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TORTOISES AND TURTLES

Indian Star Tortoise

Geochelone elegans

Geochelone elegans is a medium-sized, diurnal tortoise from the dry regions of India, Pakistan and Sri Lanka. The tall, dark shell has yellow stars on each scute, and the female reaches about 30 cm. The species requires warmth, strong UVB, a high-fibre diet of grasses and herbs and a setup where humidity can be controlled; it is sensitive in captivity and assessed as Vulnerable in the wild.

Family: Testudinidae Former name: *Testudo elegans; Testudo stellata*

KEY FACTS

THE ANIMAL

Adult size	**15-30 cm** total length incl. tail
Weight	**1,000-6,600 g**
Lifespan	**25-80 years**
Active	**By day**
Lifestyle	**Terrestrial**
Habitat	**Semi-desert, savanna and dry forest**
Difficulty	**Experienced**

CARE

Min. enclosure	**240 × 120 × 50 cm** L × W × H for 2 adults
Temperature, day	**24-28 °C**
Basking spot	**35-40 °C**
Temperature, night	**20-22 °C**
Humidity	**40-75%**
Water	**Water dish**
UVB	**Essential** Ferguson zone 3
Diet	**Plants**
Kept	**Singly, in pairs or in groups**

BREEDING

Reproduction	**Egg-laying**
Sexually mature	**36-144 months**
Clutch size	**1-10 eggs**
Clutches per year	**1-9**
Incubation	**47-180 days** at 28-31 °C

PROTECTION AND PAPERWORK

CITES	**Appendix I**
EU annex	**Annex A**
IUCN	**Vulnerable (VU)**

About the species

Geochelone elegans is a medium-sized tortoise with a high, domed carapace. Each scute has a yellow centre with yellow or light brown lines radiating out in a star, on a background of brown to black. The marginal scutes have incomplete stars, and the plastron has dark stripes on a yellow ground. Head, legs and tail are yellow to light brown, sometimes with dark spots. The scutes can be almost smooth or rise into small pyramids, even in healthy animals.

The female is clearly larger than the male. All measurements in the text are shell length (carapace). Adult males are about 15-23 cm, females about 25-30 cm, and the largest females reach 35-38 cm. Weight is 1-6.6 kg. The male has a longer and thicker tail and a concave plastron, which makes it easier to mount the female; the female's plastron is flat.

Animals from northern India are often larger and darker with a less contrasting pattern than animals from southern India, and animals from Sri Lanka are often larger with broader yellow areas. There are no recognised subspecies, and variation within each population is great. In hatchlings the stars are missing: the shell is black or brown with yellow or orange rectangles on

each scute.

The species is calm and shy. It spends much of the day grazing and seeking shade and is not an animal to be handled. Although it is adaptable in the wild, it is sensitive in captivity, and wild-caught animals do poorly; only captive-bred animals can be kept responsibly. The species can live for several decades.

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

Distribution and habitat

Geochelone elegans is found in three separate areas of the Indian subcontinent: western India and south-eastern Pakistan (including Gujarat, Rajasthan and the Thar Desert), southern India (Karnataka, Kerala and Tamil Nadu) and Sri Lanka. The species occurs from sea level up to about 450 m. In north-western India a form named *G. e. actinodes* has been described, but it is not regarded as a recognised subspecies. The countries on the map are the original range; the species has also been introduced to Florida.

The species is assessed as Vulnerable. The population is declining because of habitat loss and extensive illegal collection for the pet trade, in which the species is one of the most traded tortoises in the world.

> **Native range:** India, Pakistan and Sri Lanka.

HABITAT

Geochelone elegans lives in dry and semi-arid habitats: thorn forest, open grassland, semi-desert and humid deciduous forest with a distinct rainy season followed by a long, hot and dry period. It is also found on farmland. The species tolerates very different conditions as long as there is an annual dry season.

In the hot, dry part of the year the animals are most active early in the morning and late in the afternoon and seek shade under the vegetation for the rest of the day. When the rain comes, activity rises sharply, and the animals move about and eat for large parts of the day. In north-western India and Pakistan they are inactive in the cold winter months.

The food is grasses, herbs, leaves, flowers and fallen fruit. The animals occasionally eat insects and carrion, but plants make up the bulk. In the dry season they eat very little. The pattern breaks up the outline of the shell in tall grass and makes the animal hard to spot.

