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TORTOISES AND TURTLES

Common Box Turtle

Terrapene carolina

Terrapene carolina is a small, high-domed, terrestrial pond turtle from eastern North America. The plastron has a hinge, so the animal can close itself completely inside the shell. The species is diurnal, omnivorous and very long-lived, but it requires humidity, a large enclosure, calm care and usually a carefully managed hibernation.

Family: Emydidae

KEY FACTS

THE ANIMAL

Adult size	**11-20 cm** total length incl. tail
Lifespan	**40-50 years**
Active	**By day**
Lifestyle	**Terrestrial**
Habitat	**Wetland and temperate woodland and meadow**
Difficulty	**Experienced**

CARE

Min. enclosure	**160 × 80 × 40 cm** L × W × H for 1 adult
Temperature, day	**21-24 °C**
Basking spot	**29-31 °C**
Temperature, night	**10-20 °C**
Humidity	**60-80%**
Water	**Water dish** depth 2-5 cm
UVB	**Essential** Ferguson zone 2
Diet	**Insects, fruit, complete diet, plants and worms/snails**
Kept	**Singly or one male with several females**

BREEDING

Reproduction	**Egg-laying**
Clutch size	**3-8 eggs**
Incubation	**50-90 days** at 26-28 °C

PROTECTION AND PAPERWORK

CITES	**Appendix II**
EU annex	**Annex B**
IUCN	**Vulnerable (VU)**

About the species

Terrapene carolina is a small to medium-sized turtle with a high, rounded carapace and a large, hinged plastron. The hinge lets the animal draw in head, tail and legs and close the shell tight like a box. The carapace is brown with a highly variable pattern of orange or yellow stripes, spots and rows of spots, and the plastron is dark brown, uniform or with darker shading. The upper jaw is hooked.

The male can be recognised by several features. Most males have red irises, while the female's are yellow-brown. The male has a longer and thicker tail, short, strong and curved claws on the hind legs and a concave rear edge of the plastron, while the female has long, slender and straight hind claws and a flat or slightly convex plastron. The male is on average slightly larger. Shell length (carapace) is 11-20 cm, and the largest forms reach 18-20 cm.

The species contains several geographic forms. With the delimitation followed here, the species has three subspecies: *T. c. carolina* (about 15 cm, four toes on the hind legs), *T. c. bauri* from Florida (about 11 cm, yellow stripes, three toes on the hind legs) and *T. c. major* on the Gulf Coast (about 18 cm, dark and often almost without pattern). The three-toed form from the Mississippi Valley (*T. c. triunguis*) and the Mexican populations are placed by some authors in a separate species, *Terrapene mexicana*, by others still as subspecies of *T. carolina*, and *T. c. bauri* is treated by some as a species of its own. Care is the same, but origin matters for hibernation. Where the forms meet, there is much hybridisation, and many animals cannot be assigned to a particular form.

The species was described by Linnaeus in 1758. It is long-lived: animals in captivity typically reach 40 years or more, a few over 100 years, and the greatest known age is at least 138 years. *T. carolina* is shyer and more demanding than many other turtles and is not a species for beginners. It can be confused with *Terrapene ornata*, which is better adapted to dry grass plains.

Read more: Brumation and the seasons

Distribution and habitat

Terrapene carolina occurs in eastern North America, from southern Maine and southern New Hampshire through New York and Pennsylvania to Florida and west to Michigan, Illinois, eastern Kansas, eastern Oklahoma and central and eastern Texas. The subspecies *T. c. carolina* also reaches southern Ontario in Canada. The range is given here with the species in the broad sense: the western populations from Missouri to Texas belong to the three-toed form, and the populations in Tamaulipas and Veracruz in Mexico are included only when they are not placed in *Terrapene mexicana*. The animals live from sea level up to about 1,650 m.

Populations have declined in many places owing to habitat loss, road traffic, fire and collection for the pet trade, and the species is assessed as vulnerable. The map shows only the native range.

> **Native range:** United States, Mexico and Canada.

HABITAT

The species lives in open woodland, scrub, pastures, damp meadows and by streams and ponds. It prefers humid habitats and usually stays within an area with a diameter of no more than about 230 m. Overlapping home ranges are common, and the animals rarely show aggression towards each other in the wild.

