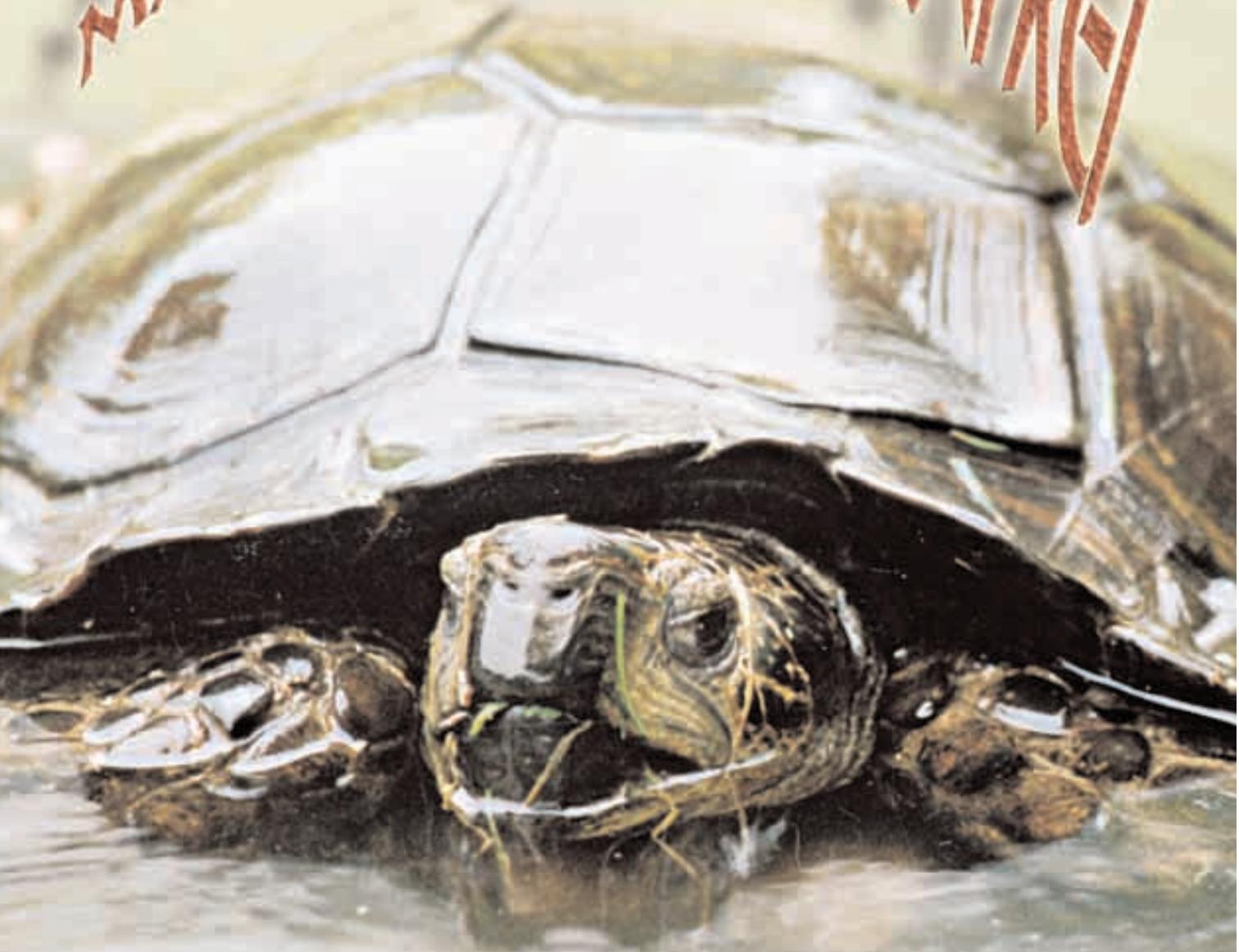


# MANOURIA EMYS PHAYREI



TEXT AND PHOTOS BY  
DR. URSULA EGGENSCHWILER

**SUCCESS AT KEEPING AND BREEDING THE  
LITTLE-KNOWN BURMESE BROWN TORTOISE**



Adult specimen eating the grass that grows in the garden



In the wild, the Asian or Burmese brown tortoise, *Manouria emys phayrei* (Blyth, 1853), lives in highly inaccessible areas, and reports of field observations are therefore practically unavailable. Hence, an understanding of this species must be formed mainly on the basis of its anatomy and physiology in conjunction with climate studies. That is the aim of this article.

