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TORTOISES AND TURTLES

Asian Brown Tortoise

Manouria emys

Manouria emys is Asia's largest tortoise and one of the most primitive tortoises in existence. It lives in humid hill forest, grows to 50-60 cm and weighs up to 37 kg. The female builds a tall nest mound of leaves and guards it, which almost no other tortoise does. The species needs a very large, humid and shaded enclosure and is only for experienced keepers.

Family: Testudinidae Former name: *Testudo emys; Manouria fusca; Geochelone emys*

KEY FACTS

THE ANIMAL

Adult size	**40-60 cm** total length incl. tail
Weight	**20,000-37,000 g**
Lifespan	**20-100 years**
Active	**By day and at dusk**
Lifestyle	**Terrestrial**
Habitat	**Rainforest and montane forest**
Difficulty	**Expert**

CARE

Min. enclosure	**500 × 400 × 60 cm** L × W × H for 1 adult
Temperature, day	**18-25 °C**
Basking spot	**26-29 °C**
Temperature, night	**15-18 °C**
Humidity	**80-99%**
Water	**Water dish**
UVB	**Essential** Ferguson zone 2
Diet	**Plants**
Kept	**Singly or in groups**

BREEDING

Reproduction	**Egg-laying**
Sexually mature	**120-180 months**
Clutch size	**15-74 eggs**
Clutches per year	**1**
Incubation	**60-100 days** at 26-29 °C

PROTECTION AND PAPERWORK

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

About the species

Manouria emys is the largest tortoise on the Asian mainland. The shell is flat, with upturned, strongly serrated edges at the front and rear, and the carapace scutes have distinct growth rings and are often slightly concave. Adults are uniformly brown to almost black; young and subadult animals often have a lighter patch in the middle of each scute. The forelegs are covered with large, pointed scales, and on each thigh sits a group of large, cone-shaped scales. When the animal sits down, the thigh scales look almost like an extra pair of legs.

There are two subspecies. *M. e. emys* lives in southern Thailand, on the Malay Peninsula, Sumatra and Borneo and grows to 50 cm and 20 kg. *M. e. phayrei* lives from north-western Thailand northwards to north-eastern India and grows to 60 cm and 37 kg. It is best recognised by the pectoral scutes on the plastron: in *phayrei* they often touch in the middle of the plastron, in *emys* they do not meet. There is great individual variation, and in the border area the subspecies interbreed.

The species is regarded as one of the most primitive tortoises, both by appearance and by genetic studies. It also stands out for its behaviour: the female gathers leaves and soil into a large nest mound, lays the eggs in it and stays by the nest to defend it. The males nod their heads and give deep, groaning sounds during courtship.

Shell length (carapace) is 40-60 cm, and weight can reach 20-37 kg. The species is not an animal for ordinary home keeping: it needs far more space than most private keepers can provide, and it is threatened in the wild. The population has fallen by around 80 % over three generations, and the IUCN lists the species as critically endangered. Animals in the trade should be captive-bred. Lifespan is not known with certainty; animals in captivity have lived at least 20 years, and the species can probably live to over 100 years.

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

Distribution and habitat

Manouria emys lives in South-East Asia and the adjoining parts of South Asia: from Bangladesh and north-eastern India (including Assam, Nagaland and Mizoram) through the mid-elevation hills of western Myanmar and western and southern Thailand, and on down through the Malay Peninsula to Sumatra and parts of Borneo. *M. e. phayrei* occurs in the northern part and extends south to southern Thailand, *M. e. emys* in the southern part. The two meet and intergrade in southern Thailand.

A few animals have also been found in Vietnam and China, but they come from the trade in live turtles for food and pets. The map shows the countries where the species is native.

> **Native range:** Bangladesh, India, Myanmar (Burma), Thailand, Malaysia and Indonesia.

