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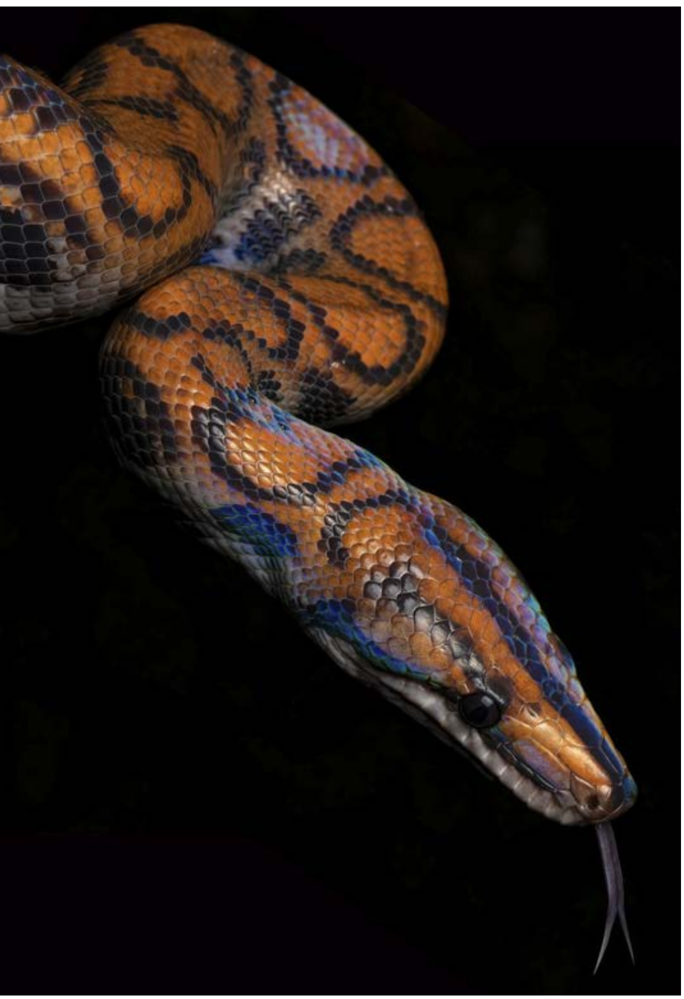
Snakes of many colors

Snakes' colors are largely dependent on the environment in which they live. In cool places, dark-colored snakes will warm up more quickly when exposed to radiant heat from the sun, whereas light-colored species reflect heat. The need to maintain the right temperature must be balanced with the need to be inconspicuous and avoid the attentions of predators.



DIFFERENT TYPES OF COLOR

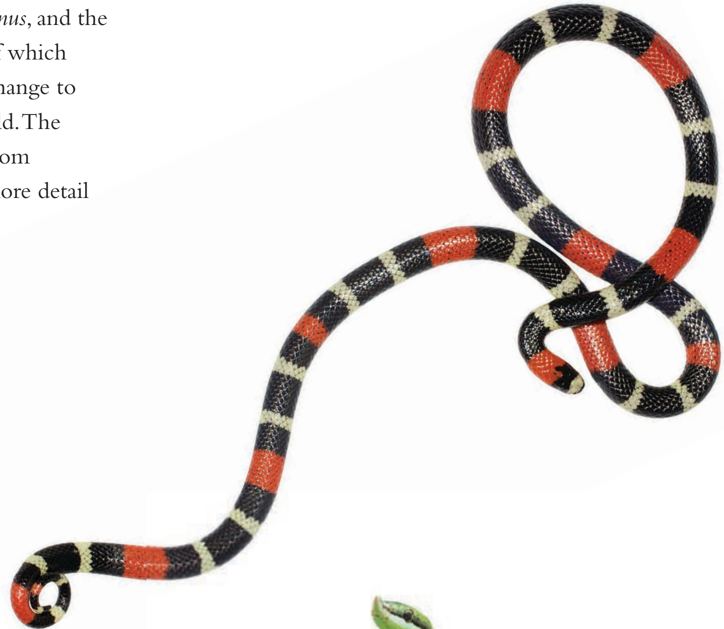
Colors in snakes are produced in three different ways. Pigments may be contained within the color cells (chromatophores). These consist of colored chemicals, of which melanin is the most common, resulting in brown or black areas. Red and orange are produced by carotenoids, and yellow may be produced by either melanin or carotenoids; white is produced by guanine.

Iridescent effects are the result of a process known as interference. This occurs when light strikes the translucent outer layer of a snake's scales at an angle and splits into its component parts, like a rainbow or a film of oil on a puddle.

Finally, there is Tyndall scattering, in which small particles known as iridophores embedded in the snake's cells refract and reflect light in a particular way, so that light at the shorter (blue) end of the spectrum is reflected more than other parts. Very few snakes are blue, however, because in most cases a layer of yellow chromatophores overlies the blue-producing cells, turning the blue to green—although blue snakes do exist.

SHADES AND PATTERNS

More than one type of color production may be found in a single snake, thus forming various shades and patterns. The distribution and type of color cells may change throughout the snake's life so that juveniles look very different from adults. The best-known examples of these are the Emerald Tree Boa, *Corallus caninus*, and the Green Tree Python, *Morelia viridis*, in both of which juveniles are bright yellow (rarely red) but change to green by the time they are about one year old. The convergent evolution of these two species, from opposite sides of the world, is discussed in more detail on page 52.