In German, this tortoise was once referred to by the impressive common name *Thailändische Riesenschildkröte* (Thai giant tortoise). However, borrowing from the English common name, the German name has been simplified to the rather nondescript *Braune Landschildkröte* (brown tortoise). In Thailand it is called *tao hook dum* — say these syllables out loud, and it sounds something like the tortoise working its way through the brush.

### Taxonomy

The full scientific classification of this reptile taxon is as follows: order Testudines (turtles and tortoises), suborder Cryptodira (turtles capable of retracting their heads into their shells by means of a vertical S-shaped bend), family Testudinidae (true tortoises), genus

*Manouria* (Indochinese tortoises), species *M. emys* (Burmese brown tortoise), subspecies *M. e. phayrei*.

The species was originally described as *Testudo emys* by Schlegel and Müller in 1844. The subspecies *phayrei* was first described by Blyth in 1853. Reiman later described the same taxon as *Manouria emys nutapundi* in his 1978 book, which was greatly influenced by Thai zoologist Wirot Nutaphand. However, the older name for the subspecies should still be valid.

The definitive names of the two subspecies now generally recognized are *Manouria emys emys* (Schlegel and Müller, 1844) and *Manouria emys phayrei* (Blyth, 1853). Because the tortoises were originally assigned to the genus *Testudo*, the names of the authors are written in parentheses. In any case, the subspecies name *phayrei* should not appear with the authors Reimann or Wirot.

A second species of *Manouria* has also been described: the impressed tortoise, *Manouria impressa* (Günther, 1882).

### Origin

*Manouria* are considered probably the oldest of known living tortoises. *Manouria emys* is a direct

descendant of an extinct European *Manouria* species of the Tertiary. A fossil specimen found in the Üetliberg region (near Zurich, Switzerland), and now at the Zoological Museum in Zurich, is larger but otherwise morphologically almost identical to *M. emys*. The Tertiary is a period of modern geological time characterized by the formation of the large fold mountains and the sunken area of the Mediterranean basin.

### Description

*Manouria emys phayrei* grows larger than *Manouria emys emys*, and there are clear morphological differences between the two subspecies. The shells differ in general form, apparent from the rear view, and in *M. e. phayrei*, the pectoral scutes meet along the plastral midline, whereas in *M. e. emys* they do not (see Figure 1).

*Manouria emys phayrei* is the largest Asian tortoise. It grows to 60 centimeters in carapace length and weighs up to 37 kilograms. The plain brown carapace is highly domed. The extremities are broad and plump. The anterior and posterior marginal scutes are upturned. Large pointed tubercles on the thighs are responsible for the Thai name *tao hook dum*, which means something like “brown six-footed turtle.”

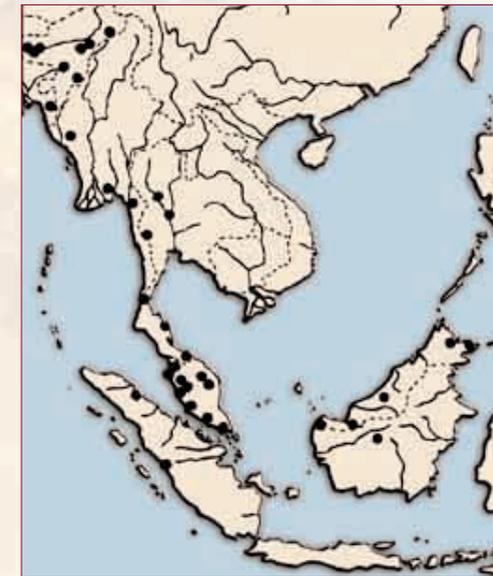
### Distribution and habitat

*Manouria emys phayrei* is supposedly found from the Assam region of India through Burma to northern and west-central Thailand; *Manouria emys emys*, from

southern Thailand through Malaysia to Sumatra, and Borneo. However, attempts by herpetologists to find the species in the wild have been mostly unsuccessful.

