecting and processing light (unlike many nocturnal animals however, owls lack a tapetum lucidum). They have a distinctive pattern of hair-like feathers on their face, called a facial disk, that channels sound into the ear openings. Most nocturnal owls have asymmetrical ear openings with one opening higher than the other. Asymmetry does not occur in owl species that hunt during the day (e.g., snowy owls).

Pallas cat: Crepuscular

Red panda: Crepuscular, they spend most of the day resting and sleeping in trees.

Snow leopard: Primarily crepuscular, although they have all the adaptations that other cats have for nocturnality, including a tapetum lucidum

Amur tiger: Tigers are most active at night, when their wild ungulate prey are most active, although they can be active at any time of the day. Tigers prefer to hunt in dense vegetation and along routes where they can move quietly. In snow, tigers select routes on frozen river beds, in paths made by ungulates, or anywhere else that has a reduced snow depth. Cats can see about six times better than humans at night. Long sensitive whiskers enable them to find their way through tall grass and

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brushy habitat. Soft padded feet with retractable claws allow them to move about quietly.

African lion: Lions spend up to 20 hours per day resting. Although lions can be active at any time, their activity generally peaks after dusk with intermittent bursts of activity through the night hours until dawn, when hunting most often takes place.

Black rhino: They are less active during the middle of the day, using mornings and evenings to eat, drink, and move around.

Bat-eared fox: 85 percent of activity occurs at night in the Serengeti, while in South Africa bat-eared foxes are mainly diurnal in winter and nocturnal in summer (to avoid the heat).

African crested porcupine: Strictly nocturnal and will even avoid moonlight in open areas.

Seba's short-tailed fruit bat (BRH): These bats fly out at sunset, forage for fruit, eat for about 15 minutes, then nap. They will repeat this cycle throughout the night. They use their memory of an area to get to the general location of food and then use their sense of smell, sight, and echolocation to hone in on the fruit. Over 500 plant species rely on nocturnal bats to pollinate their flowers, including species of mango, banana, cocoa, durian, guava and agave (used to make tequila). The pollination of plants by bats is called chiropterophily.

Screech owl (BRH): Eyes have a large cornea and pupil for collecting and processing light (unlike many nocturnal animals however, owls lack a tapetum lucidum). They have a distinctive pattern of hair-like feathers on their face, called a facial disk, that channels sound into the ear openings. Most nocturnal owls have asymmetrical ear openings with one opening higher than the other. Asymmetry does not occur in owl species that hunt during the day (e.g., snowy owls).

American toads (BRH): Primarily nocturnal and most active during warm humid times of the year. When night falls, American toads come out of their hiding spots and hunt for food. During spring, American toads have one of the most notable mating calls of all Michigan toads: a long high-pitched trill that lasts 4–20 seconds, which can be heard late into the night.

Common gray tree frog (BRH): Nocturnal

Mudpuppy (BRH): Nocturnal; spend the day hiding in deep water under rocks or fallen logs.

Northern leopard frog (BRH): Mostly nocturnal and are well-adapted to cold.

Puerto Rican crested toad (BRH): Nocturnal

Brazilian rainbow boa (BRH): Have heat-sensing pits on their face that allow them to detect the body heat of their warm-blooded prey at night.

Emerald tree boa (BRH): Have heat-sensing pits on their face that allow them to detect the body heat of their warm-blooded prey at night.

Western tufted deer: Active at night, but frequently seen at dawn and dusk.

Reeves' muntjac: Crepuscular, feeding mainly at dawn and in the evening.

EDUCATION ANIMALS

Eagle owl: In addition to the other adaptations that nocturnal owls have, the eagle owl can hear the sound of a rodent squeal over 75 feet away.

Chinchilla: Nocturnal

Domestic rabbit: Crepuscular.

European ferret: Nocturnal

Lesser hedgehog tenrec: Nocturnal, usually found sleeping during the heat of the day in small groups under boulders, tree roots, and in tree holes close to the ground.

Madagascar hissing cockroach: Nocturnal, usually spending their time hiding in crevices.

North American porcupine: Nocturnal

Sinaloan milk snake: often nocturnal and stay in their desert burrows during the heat of the day.

Virginia opossum: Nocturnal

Brown rat: Mostly nocturnal or active at dusk