← The South American Rainbow Boa, *Epicrates cenchria*, is so named because of the iridescent nature of its scales, an example of interference coloration.

→ (Top) The brightly colored South American Coral Snake, *Micrurus lemniscatus*, is an example of warning, or aposematic, coloration.
(Middle) Baron's Green Racer, *Philodryas baroni*, is a handsome, fast-moving, diurnal species from the drier parts of Argentina, Bolivia, and Paraguay.
(Bottom) A particularly colorful specimen of the Australian Carpet Python, *Morelia spilota*, belonging to the subspecies *cheynei*, sometimes known as a Jungle Carpet Python.

Ornamentation

Snakes lack the ornamentation we see in many birds and lizards, as visual display is not an important part of their lives. Flaps and protuberances, the purposes of some of which are unknown at present, are mostly confined to the head and are found in only a few species.

A single modified, thorn-like scale is found over each eye in such species as the Desert Horned Viper, *Cerastes cerastes*, or there may be a small cluster of such scales, as in the Eyelash Pit Viper, *Bothriechis nigroadspersus*, and the Many-horned Viper, *Bitis cornuta*. The Sidewinder, *Crotalus cerastes*, and three species of false-horned vipers, *Pseudocerastes*, have a structure consisting of raised and enlarged scales over each eye. The function of these is not known, but may serve to disguise the outline of the snake's head or its eyes.

Snakes with protuberances on their snouts are more common and widespread. Examples include the three species of Madagascan leaf-nosed snakes, *Langaha*, and the Rhinoceros Ratsnake, *Gonyosoma boulengeri* (until recently known as *Rhynchophis boulengeri*). The Nose-horned or Sand Viper, *Vipera ammodytes*, is a European species with an upturned snout, and another viper, the Rhinoceros Viper, *Bitis nasicornis*, has a cluster of pointed scales on its snout. The purpose of these nasal structures is unclear, but in one species—the aquatic Tentacled Snake, *Erpeton tentaculatum*—the paired appendages contain nerves that can detect vibrations and changes in pressure in the water around them, enabling the snake to find its fish prey in turbid water or at night.

← The Desert Horned Viper, *Cerastes cerastes*, does not always have horns; some lack horns, and even the same clutch of eggs can produce horned and non-horned individuals.

→ A number of snakes have horns comprised of a single, large, pointed scale, especially pronounced in this spectacular and well-named Rhinoceros Viper, *Bitis nasicornis*, from Africa.

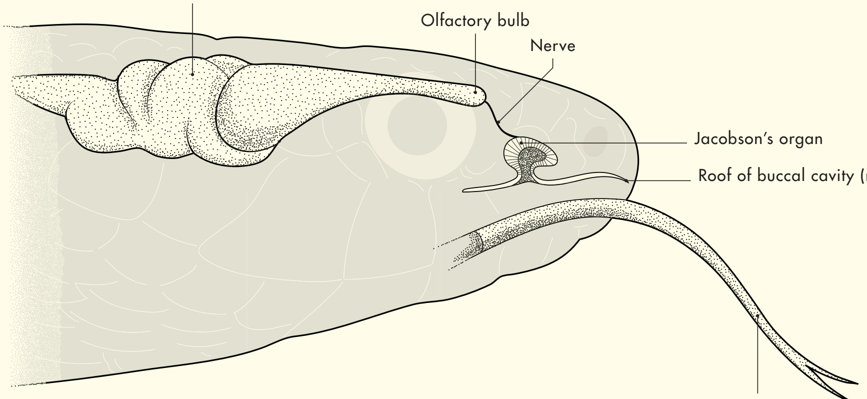
The sensory world of snakes

An essential element in the way organisms live involves the gathering of information about their surroundings. Because of their evolutionary history as burrowing animals, snakes use their senses and sense organs in ways that are different to most other animals, including ourselves.

Most snakes' eyesight is generally poor compared with humans, as is their sense of hearing (although they are not deaf, as is popularly believed). To compensate, they have an acute sense of smell, and many species have a remarkable ability to detect minute temperature changes.

CHEMICAL COMMUNICATION

Chemical communication (smell) is very important. When a snake detects some change in its environment it immediately flicks out its tongue through a notch in the upper jaw, known as the lingual fossa, and uses it to pick up scent molecules. These are returned to the mouth, where the twin tips of the forked tongue are inserted into a pair of sacs on the roof of the mouth, known as the Jacobson's organ. The scent molecules are transferred from here to



Jacobson's organ
Snakes use their forked tongue to pick up scent particles, before transferring them to the Jacobson's organ, situated in the roof of the mouth.

← A Brown House Snake, *Boaedon capensis*, extends its tongue to pick up scent molecules in the air, before transferring them to its Jacobson's organ, where they are analyzed and passed to the brain.

↓ A Lichen-colored Snail Sucker, *Sibon longifrenis*, flicks out its forked tongue in response to the photographer's presence. Scent is the most important sense to many species.

the olfactory part of the brain, along with messages obtained through the nostrils, and analyzed.

Snakes regularly monitor their surroundings by tongue-flickering. They use the information obtained to hunt for prey, detect potential enemies, and search for mates. Their olfactory system is extremely sensitive, and snakes have been known to sit by rodent trails that are many days old in wait for prey to pass by.