Although it has sometimes been possible to gain limited access to the region, an actual expedition is almost impossible for political and military reasons. Also, the dense vegetation in the distribution area does not exactly permit pleasure-hiking.

*Manouria emys* inhabits evergreen tropical rainforest and mixed deciduous transitional forest. Temperatures during the coldest months average about 18°C (64°F). Climate studies of Bhamo (northeastern Upper Burma) can serve as an indication of appropriate environmental conditions for the species. This information is important for setting up a terrarium.



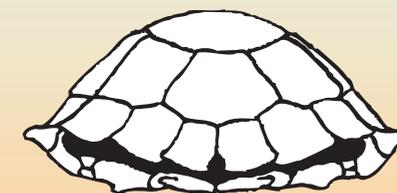
Distribution of *Manouria emys* according to Iverson

### Captive housing

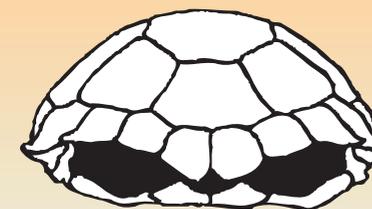
Our three sexually mature specimens are provided with a summer outdoor enclosure of about 10 x 11 meters. Through the middle runs a large hill about 8 meters long, 4 meters wide, and 2 meters high. At one side there is a round built-in bath of 3 square meters and 50 centimeters in depth.

The indoor enclosure is a small free-standing house that the tortoises can enter or exit at will during the day. It has a floor area of 3 x 4 meters and a sloped roof from 2.5 to 3.4 meters high. The floor, sides, and roof are all insulated. There are windows in the south- and east-facing walls.

Figure 1. Shell differences between *Manouria emys emys* and *Manouria emys phayrei*.

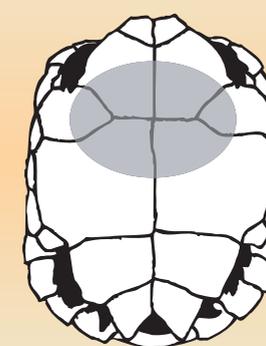


Rear view of the shell of *Manouria emys emys*

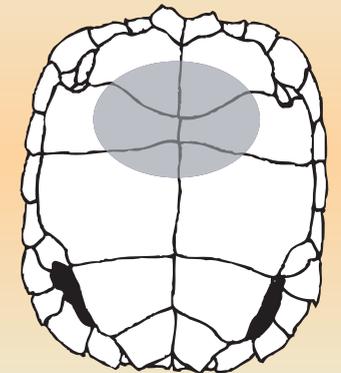


Rear view of the shell of *Manouria emys phayrei*

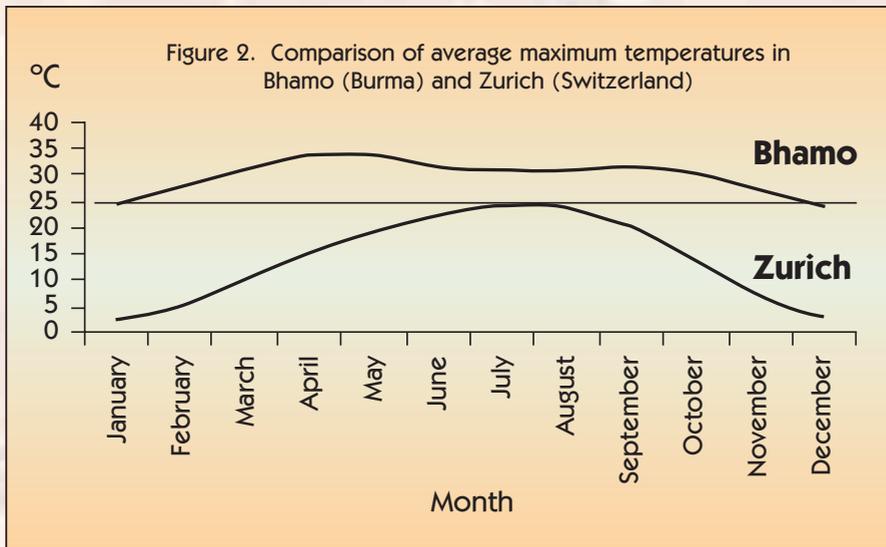
Shaded areas show how the pectoral scutes of *M. e. emys* do not meet at the plastral midline, whereas those of *M. e. phayrei* do.



