Do Snakes Sleep? How to Tell When They May Be Sleeping

Do snakes sleep? How does one tell whether snakes are sleeping? What about in other reptiles? This is especially considering the fact that they lack eyelids in which we can easily tell whether they are open or closed, instead having a clear, transparent scale over each eye known as the "spectacle". While these might seem like obvious questions, considering nearly every species of mammal, bird, reptile, amphibian, and even invertebrates have been studied or have found to have some sort of sleeping or resting phase, it is still nonetheless a commonly asked question.

But when it comes to snakes, it can be more difficult to determine whether they are "sleeping", and unlike most other animals, there has yet to be widespread sleep studies or research on snakes, which makes it even the more tougher to adequately answer this question. As will be explained in this article, snakes, as with just about all animals, undoubtedly do sleep, but the question then becomes, how, when, and/or for how long, how deeply, or whether they are capable of paradoxical sleep patterns, such as dreaming. While the jury may still be out on some of these paradoxical components of sleep when it comes to snakes, and other reptiles, this article will analyze and answer these common questions of sleep in snakes.

First of all, how do we define "sleep"? Sleep is a behavior that involves an immobile state or posture, decreased responsiveness to arousing stimuli such as noise and light, and rapid reversibility, which distinguish "true" states of sleep from other behaviors widely known in many reptiles and amphibians such as "**aestivation**" and "**brumation**" that tend to be more temperature, seasonal, or environmentally dependent than having to do with their daily circadian rhythm (described below). Physiologically, the criteria for true "sleep", or at least the criteria most frequently used to define sleep, involves the slowing down of an organism's brain waves on an EEG, or electroencephalogram, designed to measure electrical activity in the brain caused by brain cells communicating with one another, essentially.

In many animals, such as mammals and birds, generally exhibit two patterns of such EEG activity, **"slow wave sleeping" (or SWS), also known as synchronized, quiet, or non-REM sleep**, and **"Paradoxical" sleep (or PS), also known as desynchronized, active, or REM sleep**. Physiologically, this form of

"paradoxical" sleep is associated with **rapid eye movement (REM)**, and is more like an "awake" state (hence the name "paradoxical"). It is also characterized by complete muscle relaxation, muscle twitching, irregular breathing and heartbeat, and at least in humans, accompanied by dreaming.

Sleeping patterns certainly do vary tremendously across the animal kingdom, with most mammals and birds, at least those which have been tested in sleep studies, exhibit both SWS and PS, or variations thereof. When it comes to reptiles, periods of rest associated with SWS similar to mammals have clearly been shown to exist in chelonians (turtles and tortoises) and crocodilians, however, EEG data currently suggests that these animals do not exhibit REM sleep. Some other experiments which have been conducted on lizards have found REM-like sleep in these some species of this group of reptiles, but not in others. However, interpreting sleep data and EEG can be complicated, as SWS waves between reptiles and mammals, or birds differs drastically because the reptile and mammalian brains differ in structure, particularly in the neocortex, or the source in the brain that acts as the source of these sleep waves in mammals. Furthermore, some reptiles can sometimes exhibit sleep-like brain activity while awake, perhaps due to their **ectothermic, or poikilothermic nature.**

So How To Tell if a Snake is Sleeping?

So what about snakes? Unfortunately, there is still a lot we do not know or have studied when it comes to sleep in snakes. Only one relevant study, at least as far as we are aware, was conducted by French comparative sleep researchers J. Peyrethon and D. Dusan-Peyrethon. In this study, EEG was used to monitor the brainwaves of a four foot African Rock Python (*Python sebae*), over the span of two days. It was found, according to this study, that sleep-like brain waves were produced for 16 hours per day, increasing to over 20 hours following feeding, and some of the signs of sleep included:

1). Slower or reduced breathing and heart rate,
2). Some muscle relaxation, and lack of movement,
3). And perhaps lowered behavioral response threshold and perhaps reduced chemo-sensory behaviors (such as lessened tongue-flicking, etc.).

No evidence of active sleep, or paradoxical sleep patterns were recorded in snakes, at least according to this single study.

All amphibians and reptiles have **Circadian rhythms**, which are essentially their daily, or routine day and night-time patterns, or periods of behavior and activity. Many species of snakes and other reptiles and amphibians are **diurnal**, or active primarily during the day, while others might be nocturnal, or more specifically, **crepuscular**, meaning their activity and behavior patterns are most active during the dawn and/or dusk, although many species may be active at any time of day depending on the time of year, local or regional temperature and weather conditions, or other environmental factors.

However, with so much variability in the over 3,500 snake species found throughout the world, sleep patterns, and even other behavioral patterns can be just as variable! Many species of relatively heavy bodied species of snakes which tend to be cryptic, sedentary, ambush predators, or hunters will lay concealed for days, if not weeks at a time, in wait of prey. So how can we tell, if, or when these species

of snakes are sleeping, and not technically passively "foraging"? In one such radio-telemetry study on South American Bushmasters (*Lachesis muta*), it was found that these snakes displayed strict cycles of "alertness" or attentiveness, with relatively abrupt transitions between these states.

Furthermore, some animals, such as migratory birds and many marine mammals, or other animals which engage in some other form of constant activity, also tend not to sleep for long periods of time, using only "half" of their brains for sleeping at a time, while the other "half" remaining alert and awake. Similarly, it has been found that at least some lizards, and other animals in the context of high predation risks, have been found to use one hemisphere of their brain for sleeping, and it has been theorized by some sources, that other species, such as these sedentary, cryptic species of snakes might be engaging in similar patterns of activity.

What We Do Know

In summary, while the sleep behaviors, patterns, and even sleep studies have been performed and are well understood in humans and many other animals, there still remains much to still be known or understood when it comes to the sleep behaviors or patterns of snakes. However, sleep is a basic component to animal biology, and by now, it can be shown that they undoubtedly do so. It is worth mentioning that many different behaviors across many different species have differing physiological purposes or functions. For instance, snakes also do "yawn", but not for the same reasons as we humans do, but either as a means of gaining additional chemo-sensory cues about the environments around them, or to re-align or reposition their muscular and skeletal elements in their jaws. Unlike us, snakes simply are not "yawning" as an indicator of "tiredness", or for other functions we do so, such as regulating our brain temperatures, as social cues, or to improve motor function and alertness.

Whether in the wild, or in captivity, observations and studies of sleep in snakes remain vastly understudied, and with many different theories or hypothesis out there that would make for most intriguing findings in the future. What arousing stimuli could be used or recognized, and/or what further experiments could be performed on snakes to better understand their sleep behavior? And what knowledge can become much more widely disseminated to the reptile and pet keeping communities, as well as other biology, field study and research, or other branches of natural sciences centered around observing these animals in the wild? And what for even others and even the general public, in the future, to better be able to tell whether a snake is "sleeping" based on casual observations in the absence of more complex and detailed sleep studies examining it on a more physiological level? Much remains to be an open question, as snakes and even other reptiles and amphibians sense the world around them in vastly different ways than we do to begin with.

In the meantime, the best answer and criteria to this question of how one could tell whether a snake is "sleeping" would perhaps be a reiteration of the above criteria:

1). Slower or reduced breathing and heart rate,
2). Some muscle relaxation, and lack of movement,
3). And perhaps lowered behavioral response threshold and perhaps reduced chemo-sensory behaviors (such as lessened tongue-flicking, etc.).

Sources:

-Do Snakes Sleep, Life is Short, but Snakes are Long. Aug. 31st, 2015.
https://snakesarelong.blogspot.com/2015/08/do-snakes-sleep.html