As snake-keepers will no doubt confirm, captive snakes become agitated if food is placed in the same room, even if it is some distance from the cages and inside a container, and this is often accompanied by an increase in the frequency of tongue-flickering.

SIGHT

Unusually for predators, most snakes have poor eyesight. The most primitive snakes, the Scolecophidia, all of which are confirmed burrowers, have only rudimentary eyes, covered with one or more scales, and capable only of distinguishing light from dark. The more advanced snakes have, to some extent, reinvented the eye, but only to a limited degree.

Focusing is very primitive compared with other vertebrates, and consists, for the most part, of moving the lens backward and forward. In addition, the cells lining the retina—the rods and cones—are not as well organized as they are in other vertebrates, and some species lack one or the other of them altogether. All these drawbacks result in the inability to spot and identify stationary objects, although they are more alert to moving objects.

Snakes that hunt by day, such as the various racers, whipsnakes, and garter snakes, tend to have large eyes with circular pupils. Nocturnal hunters also have large eyes, but their pupils usually take the form of vertical ellipses, which can be closed down to narrow slits in bright light. Horizontally elliptical pupils occur only in the Asian vine snakes, *Ahaetulla*, of which there are 21 species, and the three African twig snakes, *Thelotornis*. These horizontal or "wrap-around" pupils allow the snake to see forward with both eyes (binocular vision) and thus to judge distance accurately. In the *Ahaetulla*

↖↖ The pupils of the Asian vine snakes, *Ahaetulla* species, are horizontally elliptical, allowing them to look forward along the grooved snout and judge distances accurately.

↑ The vertical pupil in this strictly nocturnal tree snake, *Lycodryas pseudogranuliceps*, from Madagascar, has closed down to a small aperture.

↗ The diurnal Parrot Snake, *Leptophis ahaetulla*, from South America, has large round pupils. It hunts lizards, frogs, and invertebrates, largely by sight.

↗↗ The eyes of the Aquatic Coral Snake, *Micrurus surinamensis*, which feeds mostly on eels and other fish, are situated toward the top of its head so that it can look upward when it is partially submerged.

species, this ability is further enhanced by a long narrow snout with concave sides along which the snake can sight its prey.

Snakes' eyes are usually positioned on the sides of their heads, giving them a wide arc of vision to the front and back, useful for locating prey and predators. A few species have their eyes positioned on top of their heads, looking straight up. These are either aquatic snakes that rest on the water surface, such as the file snakes, *Acrochordus*, and the unusual aquatic coral snake, *Micrurus surinamensis*, or species that burrow in sand leaving just their heads exposed, such as the Arabian Sand Boa, *Eryx jayakari*, and the Namib Side-winding Adder or Péringuey's Adder, *Bitis peringueyi*.

HEAT DETECTION

Heat detection is highly developed in several groups of snakes, and has evolved more than once. It is unique to snakes and, in the species that have it, more than compensates for poor sight and hearing.

Specialized heat-sensitive pits are lined with epithelial cells that are connected to the brain by nerves. Amongst the boas and the pythons, pits are located in or between the scales bordering the mouth. Not all species have them, though, and where present they may be large and numerous or small and few. They are most noticeable in the larger, mammal-eating species belonging to the genera *Corallus*, *Sanzinia*, *Liasis*, *Morelia*, *Python*, and *Malayopython* but are completely absent in other species such as the Common Boa, *Boa constrictor*, and all of the Erycinae (sand boas, rosy boas, and rubber boas).

The most highly developed heat pits are found in the pit vipers (subfamily Crotalinae), a group that includes rattlesnakes, *Crotalus* and *Sistrurus*, and several other genera in the New and Old World, such as *Bothrops* and *Trimeresurus*. In these snakes the pits are paired, and located on either side of the head, just below an imaginary line between the eyes and the nostrils. They are directed forward and look like an extra pair of nostrils. Some pit vipers are known as *cuatro narices* or "four nostrils" in parts of Latin America.

These pits are more sophisticated than those of the boas and pythons, having two chambers separated by a membrane. The ambient temperature is detected by the inner chamber, while the outer chamber detects heat originating from a warm-blooded animal.

In experiments, some pit vipers have been shown to detect temperature differences of as little as 0.001 °C. Because the organs are paired, they work together "in stereo" to assess range as well as direction, and the snake is able to accurately strike at prey, even in total darkness, usually targeting the head or the thoracic region where the venom will act most quickly.

HEARING AND OTHER SENSES

Snakes' hearing is not on a par with most other vertebrates, but they can pick up vibrations through the ground, via their lower jaws, which are in contact with the quadrate bone and the columella, a small bone that transmits vibrations to the inner ear (equivalent to the stapes in mammals). Low-frequency airborne sounds may also trigger vibrations, but, because they have no eardrum, snakes can only detect a limited range of airborne vibrations, much less than mammals.

← Seen from this angle, the heat pits of the Jumping Viper, *Metlapilcoatlus nummifer*, are clearly directed forward.

↗ As in all pit vipers, the heat-sensitive pits of this White-lipped Island Pit Viper, *Trimeresurus insularis*, are positioned roughly between the eyes and the nostrils.

→ In the Emerald Tree Boa, *Corallus batesii*, the heat pits are positioned between the upper and lower labial scales.