The preferred body temperature is 29-38 °C. In summer heat the animals are most active in the morning and after rain and otherwise seek shade under rotting wood and leaves, in mammal burrows or in mud. In very hot weather they go out into shallow, shaded pools to cool off. In spring and autumn they are active all day and bask. At night they dig a shallow depression and sleep in it.

In the northern part of the range the animals hibernate in October or November. They dig down up to about 60 cm into loose soil, mud, old stump holes or mammal tunnels and often return to the same place year after year. They emerge again around April. The female lays eggs from May to July, often at twilight, in loose sandy or clay soil.

Care

THE ENCLOSURE

Terrapene carolina does best in a large, secure outdoor enclosure, and a large enclosure is always better than a small one. Choose a sunny, wind-sheltered spot with well-drained soil, morning sun and shade all day. The wall must be smooth enough that the animal cannot climb, at least 60 cm high and dug about 30 cm into the ground, and the top is bent inward. The animal digs and climbs and quickly finds the holes, so check the fence regularly. Cover with netting if there are foxes, martens, rats or cats in the area. Plant shrubs for shade and edible plants such as strawberries, and lay damp piles of leaves, rotting logs and stones. A soft digging corner of loose, peaty soil gives a good place to hide and later hibernate.

Indoors the rule is that the length should be 8 times, the width 4 times and the height 2 times the shell length of the largest animal. Less space is often used successfully, but the general recommendation is 8 × 4 times the shell length. For an animal of 20 cm that gives 160 × 80 × 40 cm, corresponding to a good 1.3 m² of floor. Floor area is more important than height, because the species lives on the ground, but it is very active and uses all the space it gets, so bigger is better. Young up to about 10 cm can live in an enclosure of about 120 × 60 × 60 cm. Fit an opaque strip of about 10 cm along the front glass, so that the animal does not walk around scraping at the glass.

The substrate must be an organic, moisture-retaining soil mix: at least 10 cm indoors and about 30 cm outdoors, for example equal parts garden soil and coconut soil with a little sand. Lay at least 3 cm of leaf litter on top, preferably more, and provide at least two hides and a damp cave, for example with moistened soil inside. Avoid corn cob and wood shavings. Remove droppings daily, and replace the whole substrate every 3-6 months. Keep the species singly, unless the enclosure is very large.

TEMPERATURE

Indoors there must be a basking spot of 29-31 °C and a cool zone of 21-24 °C. Use 50 W halogen spots, one for a young turtle and at least two for an adult, and measure the surface temperature on the basking deck with a digital probe. The heat is switched off at night, so that the temperature falls to 10-20 °C.

Outdoors the animal needs no artificial heat in summer, but in a cool northern climate the season is short. Outside hibernation the animal must be moved indoors or given a warm, covered corner when the days do not reach 18 °C and the nights fall below 10 °C. Cold, wet periods make the animal sluggish and susceptible to disease, and overheating is just as dangerous, so there must always be shade, damp soil and somewhere to dig in.

Hibernation: animals from the northern and central part of the range hibernate for 3-5 months in the wild, and healthy adults in good weight must be given the opportunity, whether kept outdoors or indoors. The southern forms from Florida and the Gulf Coast often do not hibernate and can be kept awake and fed all year. Young, sick, underweight and newly acquired animals are always kept awake.

Outdoors the animal digs itself into loose, well-drained soil that does not stand under water. From late September more leaves are placed on the burrowing site, and once the animal has dug in, in October-November, it must not be disturbed. Place a layer of leaves about 30 cm thick over the site, preferably oak or maple, which do not pack completely flat, and cover it so that the wind does not take it. The site must be secured against rats and mice.

Hibernation indoors, in a box or refrigerator, is easier to monitor. The animal first fasts for at least 2 weeks at normal temperature and is bathed in lukewarm water every day or every other day, so that the gut empties. Then the temperature is lowered gradually. During hibernation a stable temperature of about 7 °C is kept in a slightly damp substrate of moss or soil; frost is life-threatening, and above about 10 °C the animal uses up its reserves too quickly. The duration is 2-4 months. The animal is weighed regularly and woken if it loses markedly in weight, or if it wakes and walks around. The figures apply to box turtles in general. After hibernation the temperature is raised over a couple of days before the animal gets full heat and food.