HABITAT

Manouria emys lives in evergreen forest, from tropical rainforest to subtropical hill forest, typically at 600-1,500 metres' elevation. It stays under the forest canopy for most of the day and prefers steep slopes and forest near streams, swamps and waterholes. Many animals stay within 50 metres of water, and some sit in the water. Bamboo forest is also among the important habitats.

The climate is warm and very humid, with up to about two metres of rain a year. On the forest floor the humidity is rarely below 90 %, even by day. In *M. e. emys* the temperature is around 20 °C at night and 30 °C by day all year round. *M. e. phayrei* in the northern range has a distinct wet and dry season, and in Assam there can be frost. In the dry season from November to February some animals lie still, buried in leaf litter or under fallen trees, for up to two months. The species becomes inactive or enters a hibernation-like state when the temperature falls below 15 °C.

The animals are most active at sunrise and sunset, but are also active by day. They do not dig true burrows, but readily bury themselves in leaf litter and soft soil, especially when it is hot. An animal can walk up to 300 metres in a day, and an individual's home range is typically 15-30 hectares.

Read more: Humidity, misting and ventilation Read more: Brumation and the seasons

Care

THE ENCLOSURE

The species is so large that an ordinary terrarium is not an option for adult animals. One adult needs an enclosure of at least 20 m², for example 500 × 400 cm, and 5 m² should be added for each additional animal. Larger is always better, and floor area is what matters, not height.

The best solution is an enclosure outdoors or in a greenhouse or tropical hall that can be kept humid and warm. The wall must be solid and smooth, of wood, smooth stone, glass or plastic, and about 60 cm high with an overhanging lip. The species climbs reasonably well and is strong enough to break weak fencing. The female builds her nest mound against the wall or in a corner, and a mound can reach 60 cm in height, so the wall must be sturdy. The wall does not need to be dug in deeply if the ground is firm enough that the animal cannot push itself under it. Do not use rough materials that can damage the shell.

The substrate is a loose, moist mix of topsoil, bark chips and humus with a thick layer of leaves, so that the animal can dig in. Plant densely, so that there is shade, cover and something to eat. Provide a water bath large enough for the animal to sit in, and preferably make a mud wallow. Give females dry leaves and twigs in large quantities for the nest mound.

Young and subadult animals are kept in a small, closed box of about 100 × 50 cm with a moist substrate, up to about ten animals of the same size together. The box has a dense, moist substrate of topsoil and leaves with many hiding places and a lid that holds in the humidity, and the animals are moved to more space as they grow. Keep animals of different sizes and ages apart.

TEMPERATURE

Manouria emys tolerates 13-30 °C and is more cold-tolerant than most tropical tortoises. It must not, however, be kept below 10 °C or above 35 °C for any length of time. Keep 18-25 °C during the day and let the temperature fall to 15-18 °C at night. Hatchlings and animals under a year old are never kept below 18 °C.

The species is not a typical basker, because it lives under the forest canopy, but it must still be able to choose between warm and cool areas. Make a warm spot of 26-29 °C, much larger than the biggest animal, with a heat lamp, a ceramic heater, a radiant panel or a heat mat. Tortoises seek the brightest spot, not necessarily the warmest, so a heat source without light is only good for raising the room temperature and not for making a warm spot.

If the temperature falls below 15 °C, the animals become inactive and enter a hibernation-like state. Keep the temperature above 15 °C, therefore, unless it is a deliberate, short cooler period. Measure with digital thermometers on the warm and the cool side.

Read more: Heat and temperature

HUMIDITY AND WATER

The species is a rainforest tortoise and needs very high humidity: 80-99 % is best, and it must never fall below 60 %. Keep the substrate moist, mist often, and make humid shelters of wet soil, moss and live plants. A water bath and a mud wallow help the animal regulate its own moisture.