SENSE ORGANS IN THE SCALES

A number of structures on and between the scales of snakes are thought to carry information about their surroundings to the nervous system. The most obvious of these are apical pits, paired sense organs situated either side of the keel or midline of each dorsal scale, absent in some species but present in most. The functions of these pits, and others like them that are found on the head scales, are uncertain, but they are served by nerve endings and probably relay information about the immediate environment to the snake's brain. They may be sensitive to light, temperature, touch, or airborne chemical stimuli, or possibly a combination of these.

Similarly, there are small tubercles on the scales around the heads of most snakes, sometimes numerous but at other times very sparsely distributed. They are thought to be organs of touch, and, in some species, especially aquatic snakes, the tubercles are equipped with a small bristle, which may detect movements in the water caused by nearby animals.

The only such structures that have been investigated thoroughly are those in the paired appendages on the snout of the Tentacled Snake, *Erpeton tentaculatum*, from Southeast Asia. This aquatic species feeds on fish and hunts in turbid water and at night. The sense organs in its tentacles consist of clusters of nerve endings that apparently react to vibrations in the water caused by the movement of nearby fish, enabling it to strike rapidly and accurately even when the prey is not visible (see page 188).

↗ The paired apical pits in each scale show up well in this shed skin from a European Aesculapian Snake, *Zamenis longissimus*.

→ The unique paired structures on the snout of the Tentacled Snake, *Erpeton tentaculatum*, contain nerve endings that sense movements in the water nearby, helping it to detect prey even when it cannot see it.

Convergent evolution

Animals that live in similar habitats often share certain aspects of their appearance and behavior, because each species has arrived at the same solution to the challenges they have in common. This is known as convergent evolution, and there are several well-known examples among the snakes.

The emerald tree boas, *Corallus caninus* and *C. batesii*, and the Green Tree Python, *Morelia viridis*, though belonging to different families and hailing from opposite sides of the world, are remarkably similar in their appearance, their behavior, and the way in which their color changes from yellow to green during their early growth. All three species live in rainforest habitats and feed largely on birds, relying on their camouflage to ambush their prey and their long curved teeth to grip and hold on.

Another example can be seen in the sidewinding vipers, *Crotalus cerastes* from North America (page 78) and *Bitis peringueyi* from southern Africa (page 100), and members of a third genus, the horned vipers, *Cerastes*, from North Africa (page 106). All of these live among loose, windblown sand dunes and, as well as looking similar and being of similar sizes, have evolved a similar method of locomotion (page 59).

The arboreal species *Sibon annulatus*, and its close relatives from tropical America, and the Blunt-headed

Slug Snake, *Aplopeltura boa*, along with other members of the Pareatidae from Southeast Asia, are all slug- and snail-eaters and share the characteristics of a large head, blunt snout, large eyes, and modified jaws adapted to extract snails from their shells.

On another level, the Australasian snakes belonging to the genus *Acanthophis*, commonly known as death adders, bear a striking resemblance to vipers, especially to members of the African genus *Bitis*, having stout bodies, a broad, triangular head, long fangs, heavily keeled scales (apart from one species), and sedentary habits. Despite their collective common name, they are not adders but members of the Elapidae. It is assumed that their body plan, hunting strategy, and reproductive habits have evolved to fill the niche left vacant by the absence of true vipers in that part of the world.

← The blunt snout, large eyes, and vertical pupils are characteristics of Asian snakes that feed on snails, such as this Montane Snail Snake, *Asthenodipsas vertebralis*, and are paralleled by South American species with similar feeding habits.

↗ The Many-horned Adder, *Bitis cornuta*, displays the short, heavy-bodied characteristics of an ambush predator. This species waits for prey to come within range before striking rapidly and forcefully.

→ Although the Australian death adders, *Acanthophis* species, belong to the Elapidae, they display all the characteristics of vipers, their sit-and-wait counterparts in the Old World, hence their somewhat misleading common name.

Moving around

Snakes clearly need to find a way to move around in their environment as they hunt for food, escape predators, find mates, and thermoregulate, and they must pursue all these activities despite lacking limbs. They use a number of techniques, some more specialized than others, and most snakes can use more than one means of locomotion.

The most widespread types of locomotion fall into three main categories: serpentine locomotion on the land (crawling) and in water (swimming); concertina locomotion, often used by burrowing snakes; and rectilinear locomotion (crawling in a straight line), used mostly by heavy-bodied snakes when moving slowly. Three additional methods are used by a handful of species that live in particular habitats: climbing, gliding, and sidewinding.

To a large extent, habitat determines which method a snake uses. They are not mutually exclusive, however, so an individual may switch from serpentine locomotion to concertina locomotion or straight-line crawling, for instance, according to its needs.

SERPENTINE LOCOMOTION

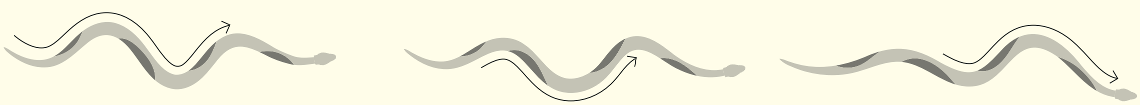
This is the most common form of locomotion. The snake wriggles from side to side, using the sides of its body to push against irregularities in the ground, rocks, or vegetation. At any given time, several points along the snake's body are pushing simultaneously against a number of different fixed objects. As the snake moves, new parts of the body come into contact with the same objects, and so all parts of the body follow the same line and the snake moves forward steadily and almost imperceptibly. The speed of movement will depend on the roughness or smoothness of the substrate, the shape of the snake, and its reason for moving.