Read more: Heat and temperature

HUMIDITY AND WATER

T. carolina comes from humid habitats and does well at an average humidity of 60-80 %, which must never fall below about 50 %. The species always needs a humid hide: a shelter at the cool end, lined with moistened soil, which creates a small, damp microclimate. Moisten the soil and surfaces with a pressure sprayer first thing in the morning, but do not spray directly on the animal. An automatic misting system makes it easier to maintain the level. At night a humidifier can help, and the reservoir is cleaned weekly. In dry periods outdoors the enclosure is watered daily.

There must always be fresh water in a shallow, wide dish that the animal can sit in, for example a large plant-pot saucer sunk into the substrate. The water should reach no higher than the knees, that is 2-5 cm. The animal often passes droppings in the water, so it is changed daily, and the dish is scrubbed weekly with an animal-safe disinfectant. Many animals also drink directly from the soil during rain.

Read more: Humidity, misting and ventilation Read more: Quarantine and hygiene

LIGHTING AND UVB

T. carolina is diurnal and needs strong light and UVB to produce vitamin D3. Use a T5 HO UVB tube of about 6 % over the basking spot, so that it overlaps the heat lamps. If there is mesh between the lamp and the animal, the back on the basking deck should be about 33-36 cm below the tube, without mesh about 43-46 cm. Aim for a UV index of about 3-4 on the basking deck, and measure it with a UV meter. Replace the tube according to the manufacturer's instructions, because the output falls long before the light goes out.

A UVB tube is nowhere near as bright as daylight. Supplement with a powerful LED lamp of about 6500 K covering three quarters of the length of the enclosure or more, especially if you use live plants. The light is on about 14 hours a day in summer and about 10 hours in winter. Outdoors artificial light is not necessary. Animals kept indoors should be taken out into natural sunlight when the weather permits, but sunbathing behind glass gives no UVB.

Read more: Lighting and UVB Read more: Calcium, vitamins and supplements

FEEDING

T. carolina is omnivorous. For the first 5-6 years young animals are mainly carnivores, while adults eat more plant food. Overall the diet should be about half animal and half plant-based and always very varied, because the species can quickly tire of one type of food and refuse it. Young, growing animals get all they can eat every day. Near adult size they are fed every other day to avoid obesity.

Animal food is earthworms, snails, black soldier fly larvae, isopods, millipedes, grasshoppers, crickets, mealworms, cockroaches and crayfish. Snails should be farmed or purged for a week on lettuce, so that they have not eaten pesticides or slug pellets. Plant food is wild herbs and flowers such as dandelion, leafy greens such as kale, berries such as strawberries and blackberries, melon, tomato, squash and edible mushrooms; apple is given in small amounts. A commercial food for turtles can be part of the diet. Always offer the food on a dish or tray, so that the animal does not eat soil.

Sprinkle calcium over the food about once a week and a multivitamin once a month. The multivitamin must contain preformed vitamin A, not just carotene, because the species is omnivorous. A cuttlebone should be left out as a calcium source and a surface for wearing down the beak. Never use slug pellets or other poison near the animals.

Read more: Feeder animals: keeping and breeding

BEHAVIOUR AND HANDLING

T. carolina is shy and poorly suited to being picked up. Many animals do, however, learn to know their keeper, take food from the fingers and enjoy a gentle shell massage. Handle only when necessary, by lifting from below with the palm and supporting both body and legs with two hands. A fall can injure or kill the animal. Wash your hands before and after.

Dominant males fight and attack all other males, so keep no more than one male in an enclosure, and give him several females. Females can be kept together. An animal that runs around along the walls and scrapes is stressed and lacks stimulation and hiding places. Newly purchased animals are quarantined for at least 3 months, and they must not be mixed with other turtles. Animals from the pet trade are often thin and diseased; check that the eyes are clear and that the animal eats before you buy. Wild-caught animals tolerate captivity poorly, and only a minority of them do well.

