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TORTOISES AND TURTLES

Mojave Desert Tortoise

Gopherus agassizii

Gopherus agassizii is a large, high-domed tortoise from the Mojave Desert in the south-western USA. It digs deep burrows and spends most of the year underground, sheltered from the heat and cold of the desert. The shell length is 25-35 cm. The species needs a large, sunny outdoor enclosure with dry, diggable soil and a long winter dormancy.

Family: Testudinidae

KEY FACTS

THE ANIMAL

Adult size	**25-35 cm** total length incl. tail
Weight	**3,500-7,000 g**
Lifespan	**50-80 years**
Active	**By day**
Lifestyle	**Burrowing**
Habitat	**Desert and semi-desert**
Difficulty	**Experienced**

CARE

Min. enclosure	**240 × 120 × 40 cm** L × W × H for 1 adult
Temperature, day	**24-30 °C**
Basking spot	**32-36 °C**
Temperature, night	**18-22 °C**
Humidity	**30-50%**
Water	**Water dish**
UVB	**Essential** Ferguson zone 3
Winter rest	**5-12 °C** 12-20 weeks
Diet	**Plants**
Kept	**Singly or in pairs**

BREEDING

Reproduction	**Egg-laying**
Sexually mature	**120-240 months**
Clutch size	**2-12 eggs**
Clutches per year	**1-3**
Incubation	**80-135 days** at 27-31 °C

PROTECTION AND PAPERWORK

CITES	**Appendix II**
EU annex	**Annex B**
IUCN	**Critically Endangered (CR)**

About the species

Gopherus agassizii is a heavily built tortoise with a high, domed carapace that leaves room for large lungs and helps the animal regulate its body temperature. The shell is greenish tan to dark brown, grey or black, and the plastron (underside) is paler. All measurements in the text are shell length. Adults are 25-35 cm long and 10-15 cm high and weigh 3.5-7 kg; males are slightly larger than females. The forelimbs are flattened and covered in sharp, claw-like scales built for digging, and the long hind legs are sturdy and columnar.

Males have a concave plastron, a longer gular horn (the projecting part of the plastron under the chin), a larger tail and two large glands under the chin that swell during the mating season. The female's plastron is flat. The species grows slowly: in the wild it often takes 16 years or more to reach 20 cm, and adults can live 50-80 years.

In 2011, studies of DNA, distribution and behaviour showed that the animals east and west of the Colorado River belong to two species. *G. agassizii* covers the animals north and west of the river, while the populations east of the river, in Arizona and Mexico, are now treated as *Gopherus morafkai*. The split reduced the range of *G. agassizii* by about 70%. Another species in the genus is *Gopherus polyphemus* from the south-eastern USA.

Distribution and habitat

Gopherus agassizii lives in the Mojave Desert in southern Nevada, south-eastern California, north-western Arizona and south-western Utah, north and west of the Colorado River. An isolated population lives in the Black Mountains of north-western Arizona. The type locality is the mountains near Fort Mojave in California, later restricted to Soda Valley.

In some areas populations have declined by up to 90% since the 1980s because of habitat loss, road traffic, disease and predators that take eggs and young. The species is protected in the USA and federally listed as threatened, and wild animals may not be collected.

> **Native range:** United States.

HABITAT

The species lives from sandy flats to rocky foothills, especially on alluvial fans, in dry washes and in canyons, where the soil is loose enough to dig in and firm enough that a burrow does not collapse. It occurs from sea level to about 1,050 m, locally up to 1,600 m. Annual rainfall is no more than 25 cm, ground temperatures in summer can exceed 60 °C, and winters bring frost.

The animal spends at least 95% of its life in burrows, rock shelters and hollows in the ground, which protect it from heat, cold and desiccation; each tortoise uses 5-25 burrows a year. Winter is spent in the burrow from about November to February or March. Activity peaks from March to June and from September to October, when body temperature is 26-34 °C, and it increases after rain.

The animal is herbivorous. Grasses make up the bulk of the diet, but it also eats herbs, wild annual flowers and new shoots, and fruit and flowers from cacti. It also eats soil and stones, probably to obtain calcium. It gets most of its water from plants, and the bladder can hold water amounting to more than 40% of body weight. After rain the animal drinks heavily, and adults can survive a year or more without access to water. When frightened, the animal can empty its bladder, which leaves it exposed in dry areas.

Read more: Calcium, vitamins and supplements

Care

THE ENCLOSURE

Little has been published about keeping *Gopherus agassizii* outside its range. The care advice rests on the habitat and on care guidelines for the species from its home country. The basking and night temperatures, the humidity and the UVB zone are estimated from the habitat and borrowed from tortoises from Mediterranean climates such as *Testudo hermanni*.

