



Yearling *Cuora trifasciata* sensu lato
(Huo-Liao Yang collection).
Photo: P. Li

Cuora trifasciata and *Cuora cyclornata* Captive Breeding in China

Ting Zhou, William McCord, Torsten Blanck, & Pi-peng Li



The Chinese three-striped box turtle, *Cuora trifasciata* (Bell, 1825) sensu stricto, is endemic to China. The species is listed in CITES Appendix II (2005), and as critically endangered (CR) in the IUCN Red List (2003). It is also in Class II of China's list of National Protected Animals (1988), and listed as critically endangered (CR) in the China Species Red List (2004).

It is known that the color and stripe pattern of the head and plastron of *Cuora trifasciata* vary with the origin of the individual. *Cuora trifasciata* sensu stricto specimens from Hainan, Guangdong, Fujian, and eastern Guangxi provinces, and Hong Kong have a yellow head and mostly black anterior plastron; whereas those from Vietnam, Laos,

and western Guangxi, China, have darker olive-brown heads, and a lighter more yellow-orange pattern on the pectoral, humeral, and gular plastral scutes.



Simulated natural habitat (Yi Li outdoor facility).
Photo: T. Zhou

With supporting genetic data, the darker headed turtles were recently described as a separate species, the

Vietnamese three-striped box turtle, *Cuora cyclornata* Blanck et al. 2006. Several surveyed facilities had recognized the morphological differences between *Cuora cyclornata* and *Cuora trifasciata*, and kept them separate, but the two species are often housed together and hybridize in captivity.

Until this taxonomic work becomes better known, some will continue considering the two forms a single species. For this article the name *Cuora trifasciata* is used sensu lato — in the broad sense, referring to both species together — unless *Cuora trifasciata* “sensu stricto” is specified, or *Cuora cyclornata* is used in the same sentence. Also for this article, we refrain from using the generic designation *Pyxiclemmys* for *Cuora trifasciata* (see VETTER and VAN DIJK, 2006), leaving such a change for future taxonomic work.

From July 2003 to December 2005 — with funds provided to The Nanjing Association for Studying Turtles by the State Forestry Administration of the People's Republic of China, and in collaboration with the Herpetodiversity Research Group of Shenyang Normal University and several private researchers — field surveys were made of Chinese *Cuora trifasciata* and *Cuora cyclornata* farms. It was already known that *Cuora trifasciata* was being bred primarily in Guangdong, Guangxi, Hainan, Hong Kong, and Macao (ZHOU and GU, 2005; ZHOU et al., 2005; ZHOU, 2006a; ZHOU, 2006b); rarely in other provinces (ZHOU, 2006c) due to harsh weather and lack of interest. Thus, we selected nineteen breeders in Guangdong, seven breeders in Guangxi, and two breeders in Hainan provinces as worthwhile survey sites.

We learned that *Cuora trifasciata* and *Cuora cyclornata* are the only species of Asian box turtles (*Cuora sensu lato* spp.) bred in large quantities in China. Small private collections dating back to the mid 1980s were found only in Guangdong and Guangxi provinces. The peak of large-scale private and commercial collecting and keeping of these turtles was in the mid 1990s, primarily in Guangdong, Guangxi, and Hainan provinces. Breeding *Cuora trifasciata* has been a path to wealth for many!

Presently, breeders are still concentrated mostly in Guangdong, Guangxi, and Hainan provinces, with the greatest number and largest of facilities in western and southern Guangdong Province. The numbers of *Cuora cyclornata* were greater than the numbers of *Cuora trifasciata* in most of the farms surveyed. The owners claim, after years of turtle breeding, that *Cuora cyclornata* grows faster and larger than *Cuora trifasciata*.