Read more: Buying animals: captive-bred, wild-caught and transport

Breeding

SEXUAL MATURITY AND SEXING

The male is on average slightly larger than the female, has a longer and thicker tail, short, strong and curved claws on the hind legs, a concave rear edge of the plastron and usually red irises. The female has long, straight and slender hind claws, a flat or slightly convex plastron and yellowish brown irises. The shell grows 1-2 cm a year for the first five years, and the animals become sexually mature after about 5 years. Growth then slows but continues for more than 20 years. The young go through several changes in colour and pattern and resemble their parents after about 10 years.

MATING

The mating season runs from spring to October. The male circles the female, bites and pushes her before he mounts her and leans the concave part of the plastron against her carapace. The male can mate with several females, and the female can lay fertilised eggs for up to four years after a single mating. Keep only one dominant male with the females, and separate the animals if the female is injured. The male can lose his balance after mating and starve if he cannot right himself, so check regularly that none is lying on its back.

EGG-LAYING AND CLUTCHES

The female lays eggs from April or May to July, most often late in the day or at night. She digs a flask-shaped nest of about 8-10 cm in loose sandy or clay soil with her hind legs, lays 3-8 eggs, typically 4-5, and covers the nest again. The eggs are elongated, white and thin-shelled with flexible shells and about 3 cm long. Some females lay several clutches 3-4 weeks apart. Give the female an undisturbed area with loose, damp soil and extra calcium in the period before laying.

INCUBATION

The eggs can stay in the ground if the nest is protected against extreme weather and predators. If you want to incubate them artificially, remove them carefully with a soft brush, without turning or shaking them. Place them on moistened vermiculite or sphagnum in a closed plastic box and put the box in an incubator. Keep about 27 °C and about 80 % humidity. The eggs hatch after 50-90 days, and in the wild it often takes about three months, depending on soil temperature and moisture. The sex depends on temperature: nests at 22-27 °C give mainly males, and above 28 °C mainly females. Check regularly that the substrate is damp.

Read more: Incubating eggs

REARING THE YOUNG

The young can spend several days getting out of the egg. Leave them alone, and only mist the eggs lightly with lukewarm water. Once the hatchling is out, it often has a yolk sac on its belly, which must not be ruptured. Leave it in the incubation box for a day or two until the sac is absorbed. It is then moved to a shallow, slightly tilted plastic tray, where one end has water and the other is dry, with islands of wood, stone or moss. The water must be no more than about 1 cm deep, because the young easily turn onto their backs and can drown. Change the water daily.

The young are very shy and often do not eat for the first few weeks. Offer live food in small pieces, for example small worms, snails and isopods, and later accustom them to other food. Keep each juvenile separately for the first six months or so, because otherwise they bite each other on the tail, head and legs. Small young are easily bullied by larger ones. Young must be protected from predators if they are outdoors.

Health and common mistakes

Typical problems and warning signs:

- A poor start in newly purchased animals: swollen eyes, lack of appetite and weight loss. The animal must be weighed, given warmth, humidity and the offer of food, and all new animals are quarantined.
- Ranavirus: swollen eyelids, runny nose and inflammation of the mouth. The disease is often fatal and strikes especially where several turtles are kept together. Isolate sick animals, and contact a vet quickly.
- Deficiencies in the diet, especially vitamin A and calcium: lethargy, swollen eyes and a soft or deformed shell. Use supplements as described and provide UVB.
- Parasites and infections, especially in animals from the trade.
- Injuries from falls and from too high or too low a temperature.

Hibernation requires that the animal is healthy and in good weight, so have a vet with reptile experience check it before the first hibernation. If in doubt about the animal's condition, if it loses weight, or if it does not wake and eat again after hibernation, it must see a vet with reptile experience. Also contact a vet if the animal does not eat for a couple of weeks, has discharge from the nose or eyes or is abnormally lethargic.

Always ask someone who knows

This guide is a good place to start, but it cannot replace experience. Animals differ, and much of what matters most is learned from people who have kept the species for years. Talk to a breeder, an experienced keeper or a vet who knows reptiles and amphibians before you get the animal - and again if anything looks wrong.