← A South American Puffing Snake, *Spilotes sulphureus*, travels across rough ground using serpentine locomotion.

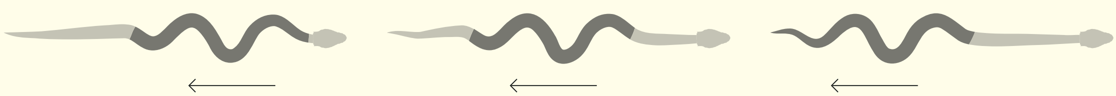
During swimming in open water the same movements occur but the body of the snake pushes against the resistance of the water. Snakes that spend a large part of their time in water may have heavily keeled scales, and a laterally flattened body shape (flattened from side to side), to improve their purchase on the water. Marine snakes have an oar-shaped tail.

Snake locomotion

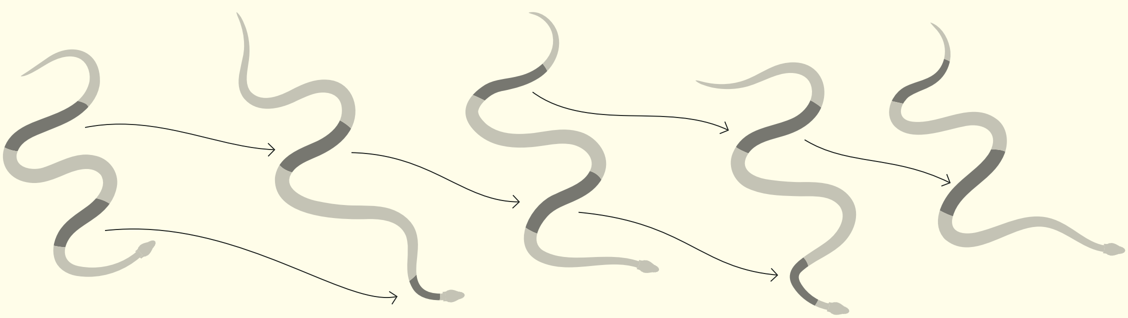
Snakes use a variety of methods of locomotion depending on the situation in which they find themselves. Serpentine is the most common; the other methods are used occasionally, depending on species and substrate.



SERPENTINE LOCOMOTION



CONCERTINA LOCOMOTION



SIDEWINDING LOCOMOTION

RECTILINEAR LOCOMOTION

CONCERTINA LOCOMOTION

This is most often seen in burrowing species, but also when any snake is moving through narrow places, such as between rocks. A cycle of movement starts with the snake using the rear half of its body to jam itself against the sides of the burrow while it extends the front half. Once this is fully extended, it in turn is jammed against the tunnel walls while the rear part is pulled toward it. This results in a stop–start routine as the snake inches forward, in contrast to the more fluid action seen in other types of locomotion.

Most burrowing snakes are cylindrical in cross-section and have smooth or lightly keeled scales. They expand their ribs to increase their diameter when jamming themselves against the sides of the burrow, and may also kink their body to gain extra purchase. Shield-tailed snakes, Uropeltidae, are able to bend the vertebral column into a series of curves independently of the sides of the body, which remain parallel. The body thus becomes shorter and thicker so that the snake can wedge itself between the walls of the burrow with one part of its body while another part is thrust forward or drawn up. This is not a speedy method of moving, but burrowing snakes rarely need to move quickly.

↑ The Black Shield-tailed Snake, *Uropeltis melanogaster*, is a burrowing species that rarely emerges onto the surface. Like the other members of its family, it moves through its burrows by means of concertina locomotion.

↗ Many climbing snakes have ridges running along the edges of their ventral scales on either side; these help them grip rough surfaces when climbing.

→ Snakes' ventral scales are broad and overlapping on their trailing edge. There movement is controlled by muscles, enabling the snake to crawl forward.

RECTILINEAR LOCOMOTION

Heavy-bodied snakes, such as certain boas, pythons, and vipers, use the raised edges of their ventral scales to hook over irregularities and pull themselves forward, thus moving in a straight line. During the process, different sections of the body will be stretching forward, while other sections are pulling, as their muscles contract and relax in a series of waves from head to tail, resulting in a smooth progression forward. This is a relatively slow method of moving but presumably uses up less energy than serpentine locomotion. Rectilinear locomotion is also used by snakes in the final stages of stalking prey, as they inch forward slowly, and almost imperceptibly, to get within striking distance.

CLIMBING

Snakes that habitually climb amongst branches tend to have elongated bodies, and many are deep-bodied. This creates a girder-like cross-section, allowing the snake to cantilever the front part of its body across a wide gap while reaching for its next point of contact.

Other species, those that are not so specialized, move up tree trunks by using crevices in the bark to act as purchase points. They move in much the same way as they would when covering uneven ground, using serpentine locomotion, but in a vertical rather than a horizontal plane. A number of snakes from different genera have sharp keels at the edges of their ventral scales, where they meet the dorsal ones, creating a pair of ridges running along the length of the snake and providing it with a better grip on bark or other rough surfaces.