Young and subadult animals need constantly higher humidity than adults. If they are too dry, the growth zones of the shell become sunken, and the scutes grow up into pyramids that do not go away again. Soak them regularly in lukewarm water, and keep them in a closed box with a very moist substrate and air. Animals of *M. e. phayrei* from the northern range know a dry season from the wild, and a short dry period can be healthy for them. *M. e. emys* does not know a dry season.

WATER AND WATER QUALITY

There must always be clean drinking water in a bath large enough for the animal to sit in. The water must reach no higher than the height of the shell, and the edge must be flat with good footing, so that the animal can climb out easily. The tortoise likes to sit in water and passes its droppings in it, so the water must be changed often. A drain in the bottom makes cleaning easier.

LIGHTING AND UVB

The species lives under the canopy and needs subdued light with shade, but UVB is essential for its health. It belongs to Ferguson zone 1-2, with a UV index of 0.1-1.0 over most of the enclosure and at most about 3 at a single basking spot. Use T5 tubes over a large part of the area, so that UVB is spread softly as in the shade, rather than a single powerful lamp. Measure the UV index at the animal's height with a UVI meter, and replace the tubes every 6-12 months if you do not measure.

In dark months, metal halide lamps are a good supplement, because they give the most natural light of the lamps available to buy. Natural, unfiltered daylight in a greenhouse or through a skylight is better still. Keep the day length in line with the season, and keep it dark at night. Outdoors in sunshine, artificial light is unnecessary.

Read more: Lighting and UVB

FEEDING

Manouria emys is herbivorous, with a large element of fungi and a little animal food. The staple is leafy greens and high-fibre food: large leaves of elephant ear (*Alocasia*), banana plant, papaya and hibiscus, dandelion, plantain, stinging nettle, bramble leaves and bamboo. Add hay of timothy, cocksfoot or lucerne. Vary the greens and roughage rather than giving the same every day.

Fungi are one of the species' favourite foods: offer whole button mushrooms, oyster mushrooms, shiitake and chanterelles 1-2 times a week. Vegetables such as carrot, sweet potato and squash can be given 1-2 times a week. Fruit, for example mango, papaya, mulberries and low-sugar berries, at most once a week and never more than 10 % of the diet, so that the animal cannot pick it out. Animal food, such as earthworms, snails, whole newborn mice and fish, is given rarely, in small amounts and at most once a week. Pellets must be high in fibre and low in protein; pellets for tropical tortoises are too rich in protein.

Young animals get the same food as adults, cut into smaller pieces, and they should be fed at least every other day. They may eat freely, but a diet too rich in protein causes too rapid growth and thus shell defects. Offer the food on a clean, flat surface, so that the animal does not swallow substrate. Calcium amounting to about 1 % of the dry weight of the food gives safe amounts, and females should always have free access to a cuttlebone, snail shells or eggshells. With proper UVB and a varied diet, further supplements are rarely necessary.

Read more: Calcium, vitamins and supplements

BEHAVIOUR AND HANDLING

The species is curious and relatively tame, but it should only be picked up when necessary. Handling causes stress, and the animal may urinate out of fear and thereby lose fluid, especially when small. Young animals are shy and hide in leaf litter or dig in, so provide plenty of hiding places.

Manouria emys is really solitary, but often thrives in groups if there is enough space. Males can be aggressive towards each other and bite, push and flip each other over, and an animal that lies on its back for too long can overheat or develop circulation problems and die. Some males live peacefully together, but it depends on the animals. Supervision is necessary when several males share an enclosure. Females can become stressed by males and should have the chance to get away, and males can be kept apart from the females outside the breeding season. Females can also mount each other, probably as an expression of dominance. Never keep other animals with a nesting female, and do not keep egg-eating animals in the same enclosure.