Plastron of *Manouria emys emys*



Plastron of *Manouria emys phayrei*



The floor of the house is covered with bark mulch, on which a 30-centimeter layer of straw is strewn. In one corner there is a bath 60 centimeters square and 7 centimeters deep. In another corner, a shelf is mounted 60 centimeters above the floor, under which the tortoises sleep. An electric oil-filled radiator is set on top of the shelf to control the ambient temperature within the house, and a heat mat is set on the floor under the shelf on the coldest days.

The adult tortoises are active in the morning, take a siesta during the heat of day, and become active again in the evening. On balmy summer evenings they may graze long into the twilight.

They like to sit for long periods of time in piles of branches or under shrubs. Indoors they bury themselves in the straw with only their nostrils or eyes just barely showing.

#### Water

The rainy climate of their natural range corresponds with a very interesting physiological characteristic of these tortoises. *Manouria* species do not excrete uric acid — the white insoluble form of nitrogenous waste excreted by other tortoises (e.g., *Testudo hermanni*). Instead, these species excrete nitrogen as urea, requiring more water, and reflecting the fact that these tortoises do not experience a dry season. In captivity



3-week-old hatchling

they must rely on the continuous availability of water. Zoo specimens in Thailand lie in shallow water for days, and we have observed that in our captive setup the tortoises use their baths fully, especially when temperatures are above 24°C (75°F).

Our tortoises often defecate in their indoor bath, but feces are usually not found in the outdoor bath. The water container must be cleaned daily, and the animals themselves are also regularly scrubbed under running water. They like to bury themselves in the straw, which appears to also have a cleaning effect — the tortoises always look clean and polished.

#### Temperature and light

Tortoises of this species do not really bask, and in the beginning our freshly imported specimens even avoided bright light for several years, retreating to the cooler shade. In recent years they tend to spend more time lying in the sunlight that comes in through the window of their house, but they have never been seen basking outdoors. Juveniles like to lie under a halogen lamp, or by the window in the sun.

In winter, the ambient temperature in the tortoise house should be kept at 20–28°C (68–82°F). On very cold days the floor temperature could drop too low, and an additional infrared lamp may be needed.

The tortoises can go outside when the temperature is above 18°C (65°F), but even in summer they always spend the night inside their house.

#### Diet

Sharing experiences with other *Manouria* keepers has shown that diet is a tricky topic. Our feeding scheme is based on morphological considerations, and supported by 20 years of experience keeping these tortoises.

Thai biologist Wirot Nutaphand believes that *Manouria emys* follows mountain streams, from which it eats vegetation such as lotus blossoms. The chewing apparatus and



Female *M. e. phayrei* preparing to bask

intestinal structure (including a well-developed cecum) of this species indicate that it is herbivorous. The beak is worn down sufficiently only when tough, stemmy fodder is provided. The intestinal flora — including flagellate and ciliate protozoa, which help in the breakdown of cellulose — also indicates a vegetarian diet. Our specimens graze like cows, and no vegetation is too tough for them.

With this diet, the tortoises defecate large quantities. Their feces is compact, sausage-shaped, and dark olive-green in color. We strongly recommend against adding fruit or animal products to the diet. We notice that large numbers of slugs crawl freely through the enclosure without the tortoises showing any interest in them.

