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AGAMAS

Forest Garden Lizard

Calotes emma

Calotes emma is a slender, diurnal agamid from the forests of South-East Asia that climbs in bushes and low trees and is recognised by the small groups of spines behind the eye and above the eardrum. It reaches 28-35 cm, is brown with dark bands and feeds on insects. Almost nothing is known about its care in captivity, so this guide draws on its habitat and on the close relative *Calotes versicolor*.

Family: Agamidae Former name: *Calotes alticristatus*

KEY FACTS

THE ANIMAL

Adult size	**28-35 cm** total length incl. tail
Lifespan	**8-12 years**
Active	**By day**
Lifestyle	**Arboreal**
Habitat	**Dry forest and rainforest**
Difficulty	**Intermediate**

CARE

Min. enclosure	**100 × 50 × 100 cm** L × W × H for 1 adult
Temperature, day	**25-29 °C**
Basking spot	**33-38 °C**
Temperature, night	**21-24 °C**
Humidity	**65-85%**
Water	**Water dish**
UVB	**Essential** Ferguson zone 2
Diet	**Insects**
Kept	**Singly or in pairs**

BREEDING

Reproduction	**Egg-laying**
Clutch size	**10-12 eggs**
Incubation	**60-70 days** at 27-31 °C

PROTECTION AND PAPERWORK

CITES	**Not listed**
EU annex	**Not listed**
IUCN	**Least Concern (LC)**

About the species

Calotes emma is a slender, angular agamid with a long, laterally compressed tail and a crest of scales along the nape and forebody that fades towards the rear. On each side of the head sit three small groups of spines, completely separate from one another: one behind the brow and two above the eardrum. In front of each shoulder runs a transverse fold, which is black with an irregular white edge, and the gular pouch is only slightly developed.

The ground colour is brownish to olive-brown with dark brown crossbands on the back, which are paler in the middle and interrupted by a white band along each side. The eyelids have short brown stripes radiating outwards, and a brown band runs from the eye to the eardrum. The legs and tail have indistinct dark crossbands.

The animal reaches 28-35 cm including the tail, and the tail makes up about two thirds of the length. The body measures 7-11 cm snout-vent length. As in other agamids, the tail cannot be shed. Lifespan in captivity is not documented; 8-12 years is an estimate based on *C. versicolor*.

C. emma closely resembles *Calotes versicolor*. The difference is that *C. emma* has a distinct spine behind the eye and small, granular scales in the skin in front of the foreleg, whereas *C. versicolor* lacks both. Two subspecies are regarded as valid: *Calotes emma emma* on the Thai peninsula south to Perak in Malaysia and *Calotes emma alticristatus* in northern Thailand and southern China.

Distribution and habitat

Calotes emma lives in mainland South-East Asia and the neighbouring countries: in Myanmar, Thailand (also on Phuket and other near-shore islands), Laos, Cambodia, Vietnam (also the Con Dao Islands) and on the Malay Peninsula, in southern China (Yunnan and Guangdong) and in north-eastern India (Assam, Mizoram, Tripura and Nagaland) and Bangladesh. The map shows these countries. An occurrence in Bhutan is possible but not certain.

The subspecies *C. e. emma* lives on the Thai peninsula and south of it, while *C. e. alticristatus* occurs in northern Thailand and southern China.

> **Native range:** China, India, Bangladesh, Myanmar (Burma), Thailand, Laos, Vietnam, Cambodia and Malaysia.

HABITAT

The species lives in several kinds of forest: dry deciduous forest, coastal forest and moist evergreen forest, often along streams and at forest edges. It is diurnal and both arboreal and ground-dwelling. It is most often seen on low vegetation 30-150 cm above the ground, especially at the edge between forest and open ground such as paths and roads, and it also hunts on the forest floor along narrow, slow-flowing streams. It is most common in undisturbed forest but also occurs in disturbed forest. It is seldom seen near buildings.

The climate is tropical: the northern subspecies lives with a dry winter, the southern one with a monsoon climate. The diet is insects and other invertebrates: locusts, ants, termites, cockroaches, beetles, moths and low-flying butterflies, as well as insects and larvae from the ground. The breeding season falls in early summer (May-June).

Care

THE ENCLOSURE

Almost nothing is known about the care of *Calotes emma*, and the species is rare in captivity. The care described here draws on the habitat (tropical forest, low branches and scrub, 30-150 cm above the ground) and on size. The figures for temperature, humidity, UVB, enclosure size, food and behaviour are borrowed from the close relative *Calotes versicolor* and adapted to a slightly smaller forest species.

An adult *C. emma* needs an enclosure of at least 100 × 50 × 100 cm (length × width × height). The species climbs, so height is just as important as floor area. A pair needs at least 120 × 60 × 100 cm. Large and tall is better.

Furnish with plenty of branches of different thicknesses and angles, cork, bark, a back wall with climbing opportunities and live or artificial plants, so the lizard can both sit high and hide in foliage. A mix of soil and leaf litter, kept slightly damp, suits as substrate. The enclosure needs good ventilation and a tight-fitting lid, because the species is quick and jumps. Remove droppings and uneaten food daily.