Breeding

SEXUAL MATURITY AND SEXING

Males have a longer and thicker tail than females, and the tail extends beyond the large thigh scales. The anal scutes are curved and point slightly upwards in the male, while they are pointed, flat and straight in the female. The male's plastron is often not concave, so it cannot be used alone to tell the sexes apart. The most reliable sign is that the animal builds a nest mound and lays eggs, or that the male shows his penis. In young and subadult animals sex can only be determined reliably by endoscopic examination of the body cavity (laparoscopy), which can be done from the age of five months. The animals show sexual behaviour from the age of eight to ten years, but the first eggs are rarely fertilised, and most animals only lay fertile eggs from around the age of fifteen. Females can begin laying at about 18 kg.

MATING

The male nods his head, points his head and neck towards the female and follows her. When she stops, he tries to mount her, and often bites her nose and legs to make her stand still. During mating he gives deep groaning sounds. Mating can cause the female injuries to the legs and scrapes on the shell, so check for them. Make sure the female can get away and that there is enough space. The female can store sperm for several years and lay eggs without a male. Natural shifts in humidity and temperature can set breeding in motion, and the sound of monsoon thunderstorms together with rising humidity can bring the females into lay.

EGG-LAYING AND CLUTCHES

The female builds a nest mound of leaves, soil and twigs. She gathers the material with her forelegs by sweeping it backwards, from up to 10 m away, and the mound is typically 30-100 cm high and up to 3 m in diameter. It is often placed in a corner or against a wall. She forms a shallow chamber at the bottom of the mound, lays the eggs over about an hour and covers them. The eggs are round, 41-54 mm in diameter and weigh 46-80 g. In *M. e. emys* the clutch averages 35 eggs (15-51), in *M. e. phayrei* usually around 60 and up to 74. The first clutches are small and often infertile. The female typically lays one clutch a year. After laying she guards the nest for 3-20 days, pushing and biting any intruder and lying flat over the nest if she cannot chase it away. She continues to add material and probably regulates the temperature in the mound. Give her peace and plenty of dry leaves and twigs.

INCUBATION

The eggs can be incubated artificially in an incubator in a loose, moist medium such as vermiculite or sand, never wet, and at a humidity of at least 80-100 %. Temperature determines sex: about 29 °C gives roughly equal numbers of each sex in *M. e. emys*, lower temperatures give mostly males and higher mostly females. For *M. e. phayrei*, about 27 °C is recommended for a mix with good hatching. The temperature must never exceed 32 °C or fall below 25.5 °C. At 26-29 °C incubation takes 63-84 days; at the highest temperatures 60-75 days and at the lowest up to 100 days or more. Hatching can take several days.

Read more: Incubating eggs

REARING THE YOUNG

The hatchlings weigh 50-55 g and have a shell length of 5-6 cm at hatching. First keep them in a clean container with no loose substrate until the yolk has been absorbed and the navel has closed (0-4 days). Then move them to a moist substrate of topsoil and leaves. Keep them in closed, very humid boxes, soak them regularly and keep them warm, above 18 °C. Give them the same food as the adults in small pieces at least every other day. Growth is slow, probably a few centimetres a year. Keep young and adults apart.

Health and common mistakes

Most problems are caused by incorrect humidity, light and food:

- Shell pyramiding and stunted shells in young animals kept too dry. Humidity is the most important cause.
- Bone disease (metabolic bone disease) from a lack of UVB and calcium: soft shell, weak legs, growth defects and, in the worst case, kidney failure and gout.
- Too rapid growth from too much protein and starch.
- Overgrown beak when the food is too soft or too rich in protein. Provide hard roughage.
- Injuries after fights, where an animal may lie on its back, and after mating.
- Respiratory infections, which show as lethargy, weight loss and discharge from the nose and eyes.

A healthy animal is active, has clear eyes, a firm shell and a good appetite. Have the animal examined regularly by a vet with experience of tortoises, and have a faecal sample taken from new animals. Never do more to a nesting female than necessary, because disturbance stresses her. Buy only captive-bred animals from a reliable breeder, because the species is critically endangered in the wild.

Read more: Common diseases and signs of illness

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.