GLIDING

Gliding is a seemingly unlikely form of locomotion for snakes, lacking as they do the limbs or wings that other animals use to fly or glide. But snakes of the South and Southeast Asian genus *Chrysopelea* (the five species of which are known, rather inaccurately, as "flying" snakes) can launch themselves from tall trees and descend in a gradual and controlled manner to reach lower branches, or the ground, in order to escape predators. They do this by flattening their bodies until the ventral surface is slightly concave, to increase air resistance, while moving their bodies in a slowed-down sinuous serpentine motion. In this way they are able to steer and to maintain a position almost parallel to the ground throughout the "flight."

↖ A Leopard Snake, *Zamenis situla*, climbs a tree trunk by using the ridges on its ventral surface to gain purchase.

↑ A flying snake, *Chrysopelea* species, glides by flattening its body and "swims" through the air by forming a series of sinuous loops.

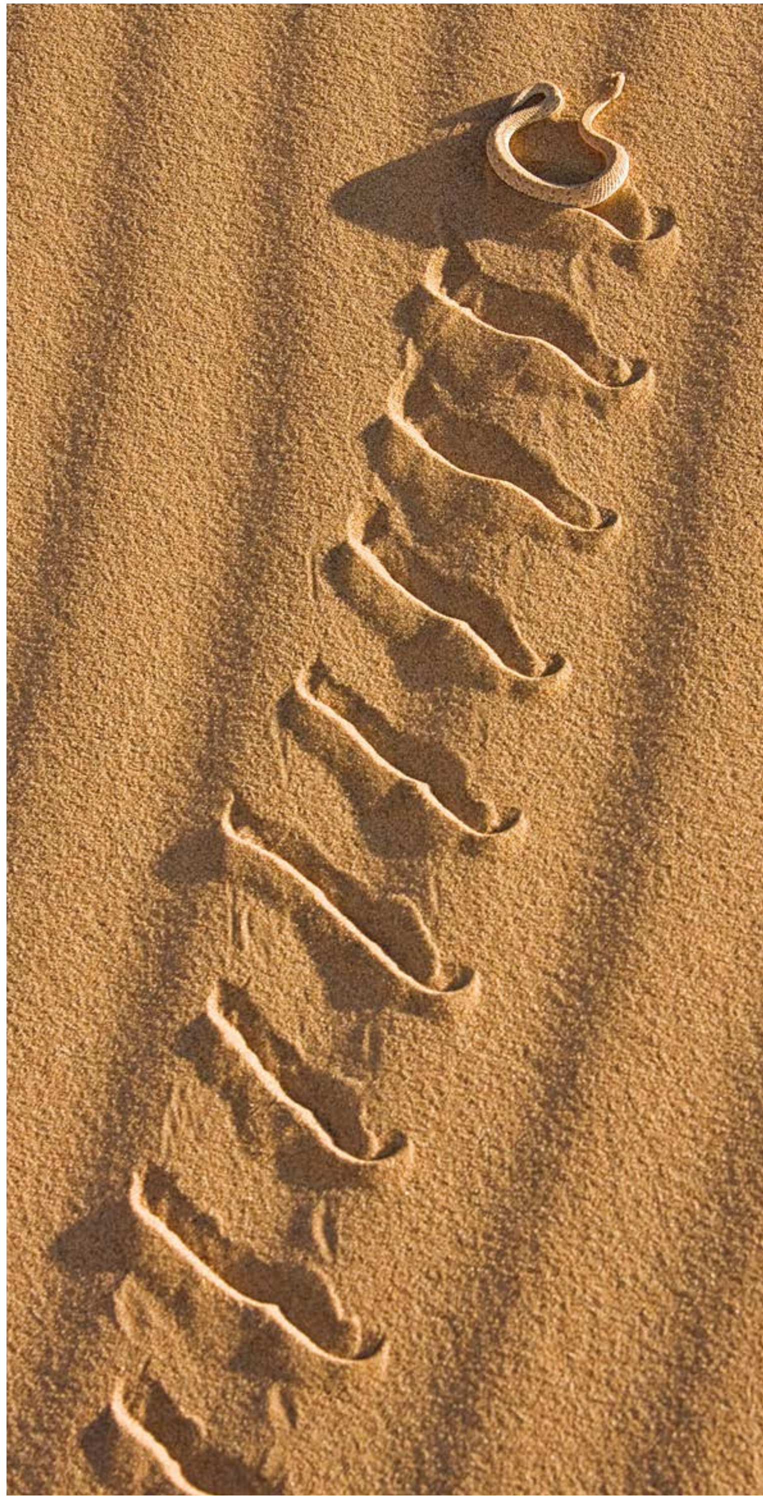
→ A Péringuey's Viper, *Bitis peringueyi*, moves rapidly across loose sand in the Namib Desert by means of a characteristic sidewinding technique.

SIDEWINDING

Snakes that live in deserts consisting of windblown sand dunes have difficulty in gaining purchase on the loose substrate, and their locomotion is impaired. Some species—those that live almost exclusively in this type of habitat—have evolved a specialized, and very effective, method of locomotion called sidewinding.

Starting from a resting position, they raise their head and neck off the ground and move it sideways, with the rest of the body providing an anchor-point. As soon as the head and body are back on the ground they, in turn, act as anchor-points and the rest of the body follows. In reality, this is a fluid movement, with one cycle beginning before the previous one has been completed, giving the impression that the snake is gliding sideways across the surface. The snake moves at about 45 degrees to the line of its body and leaves a trail of disconnected J-shaped impressions of its body in the sand.