In summer the tortoises eat what grows in their enclosure — mostly well established grass. From April to October, no other food is given; they “hunt” for their own food. In the morning they leave their shelter and stop at the first green thing they come to. Then, not being at all picky, they simply eat everything within reach of their necks in all directions, and work their way gradually forward.

In winter, when they stay indoors, the tortoises are given salad greens such as endive, lettuce, and chicory. This is given whole, and always covered with a good handful of hay. If the food is a little late, the tortoises start eating the straw that is strewn as a floor covering.

#### Social and mating behavior

A special characteristic of these tortoises is the way they greet each other with head bobbing. This behavior can also mean the beginning of combat. Such head bobbing, by both animals, can go on for several minutes. The male also bobs its head at the female in courtship.

The female can emit noises that sound like a combination of muffled growling and groaning. During copulation, the male emits long (2–3 seconds) rhythmic muffled groans, starting with a deep pitch and then rising to a higher pitch over a period of a few minutes.

Males initiate copulation in all seasons. Although it has not been observed when temperatures are very hot in the summer, copulation



*M. e. phayrei* 1-year-old juvenile



Close-up of a juvenile *M. e. phayrei*

otherwise takes place year-round, especially before mid-day. The male first sniffs the front legs of the female, and then, after this initial contact, moves to her rear. The whole procedure is very peaceful; females seem to accept it calmly. Aggressive biting or chasing through the enclosure, as seen in *Testudo hermanni*, has not been observed in *Manouria emys*.

Once a year, our male is taken away and put with a female of a different group for several weeks. When he returns home, head bobbing is fervent, and not 5 minutes go by before he mounts a grazing female, which she does not try to prevent.

#### Nest building

*Manouria emys* has a particularly characteristic behavior when preparing to lay eggs. About 2–3 weeks before laying, the female becomes very territorial. Our two females sometimes engage in serious combat. With retracted heads, they move back to get a running start, push off with their hind legs, and ram each other with the fronts of their carapaces. The weaker

female is driven away. The strength of these tortoises is incredible, and if they are to be separated, it is quite difficult to loosen their anchor grip on the ground.

The winning female then begins to meticulously build her nest. For hours she uses her front legs to move substrate back into a pile. In the tortoise house, we keep our specimens on a substrate of bark mulch and straw, and no stem remains unused. Finally the female climbs on top of the mound and waits. Our tortoises are usually kept together in a group, and we have often seen the male come merrily along and dig into the nest mound, oblivious to all the hard work of the female — typical male (sorry!).

For several years, we repeatedly experienced an embarrassing mishap. The covered sleeping corner of the tortoise house — with the electric radiator mounted on the shelf above, and the heat mat on the floor — was regularly chosen for the nest site. With the added height of the nest, the carapaces of the females would push up on the shelf and move the radiator, causing a short circuit. After 3 years of having our coffee machine and the kitchen light

suddenly go out, always during the first week of May, we learned to remove the shelf in mid April. Since then our coffee machine has worked uninterrupted through the spring.

#### Eggs

During the first week of May, practically to the exact week, egg-laying takes place, usually secretly. The clutch consists of 45–60 soft-shelled spherical eggs. They are often dented on the sides where they touch each other.

As soon as they are discovered, usually on the same day they are laid, the eggs are transferred to an incubator. The female continues to guard the nest for 2 weeks at the most, and then interest is lost. This year we did not remove the eggs, and the nest was guarded for at least 6 weeks. One of the females was constantly sniffing and rearranging and adding substrate to the mound. But finally interest again was lost. These eggs died because the nest substrate was not at all suitable.

We recommend quickly transferring the eggs to very moist substrate for artificial incubation. The dented sides usually return to their spherical shape in a very short time. If they are not quickly reburied and kept moist enough, however, the eggs will become permanently dented.

We incubate eggs in vermiculite or expanded clay granules. Because of our inexperience with incubating soft-shelled eggs, we had to pay the price of the learning process. We were so impatient that we sometimes checked the eggs daily. But it was not until after 3 weeks that the first blood vessels actually became visible. During the first successful incubation, we sorted the eggs by smell. Many eggs developed embryos, but for some reason these died and the eggs putrefied.