The species belongs outdoors in a large area. From early spring to autumn, when it is above about 21 °C and sunny, the animal should be out in a large, sunny, well-drained enclosure with grass and herbs, shelter, shade and a dry hide against rain and night-time cold. An enclosure can never be too large. The walls must be opaque, at least 40 cm high and extend well into the ground, because the species digs and tries to get through anything it can see through. Remove poisonous plants, and use neither pesticides nor fertiliser in the enclosure. An artificial burrow, for example a pipe or a box covered with soil, provides the cool, more humid microclimate the animal would otherwise find in its burrow. Leave part of the ground as loose sandy soil. A small greenhouse or cold frame with a heat lamp gives warmth on cool days. Cold, wet days are the greatest risk in a cool northern European climate.

Indoors, in cold periods, an open tortoise table is best. The length should be at least 8 times and the width 4 times the shell length. For an animal of 30 cm that gives 240 × 120 cm with sides of about 40 cm; for more animals, add more space. Use at least 10 cm of a dry mixture of loam and sand without fertiliser, so the animal can dig in. Avoid fine sand and small stones, which the animal may eat. A glass terrarium is unsuitable, because the animal can see out and tries to get through.

Read more: Lighting and UVB Read more: Humidity, misting and ventilation

TEMPERATURE

By day the temperature should be 24-30 °C, with a basking spot of 32-36 °C under a heat lamp, measured on the substrate. At night 18-22 °C is suitable, and the heat is switched off. Active animals in the wild have a body temperature of 26-34 °C. Always provide a cooler place and shade, so the animal can get away from the heat.

Dormancy: The species hibernates in the wild, and healthy, well-nourished animals should do so in captivity, from October or November to March or April. The temperature should be 5-12 °C for 12-20 weeks and must not stay above 15 °C for long, because the animal then burns through its reserves and can lose water and weight. Use a min/max thermometer and choose a place with a stable temperature, for example an insulated box in a cold garage or a cool room, raised off the floor. The animal must be plump and healthy before dormancy; do not hibernate sick animals or animals that have been treated for a respiratory infection the same summer. Check the animal regularly: if it wakes in mid-winter, it should be given water but not food. Weigh adults before and after dormancy; weigh young animals every two weeks and move them to a cooler place if they lose more than 1-2% of their weight. If they are dehydrated, wake them and give them water. In spring the animal is given a lukewarm bath and starts eating again after one to two weeks.

If you do not want to give it dormancy, the animal must be kept indoors at 24-30 °C with 13-14 hours of light a day and taken outside on warm, sunny days.

Read more: Heat and temperature Read more: Brumation and the seasons

HUMIDITY AND WATER

The species belongs to a dry climate, and the relative humidity should be 30-50%. Keep the substrate mostly dry, but make a slightly more humid spot under a hide or in an artificial burrow where the animal can rest. Dehydration is one of the most common problems, so provide a shallow, stable dish of clean water, changed daily and placed in the shade, and a lukewarm bath once a week. The animal drinks heavily after a bath or rain. An animal that sits in the water dish for hours is often dehydrated and is being kept too hot and dry.

LIGHTING AND UVB

The species is diurnal and basks a lot. Sunlight is best, and the animal should be out in the sun as often as the weather allows; artificial light cannot replace one to two hours of sunlight a day. Indoors there must be UVB lighting with a UV index of 2.0-3.0 at the basking spot (Ferguson zone 3). Fluorescent tubes lose output and must be replaced regularly, and a lamp that gives both heat and UVB must hang high enough that the basking spot does not become too hot. Ordinary full-spectrum lighting does not give enough UVB, and glass and Perspex block UVB. The light follows the season, at about 12-14 hours a day.

FEEDING

G. agassizii is a herbivore, and grazing is the foundation. Grow grasses, herbs and wild flowers in the enclosure, and also give wild plants such as dandelion, mallow, plantain, clover and mulberry leaves, grape leaves, lucerne in small amounts and opuntia (spineless cactus pads). Supplement with endive, escarole and small amounts of kale and romaine lettuce. Fruit should not be part of the diet, except cactus fruit in season, and certainly not banana. Avoid too much of plants high in oxalic acid, such as parsley, spinach, beet leaves and Brussels sprouts, and of cabbage-family plants such as broccoli, cauliflower and mustard greens. Do not give soya, tofu or animal protein, and keep prepared food a small part of the diet. All food must be free of fertiliser and pesticides.

The animal has a high calcium requirement: leave a cuttlebone within reach, or dust the food with calcium carbonate without phosphorus. Do not use calcium with D3 if the animal is outdoors. With a varied diet of wild plants, multivitamins are not necessary. Serve the food on flat stones, so the beak is worn down and the animal does not eat the substrate. Indoors, adults are fed every other day and young animals every day.