Cuora trifasciata in China are raised on rooftops, in yards, and indoors. The indoor ponds of Huo-liao Yang in Dianbai County, Guangdong Province, built on the second floor of his house, are an



Huo-liao Yang and his indoor pools with nesting areas. Photo: P. Li



Senior author and pool with *Cuora trifasciata sensu stricto* (Huo-liao Yang facility). Photo: P. Li



Cuora cyclornata meieri (Zao-liu Ou collection). Photo: T. Zhou



Indoor pool (Zao-liu Ou facility). Photo: T. Zhou



Cuora trifasciata sensu lato (Zao-liu Ou collection). Photo: T. Zhou



Cuora cyclornata cyclornata (Zao-liu Ou collection). Photo: T. Zhou

impressive example — involving about 250 square meters, and containing more than 150 breeding turtles. A large number of ornamental plants such as *Monstera deliciosa* give the installation the feeling of an arboretum. The ponds are designed to provide for the changing developmental and breeding needs of the turtles with three distinct areas: a general open-swimming area, a feeding area, and a nesting area of red sand that is inaccessible to the turtles outside the breeding season. The walls and floors of the ponds are lined with decorative green and crimson tiles; the tiles on the ramps leading to the nesting sites are reversed to give the turtles better traction for climbing out of the water.

Another serious breeder, called Zao-liu Ou, is located in the Shunde area of Fushan City in Guangdong Province. He maintains more than 100 breeding turtles in a 150-square-meter fenced and walled-in roof courtyard, with security cameras, Rottweilers, and able-bodied guards watching everything. He makes good use of the available space, and has nesting areas within the general living quarters. One of his turtles, shown only to the senior author, weighed 4.5 kilograms and had a carapace length of 32.3 centimeters! It may be the largest three-striped box turtle in China.

Of 28 private breeders surveyed, the most impressive facilities were those of Yi Li from Boluo in Guangdong Province, first visited on 11 May 2004. His outdoor breeding ponds of about 980 square meters, were the most natural-looking habitat in a successful *Cuora trifasciata* breeding facility seen anywhere. The turtle ponds are walled around the perimeter and covered with an open metal grid roof, giving the appearance of a huge metal cage — necessary for protection from predators, including human since *Cuora trifasciata* are so valuable. Inside this “cage,” an aesthetically pleasing naturalistic environment has been created, in which green plants abound. There were more than 200

adult *Cuora trifasciata* producing more than 200 offspring per year. Over the past 10 years, Yi Li has become wealthy breeding his *Cuora trifasciata*.

On 24 September 2005, during our second visit to his place, Yi Li showed us two special five-story buildings set up primarily to satisfy the needs of 400–500 juveniles and subadults along with some adults. The buildings each provide 1,800–2,000 square meters dedicated entirely to *Cuora trifasciata* husbandry. In some parts the interior decor was so natural-looking that it was virtually like being in the natural habitat. Each floor measured about 360 square meters, divided into four cemented pond setups and space for people to move about and work in. Each of the setups measured about 20 x 3.5 meters — two-thirds with water 20 centimeters deep, and one-third with nesting sand about 30 centimeters deep. The walls between the ponds had removable partitions to allow mixing of turtles when desired. Most of the turtles we saw were buried in the sand. There was no overhead sunlight or artificial illumination, only the light that came through the windows. *Cuora trifasciata* and *Cuora cyclornata* were kept separate, as were excess males (in groups of up to 75) and non-breeding females (in groups of up to 50). Juveniles were kept in groups of about a hundred. On 2 February 2006 “Agriculture World” of CCTV-7 (China) interviewed Yi Li, giving recognition to his successful turtle husbandry.