The best-known sidewinding species are the Sidewinder, *Crotalus cerastes*, from the deserts of the North American Southwest, and the Namib Side-winding Adder or Péringuey's Adder, *Bitis peringueyi*. There are other sidewinders, such as the Saw-scaled Viper, *Echis carinatus*, and the horned vipers, *Cerastes* species, all from North Africa and the Middle East. A small number of snakes that live in coastal habitats, such as the Puff-faced Water Snake, *Homalopsis buccata*, and related species, may also use a similar sidewinding technique to cross mudflats, and some other snakes may switch temporarily to a primitive form of sidewinding when faced with a substrate that does not provide enough purchase for their normal mode of locomotion.



↑ An Ornate Tree Snake, *Chrysopelea ornata*, one of the "flying" snakes, is at home amongst high branches in rainforests. It will launch itself into the air if necessary to avoid predators.

↗ The Green Bush Viper, *Atheris chlorechis*, is a highly arboreal venomous snake from West Africa. All the *Atheris* species are covered in heavily keeled scales.

AHAETULLA NASUTA

Long-nosed Vine Snake

The snake with wrap-around eyes

SCIENTIFIC NAME	*Ahaetulla nasuta* (Lacépède, 1789)
FAMILY	Colubridae
SUBFAMILY	Ahaetuliinae
SIZE	3¼–5 ft (1–1.5 m)
REPRODUCTION	Viviparous, with 5–15 young
HABITAT	Forests

Various populations of vine snakes have recently been recognized as "cryptic species," in other words, species that are identical in appearance but show differences when subjected to genetic sequencing. Analysis of their DNA has shown that only the Sri Lankan populations should be assigned to this species, all the others being genetically distinct but morphologically the same: "hiding in plain sight," as some scientists have described it.

This snake, along with its close relatives, is remarkable for its long, pointed snout, large eyes, and horizontal pupils. These characteristics complement each other, and enable the snake to focus on a subject immediately in front of it by looking along its concave snout with both eyes. This binocular vision helps it to judge distances between the branches through which it moves, and a large proportion of its elongated body can be cantilevered out to bridge gaps.

Binocular vision also enables it to strike accurately at prey, usually arboreal lizards. Prey is killed by venom introduced via long fangs in the rear of its mouth, and it will hold the prey until it stops struggling, an essential strategy for snakes that hunt above the ground.

The Long-nosed Vine Snake is diurnal and highly arboreal, rarely descending to the ground and relying on its elongated shape and green coloration to provide excellent camouflage. Individuals tend to "freeze" when disturbed, enhancing their crypsis. If threatened, the snake will open its mouth widely and flatten its neck to display black and white markings. Bites can be painful but the venom is not dangerous to humans.

→ The long pointed snout and the horizontal pupils make the tree or vine snakes, *Ahaetulla*, of which there are 21 species in all, instantly recognizable.

ERYX JACULUS

Javelin Sand Boa

Europe's only boa

SCIENTIFIC NAME	*Eryx jaculus* (Linnaeus, 1758)
FAMILY	Boidae
SUBFAMILY	Erycinae
SIZE	12–20 in (30–50 cm), occasionally longer
REPRODUCTION	Viviparous
HABITAT	Dry rocky, sandy, and scrub-covered fields, valleys, and hillsides

This small boa is the only European representative of the Boidae, a family that is more usually associated with tropical and subtropical regions. It only occurs in the warmer parts of the continent, along the eastern Mediterranean coastal region, including many small islands. The rest of its range falls within North Africa and the Middle East.

Like all sand boas, this is a secretive burrowing species, spending most of its time underground in rodent burrows or beneath flat rocks, where some heat penetrates through to the substrate. Its small, smooth scales and cylindrical cross-section are adaptations to a burrowing lifestyle, allowing it to move easily through the ground. When beneath the surface it moves by means of concertina locomotion (see page 56), inching its way slowly through tunnels or cracks or forcing its body through loose soil. It probably finds most of its prey in this manner, feeding on rodents, although the snakes on some islands are much smaller than those on the mainland, and probably feed on small lizards and lizard eggs.

Although not endangered, owing to its large geographical range, some populations have been reduced or eliminated altogether through habitat destruction, mainly agricultural development and overgrazing. On a more positive note, in 2015 the presence of this species was confirmed from a small area in the south of Sicily, the first completely new reptile species for Italy for many years and a huge range extension from the rest of the European populations. In fact, individuals on Sicily resemble those in North Africa more than they do those in eastern Europe, leading to speculation that they may be more closely related to these populations.

→ Perfectly adapted to burrowing, with its cylindrical body, smooth shiny scales, and underslung jaw, the Javelin Sand Boa is the only member of the Boidae family that can be found in parts of Europe.

MALAYOPYTHON RETICULATUS

Reticulated Python

Jungle giant

SCIENTIFIC NAME	*Malayopython reticulatus* (Schneider, 1801)
FAMILY	Pythonidae
SIZE	16–20 ft (5–6 m), potentially to 30 ft (9 m) or more
REPRODUCTION	Oviparous
HABITAT	Rainforest, often around human habitation

One of the two largest snakes in the world, and probably the longest, even a half-grown Reticulated Python is a formidable predator. They have been known to take monkeys, crocodiles, and tigers as well as livestock such as goats, dogs, cats, and chickens. Humans have also been eaten on rare occasions.