Care

THE ENCLOSURE

Geochelone elegans should preferably be kept outdoors in summer, when the weather is warm, in a sunny enclosure with grass and drought-tolerant, edible herbs that the animal can graze. The enclosure must be at least as large as the indoor table and preferably much larger. The wall must be opaque, solid and dug into the ground so that the animal does not pace along it or dig its way out, and the top secured against predators, dogs and children. Parts of the enclosure must always lie in shade. At night the animal needs a heated shed or greenhouse, and when nights fall to about 10 °C it must come in to the warmth. In a cool northern European climate the season is short.

Indoors the animal is kept in an open tortoise table without glass walls. The length must be at least 8 times and the width 4 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 a female of 30 cm this gives 240 × 120 cm with sides of about 50 cm. The size applies to up to two animals; for a third and fourth animal at least 10 % more floor area is added, from the fifth animal 20 %. A table is suitable only in a room that is already warm, because it does not retain heat.

Young animals are kept for the first years in a closed, well-ventilated enclosure so that humidity can be kept high enough for even growth, and can later move to a table with a humid hide. The substrate is dry on the surface and suitable for digging, for example a mixture of topsoil and sand, at least 15 cm deep. Remove droppings and wet patches every day. Provide hollows and hides, flat stones and edible plants. The species is not kept together with other tortoise species, because they can infect one another, and is best kept in a group of its own species.

Read more: Humidity, misting and ventilation

TEMPERATURE

During the day the air should be 24-28 °C. Under a halogen lamp there should be a basking spot of 35-40 °C, measured at carapace height with a probe or an IR thermometer, so that the animal can warm up and then seek cooler places. At night the temperature should be around 20-22 °C; a ceramic heat emitter without light can maintain this if the room is colder, and it must be controlled by a thermostat and have a protective cage. Overheating is at least as dangerous as cold, so the animal must always be able to reach shade.

Outdoors, the night temperature must not fall below 10 °C, and a night-heated shed at around 16 °C makes a couple of cold nights harmless. A cold, wet summer is the greatest risk in a cool northern European climate, because cold and damp cause respiratory infection.

The species does not hibernate in captivity and needs light and warmth all year round. In the wild, animals from the coldest regions in the north-west are only inactive during the cool winter months.

Read more: Heat and temperature

HUMIDITY AND WATER

Humidity should be 40-75 % in adults. Young animals need higher humidity, about 70-80 %, to grow evenly and not develop a lumpy shell; this is why they go into a closed enclosure for the first years. A humid hide on the cool side, filled with moist substrate or sphagnum, gives the animal a place to take up moisture. The substrate itself must be dry on the surface, because a persistently wet substrate and stagnant, humid air cause respiratory infection and shell disease.

There must always be a shallow bowl of fresh water, changed every day and scrubbed every week. The bowl must be so shallow that small animals cannot drown. Young animals are given a supervised soak in lukewarm, shallow water 2-3 times a week for 10-30 minutes so that they drink and empty the bowel. Outdoors the cool part of the enclosure can occasionally be sprayed with water in dry weather.

LIGHTING AND UVB

G. elegans is diurnal and needs UVB to produce vitamin D3 and develop a strong skeleton. Outdoors in sun the animal gets it, but glass and Perspex stop UVB. Ferguson zone 3 is an estimate shared with related tortoises from dry regions such as *Stigmochelys pardalis*.

Indoors use a T5 HO tube with 10-12 % UVB in a reflector covering about half the length of the setup. The tube should hang 36-41 cm above the animal's back with no mesh in between and 23-31 cm if there is mesh. There must be neither glass nor plastic in between. The tube's output falls long before it stops shining, so replace it according to the manufacturer's instructions. A mercury vapour lamp gives both heat and UVB over a tortoise table.

Supplement with a powerful daylight lamp of about 6,500 K. The light should be on for about 12 hours a day. Do not use coloured light.

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

FEEDING

G. elegans is a herbivore, and the diet should be high in fibre and calcium and low in protein and sugar. In the wild it eats grasses, herbs, leaves, flowers and fallen fruit, and above all the fresh shoots in the rainy season. About 90 % of the diet is grass, hay, weeds and herbs, and about 10 % is salad leaves and vegetables. Offer grass, hay, clover, dandelion, chickweed, plantain, mulberry leaves, vine leaves, hibiscus leaves and opuntia pads without spines. Leafy greens such as kale, endive, radicchio and turnip tops and a little pumpkin or squash can supplement. Edible flowers such as dandelion, nasturtium, hibiscus and rose provide variety. Fruit is avoided, and the animal should not be given animal food.