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

TEMPERATURE

The species needs a clear gradient. The daytime temperature in the enclosure should be 25-29 °C, and the basking spot should be 33-38 °C, measured on the surface with an IR thermometer. At night it should be 21-24 °C. Place the basking spot on a branch at mid-height or higher, and make sure the lizard can always get away from the heat.

Use a halogen spot or another heat lamp over the basking spot, shielded with a guard so the animal cannot burn itself. Measure the air with thermometers at the warm and the cool end. At night the heat is switched off and the temperature may follow the room, as long as it does not fall below 21 °C. Too low a temperature causes poor digestion and appetite.

Read more: Heat and temperature

HUMIDITY AND WATER

Relative humidity should be 65-85 %. This is achieved by misting the enclosure lightly once or twice a day and letting the substrate and plants dry partially between mistings. The lizard drinks water droplets from leaves and branches, so the misting also provides drinking water.

Also put in a shallow dish of fresh water, and change the water daily. If the air is persistently too dry, the animal will have problems shedding.

LIGHTING AND UVB

The species is diurnal and basks, so it needs strong light and UVB. Use a 5-7 % UVB tube (T5 HO) over the basking spot, corresponding to Ferguson Zone 2. The animal lives at forest edges and in partial shade and therefore needs a slightly lower zone than agamids from open country. The aim is a UV index of 2-3 at the basking spot and lower further down. The distance between tube and animal depends on the tube and fitting and is checked with a UV meter. Tubes are replaced according to the manufacturer's instructions, because UVB output falls long before the tube stops lighting.

Turn the light on for about 12 hours a day. Heat lamps give no UVB and cannot replace the tube.

FEEDING

C. emma is insectivorous. In the wild it eats locusts, ants, termites, cockroaches, beetles, moths and larvae. Plant food is not documented.

Offer varied live food no larger than the distance between the animal's eyes: locusts, crickets, cockroaches, silkworms and larvae, with mealworms and waxworms as a supplement. Juveniles are fed daily, subadults and adults every other day. Dust the feeder insects with calcium at most feeds and with a vitamin and mineral supplement once a week. Gut-load the insects with nutritious food the day before. Reduce the amount of food if the animal becomes fat. Offer the food at branch height, so the animal can hunt from its lookout post.

Read more: Feeder animals: keeping and breeding Read more: Calcium, vitamins and supplements

BEHAVIOUR AND HANDLING

The species is diurnal and quick and may dart out when the lid is opened. Give a new animal a couple of weeks in peace. It is suited to watching rather than frequent handling, and if it has to be picked up, support the body and never grab the tail.

Behaviour in captivity has not been described, but the males are probably territorial as in *C. versicolor*, so there must be only one male in each enclosure. A pair in a large enclosure requires supervision, and if there are bites or wounds, the animals must be separated. Signs of stress are persistently dark colours, escape attempts and refusing food.

Breeding

SEXUAL MATURITY AND SEXING

The differences between the sexes have not been described in detail for the species; as in *C. versicolor*, the male probably has a broader head, a taller nuchal crest and a thicker tail base. Age at sexual maturity is not documented; in *C. versicolor* it is reached during the first year. Breed only animals that are in good condition.

MATING

In the wild the species breeds in May-June. Mating behaviour has not been described for the species. Put the female with the male in a large enclosure and keep an eye on them, so the female can get away if the male becomes too rough.

EGG-LAYING AND CLUTCHES

The female lays about 10-12 eggs; the figure is based on little information. The number of clutches per year is not documented. As in *C. versicolor*, the female digs a hole in moist soil and covers the eggs. The enclosure must therefore have an area with at least 20 cm of moist soil and sand, or a laying box. If she lacks a suitable site, she may retain the eggs, which can be life-threatening. Give the female plenty of food and calcium before and after laying.

INCUBATION

The eggs hatch after about 60-70 days. The incubation temperature is not documented; 27-31 °C is borrowed from *C. versicolor*. Dig the eggs up carefully without turning them, and place them in a closed container with slightly damp soil, sand or vermiculite with small air holes. Eggs that turn yellow, collapse or go mouldy are usually dead and can be removed.

Read more: Incubating eggs

REARING THE YOUNG

The size of the newly hatched young is not documented. Keep them in a smaller but tall, well-ventilated enclosure with branches, plants, a basking spot, UVB and the same humidity as the adults. Feed them daily with small insects such as small crickets, small larvae and fruit flies, dusted with calcium. Sort the young by size, and separate the males as soon as they begin to show colours and territorial behaviour.

Health and common mistakes

Most problems are caused by faults in care: too low a temperature, too little UVB, a one-sided diet and air that is too dry. Typical problems in agamids are:

- Metabolic bone disease from too little UVB and calcium.
- Poor digestion and appetite at too low a temperature.
- Shedding problems in air that is too dry.
- Bite wounds and stress in males that are kept together.
- Egg-laying difficulties in females without a suitable digging substrate.
- Parasites in wild-caught animals, which should be examined by a vet and quarantined for at least three months.

A healthy animal has clear eyes and an upright posture and is active. Wash your hands after contact with the animal and enclosure, as reptiles can carry salmonella. See a vet with experience of reptiles if the animal loses weight, does not eat, gapes without basking or seems lethargic.

Read more: Quarantine and hygiene Read more: Common diseases and signs of illness Read more: Buying animals: captive-bred, wild-caught and transport

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.