Reticulated Pythons hunt mainly in the evening and during the night, actively seeking prey, which is detected by the heat-sensitive pits in the scales bordering the mouth (the labial scales). They are powerful constrictors, wrapping several coils around their prey and exerting pressure until it suffocates; bones may be broken in the process. They are slow-moving, crawling in a straight line (rectilinear locomotion) when on the ground, and often come to a complete halt when first encountered, rather than trying to escape.

Young and sub-adult Reticulated Pythons are partially arboreal, and typically rest in the branches of trees overhanging rivers, dropping into the water to escape if they feel threatened. They are powerful swimmers.

They are among the most prolific of snakes, laying clutches of 50–100 eggs, although 20–50 is more normal. The female coils around her clutch for the duration of the incubation period, although they appear to be unable to raise the temperature by muscular contractions, unlike some other large pythons.

Due to their large size and intricate pattern, Reticulated Pythons are one of the most desirable snakes in the skin trade; a total of 300,000–450,000 skins are traded each year, the majority of which come from Indonesia. They are also popular amongst zoos and amateur snake-keepers, and a number of strains, of a wide array of colors and markings, have been selectively bred to satisfy this market.

→ The Reticulated Python is a rainforest species that readily adapts to human-altered environments, such as plantations and villages, where its preferred prey of rodents and larger mammals is plentiful.

GONYOSOMA BOULENGERI

Rhinoceros Ratsnake

Long-nosed climber

SCIENTIFIC NAME	*Gonyosoma boulengeri* (Mocquard, 1897)
FAMILY	Colubridae
SUBFAMILY	Colubrinae
SIZE	3–5 ft (90–150 cm)
REPRODUCTION	Oviparous
HABITAT	Forests, including degraded forests, often near water

The purpose of the nasal protuberance that gives this species its name is unknown. It is present in both sexes and is covered in scales and is flexible. It may simply serve to break up the outline of the snake.

This is an arboreal snake, moving easily and rapidly through the branches of trees and understory shrubs, and most often found in humid river valleys at moderate altitudes, up to 5,000 ft (1,500 m). It lays clutches of 4–15 eggs which hatch after about two months. The young measure about 1 ft (30 cm) in length when they hatch and have the "rhino horn" right from the start. They are brown initially, changing to dark gray and eventually green or bluish green as they mature.

They feed on small vertebrates, lizards probably forming their main prey, although they also eat amphibians, small mammals, and birds. Populations appear to be reasonably secure, as much of their range is within protected areas, but habitat degradation is a problem in some places and small numbers are collected for the pet trade.

There are seven other species of *Gonyosoma*, all from Southeast Asia, mostly arboreal and green in color, though there are some exceptions. All of these other species lack the nasal appendage apart from *Gonyosoma hainanense*, described as recently as 2021 from Hainan, China; it is almost identical to *G. boulengeri*, except for small differences in color and the pattern of scales on its head.

The specific name *boulengeri* honors the Belgian-British herpetologist and polymath G. A. Boulenger, who worked at the Natural History Department of the British Museum from 1880 to 1920, describing 872 new species of reptiles as well as many fishes and amphibians.

→ The appendage growing from the snout of the well-named Rhinoceros Ratsnake is distinctive, but its function is a mystery.

BOTHRIECHIS NIGROADSPERSUS

Central American Eyelash Pit Viper

Multi-colored jungle dweller

SCIENTIFIC NAME	*Bothriechis nigroadspersus* (Steindachner, 1870)
FAMILY	Viperidae
SUBFAMILY	Crotalinae
SIZE	2–2½ ft (60–80 cm)
REPRODUCTION	Viviparous
HABITAT	Lowland tropical forest

This is a highly arboreal pit viper, usually found coiled a short distance above the ground, often in low-growing palms. For this reason members of the genus *Bothriechis* are known collectively as palm pit vipers. This species is remarkable for the pointed scales above its eyes, the "eyelashes" that give it its English name.

This pit viper occurs in many color forms, depending to some extent on its origin. The mottled coloration is the most common, but the shade of green and the extent of the markings vary. Other forms include tan, orange, or yellow; the bright yellow form, common in some parts of Costa Rica, is known as *oropel*, meaning tinsel or glitter. Polychromatic snakes such as these, in which there are a number of color and pattern types, are thought to benefit by confusing predators, and perhaps even prey, which are unable to build up a search image and so overlook them.

Eyelash Pit Vipers feed on a wide variety of prey, including small mammals, birds, and lizards. The juveniles often have colored tips to their tails, which they use as lures. There is some evidence that individuals "stake out" tropical flowers in order to ambush birds that are attracted to them for their nectar. Owing to their habit of resting at eye level, bites to humans are often on the face or hands. Bites are serious but rarely life-threatening in healthy humans.

The taxonomic relationships of this group of snakes has been revised. Many of the populations previously known as *Bothriechis schlegelii* have been reassigned to related species, and five new species have been described recently (2024). *B. schlegelii* is now restricted to the highlands of Colombia. Lowland populations from Central America are now mostly *B. nigroadspersus* but some have been reassigned to the species *B. supraciliaris*. Of the new species, only *B. schlegelii* and *B. supraciliaris* have the eyelash-like superciliary scales.

→ The Eyelash Pit Viper is an iconic species from Central America. It is fairly common, occurring in many colors and patterns that camouflage the snake against a variety of lichens, mosses, and other vegetation.

(continued...)

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