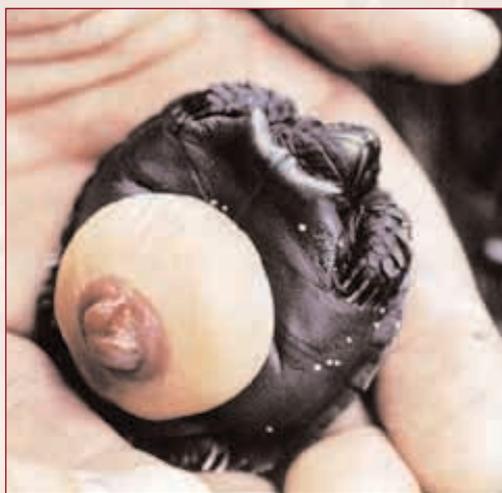
One day before hatching, the eggs begin to sweat and the shell develops hairline cracks. In our first successful incubation, eclosion started after 67 days, and the last egg hatched after 74 days. Hatchlings emerged with shockingly large yolk sacs, and were immediately



Female *M. e. phayrei* laying eggs



Male observing the eggs



Recently hatched neonate



Eclosion has begun!



Group of *M. e. phayrei* juveniles

transferred to small plastic containers lined with rings of moistened gauze. Here the hatchlings were left to rest and absorb their yolk sacs, which surprisingly were gone in 3 days. At birth, our hatchlings have weighed 41–59.1 grams.

### Hatchlings

*Manouria emys* hatchlings have a uniform warm brown coloration, and strongly serrated margins. The egg tooth is well developed. The extremities are covered with hard scales. The babies sometimes start hissing even before they are fully out of their shells. They panic when they are picked up, and hide immediately when they are released.

We keep hatchlings on very moist bark mulch. Outdoors, great care must be taken to ensure that the humidity is kept high enough to prevent eye inflammations. Being transferred from indoor to outdoor enclosures is especially stressful for the baby tortoises, and can cause panic reactions. We are therefore using the outdoor enclosure less.

The tortoises from our first successful incubation show surprisingly harmonious growth. They have smooth domed carapaces, and look

quite compact. In 6 months, weight increased by 50–100 percent. After 3 years, the tortoises weigh six times their birth weight. In size, I believe the tortoises are growing too fast, but compared to specimens kept by other keepers, ours are among the smallest.

Like the adults, our juvenile tortoises are fed a vegetarian diet. They eat eagerly and are not picky. We offer them whatever “weeds” we get from the garden. In the winter months, we offer endive, lettuce, and similar leafy greens. Hay is turned down, and the woodlice and snails that get into the tortoise enclosure are fully ignored.

A daily bath is important for the young tortoises, and they are often seen soaking in the shallow trough. The water must be changed several times a day because bathing evidently stimulates defecation.

So far we have not observed any rivalry among juveniles. Our specimens are now in their fourth year.

*Manouria emys* require an environment with rough surfaces and plenty of space to move around in so that they can sufficiently wear down their claws and the horny scales on their extremities. Also,

their food should be tough and stemmy enough to prevent the beak from growing too long. Otherwise we have had no health problems with our tortoises.

### Conclusion

The Burmese brown tortoise is a quiet and fascinating animal that can apparently be kept in captivity without any problem. Like other tortoises, it reacts with consternation to being moved to a new enclosure, but within its usual home environment it is very curious, and shows no aggression toward conspecifics except during egg-laying.

For proper captive care of this tortoise, the keeper must consider the significant size and weight of the species. *Manouria emys* should not be kept without an enclosure of at least 100 square meters, summer and winter, otherwise it will feel cramped. Our winter enclosure is too small, so we no longer keep our specimens.

The tropical climate to which this species is native must also be taken into account. *Manouria emys* needs a very warm and wet environment, with warm showers. The diet should be entirely vegetarian. ■