The food is placed on a plate or tray so that the animal does not eat the substrate. Young animals are fed every day. Dust calcium lightly over the food, and always keep a cuttlebone available so the animal can gnaw it and keep the beak worn down; remove the hard backing first. Commercial tortoise food can be included in small amounts, but never as the staple diet. Fast growth gives a lumpy shell, so avoid food high in protein and energy.

BEHAVIOUR AND HANDLING

G. elegans is calm and shy and is most active in the morning and late in the afternoon. The animal is not a pet to be picked up: lift only when necessary, under the plastron with both hands, and hold it low so that a fall does not damage the shell. Hand-feeding and a light touch on head and shell are the gentlest contact.

The species can be kept alone, as a pair or in a group of its own species. Males are rarely aggressive towards one another, but in the mating season they may shove one another, try to flip rivals and pursue a female as a pack, so there must be hides and

space. Keep the species apart from other tortoise species, which it can infect and be infected by. An animal pacing along the wall often has too little space, a transparent wall or too little cover.

Breeding

SEXUAL MATURITY AND SEXING

The male has a longer and thicker tail and a concave plastron; the female has a short tail and a flat plastron. The female is clearly larger: about 29 cm against the male's 23 cm. In the wild, males become sexually mature after 6-8 years and females after 7-12 years. In captivity it goes faster, and males can be mature after 3-5 years, while females are rarely ready before 10 years.

MATING

Mating follows the rainy season; in southern India it begins when the rain comes in June. The animals become very active and eat the new shoots. In captivity the urge to mate can be stimulated by a heavy downpour or by spraying the animals thoroughly with a garden hose. The courtship of the female is quieter than in many other tortoises, often without shoving and biting, and the male grunts during mating. Provide the female with hides so that she can get away. The species is not easy to get to breed outside its own climate.

EGG-LAYING AND CLUTCHES

The female begins to walk around and sniff the soil 60-90 days after mating, often in the evening. She urinates on the soil to soften it and digs a flask-shaped hole with her hind legs. She lays several clutches a year, typically three and up to 9. A clutch is typically 3-6 eggs, 1-10 in total. The eggs vary greatly in size, about 38-50 mm long and 12-38 g in weight. She then covers the hole and presses the soil flat with her plastron. Give a female an area of loose, slightly moist soil and sand at least 30 cm deep in a quiet part of the enclosure, and give her extra calcium.

INCUBATION

The eggs have a hard but brittle shell and are pink and translucent when laid; after 2-3 weeks they turn white. They are carefully moved to an incubator without being turned and incubated at moderate to low humidity. At 28 °C the eggs hatch after about 100 days and at 30 °C after about 75 days. In the wild and at fluctuating temperature the time varies from 47 to 180 days. Sex depends on temperature: at 28-30 °C mostly males appear and at 31-32 °C mostly females.

Read more: Incubating eggs

REARING THE YOUNG

The hatchlings are about 35 mm long at hatching. They have no stars, but a black or brown carapace with yellow or orange rectangles, and the star pattern only becomes clear at around one year of age. They fend for themselves from hatching, and the parents show no care. Young animals need an enclosed terrarium with high humidity (70-80 %), warmth, UVB and finely chopped, edible herbs, and they must be bathed a couple of times a week. Avoid protein-rich and energy-rich food, because rapid growth causes a pyramided shell.

Health and common mistakes

The species is sensitive in captivity, including captive-bred animals, and most problems are caused by husbandry:

- Bone disease (metabolic): soft shell and deformed legs from too little UVB or calcium.
- Pyramiding: the shell grows in lumps if the diet is too high in protein and energy, if humidity is too low in young animals, or if UVB and calcium are lacking. The species often has slight pyramiding naturally, so a slight, even pattern is not in itself a sign of disease.
- Respiratory infection: runny nose, bubbling from the nose and open mouth, especially in stagnant, humid air and in cold and draughts. Requires a vet.
- Parasites: tortoises in the wild carry ticks and intestinal worms. New animals are quarantined, and a faecal sample is taken before they are put together with other tortoises.
- Wild-caught animals do poorly: they are often weakened and rarely get over the change.
- Dehydration, especially in young animals, and injuries from falls or during mating.

Weigh and measure the animal regularly, and keep a log of weight and appetite. Contact a vet with reptile experience if the animal loses weight, does not eat, has discharge from the nose or seems listless. All reptiles can carry *Salmonella*; wash your hands after contact.

Read more: Quarantine and hygiene

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.