BEHAVIOUR AND HANDLING

The species is calm and busies itself with digging, eating and basking. It uses many burrows and hides and should have at least one dry hide at each end of the enclosure. Males are aggressive towards each other, especially just after dormancy, when they chase the females and fight over them; the one that is flipped can end up helpless on its back. Keep only one male in each enclosure. The animals are kept singly or as pairs.

Handle the animal as little as possible. If frightened, it can empty its bladder, which costs it part of its water store, so it must be given water. Never tether the animal, and never drill holes in the shell.

Breeding

SEXUAL MATURITY AND SEXING

Males have a concave plastron, a longer gular horn, a larger tail and large glands under the chin. The female's plastron is flat. In young animals the sex is almost impossible to see; the male's plastron becomes clearly concave when the animal is about 20 cm long, which takes 10-15 years in the wild and 5-10 years in captivity. The animal becomes sexually mature at 18 cm or more, after 13-20 years in the wild and faster in captivity. The species can live 50-80 years.

MATING

The animals mate in spring and autumn, and the males chase the females shortly after dormancy. The male circles the female and bites her shell before he mounts. Give the female many hides so she can get away from the male, and keep the males apart because they fight. Mating requires a dormancy; see the section on temperature.

EGG-LAYING AND CLUTCHES

The female lays 2-12 eggs, most often 4-8, the size of table tennis balls. Laying takes place between May and July, and in the wild she can lay up to three clutches a year, depending on the climate. The nest is 8-25 cm deep and is dug in loose, sandy soil at the entrance to a burrow or under a bush. Give the female at least 25 cm of deep, loose, sandy soil in a sunny, well-drained spot. The female often digs several trial holes before she lays.

INCUBATION

The eggs are incubated at 27-31 °C. At that temperature more than 83% of the eggs hatch, while only 53% hatch at 25 °C. Incubation time falls from about 125 days at 25 °C to about 78 days at 31 °C; in the wild it lasts 90-135 days, and some eggs overwinter and hatch the following spring. Sex is determined by temperature: below 31 °C all the young become males. The substrate and humidity in the incubator are not documented for the species; use moist vermiculite as for other tortoises, and do not turn the eggs. The hatchling uses an egg tooth to open the shell and may stay in the egg until the yolk sac is absorbed.

Read more: Incubating eggs

REARING THE YOUNG

Once the young has hatched, the yolk sac needs time to disappear; keep the young on clean waxed paper until it is fully closed, so the sac does not rupture. Young animals are 5-8 cm and have a soft shell, which hardens with food and sunlight. Keep them preferably outdoors in enclosures covered with netting against birds, cats and rats, with plenty of shade and a small sunny area for morning sun, and let them graze; they must always be able to get into shade, because the sun can quickly kill a young animal. Indoors, a tortoise table with a hide at the cool end is better than a glass terrarium, and a glass tank must never stand in the sun, because it heats up like a greenhouse. The temperature is 24-32 °C by day and 21-24 °C at night, with a cooler end; the basking spot must not exceed 32 °C. The young need UVB and dry, clean substrate, but not calcium sand. They are fed several times a day with finely chopped mixed greens, and calcium is dusted over the food twice a week. Provide water and baths to avoid dehydration, which can cause bladder stones and misshapen shells. Do not keep young animals with larger ones.

Health and common mistakes

The greatest health risk is respiratory infection, especially upper respiratory tract disease, which has decimated wild populations. The signs are a runny or bubbly nose, swollen eyes, loss of appetite and gasping. The disease cannot be cured completely, but the symptoms can often be controlled if treatment begins early. A sick animal must be kept apart from other tortoises, and indoors away from flies. Swollen or sunken eyes are most often a sign of dehydration or respiratory disease. Do not let the animal be given vitamin A by injection if it is eating greens.

- Dehydration and bladder stones: an enclosure that is too dry and hot, and a lack of water and burrow. Provide baths and a more humid hide.
- Misshapen shells (pyramiding): too little UVB and calcium, a substrate that is too dry and food that is too rich.
- Parasites: have a vet test the droppings, especially in newly acquired animals. Some wormers such as albendazole and ivermectin can be dangerous to tortoises, so let a vet with experience choose the treatment.
- Cold and damp: respiratory infection, especially outdoors on cool autumn and spring nights.

Weigh the animal regularly; sudden weight loss is often the first sign of illness. Contact a vet with experience of tortoises if the animal is not eating, is losing weight or has loose droppings. A new animal must be quarantined before it is placed with other tortoises. Never release captive animals, because they can spread disease to wild populations.

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.

The full guide with map and updates: herpy.org/en/tortoises-and-turtles/gopherus-agassizii