It is a known fact that *Cuora trifasciata* have great monetary value. The price was already as high as \$1,500–1,625 per hatchling in 2004, and continues to increase. Breeders were found to want *Cuora trifasciata* for several purposes: as food, for use in traditional or non-traditional Chinese medicine, to be kept as investments for the future, for use in various business exchanges, or to replace losses in existing collections. *Cuora trifasciata* breeding activity can be brutal, sometimes leading to female



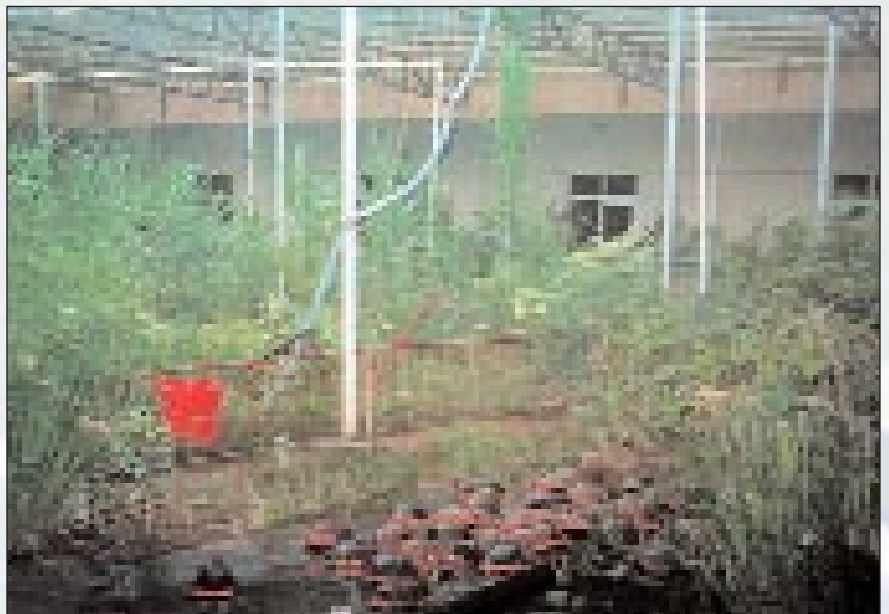
Cuora cyclornata hatchlings (Zao-liu Ou collection). Photo: T. Zhou



Shallow maintenance pools.
Photo: T. Zhou



Shallow juvenile pools with artificial lighting.
Photo: T. Zhou



Basking in courtyard (Yi Li outdoor facility). Photo: T. Zhou

mortality, and the need for replacement of breeders.

According to folklore in Guangdong and Guangxi provinces, *Cuora trifasciata* can help preserve or restore good health, particularly preventing or treating cancer. Thus, this turtle is popular among the wealthy as food and medicine. The financial success of early breeders gave newcomers the idea that breeding *Cuora trifasciata* was lucrative, which stimulated investment in the species. The common name used for *Cuora trifasciata* in China is “golden coin turtle” — associating it with good luck, good fortune, long life, and prosperity in general — and the turtle is a very popular element in shop displays and celebrations of all kinds. The Chinese word for turtle is “*guī*,” which is pronounced and spelled (in Roman

letters) the same as a different word meaning “come” or “arrive,” leading to an inference that money comes or arrives from owning a turtle.

The 28 breeders of *Cuora trifasciata* surveyed in this study are just a small sample of a much greater number. By our calculations in 2005 in Guangdong, Guangxi, and Hainan provinces, there were 200–300 owners keeping a total of 8,000–10,000 captive adult turtles and producing an estimated total of 5,000–8,000 hatchlings yearly. Many breeders reported successfully producing second generation offspring.

Although husbandry is successful overall, a number of owners mentioned some problems in the Chinese *Cuora trifasciata* breeding business. Sometimes an unbalanced diet or overcrowded captive setups result in

juvenile turtles with varying degrees of discoloration, misshapen shells, aberrant scutes, or overgrown parrot-like upper jaws. Attempts to treat or prevent these conditions have failed. Although the hatch rates of captive *Cuora trifasciata* have reached 85–90 percent, most hatchlings are female. We speculate that room-temperature incubation in the warmer lowlands may favor the development of female offspring, whereas the cooler climates of the natural highland habitat would produce a more balanced sex ratio.

Trade involving *Cuora trifasciata* has been legally restricted in Guangxi and Guangdong provinces and Hong Kong for over 20 years, making replacement stock more difficult for breeders to obtain. Chinese law requires a domestication and breeding license for maintaining and



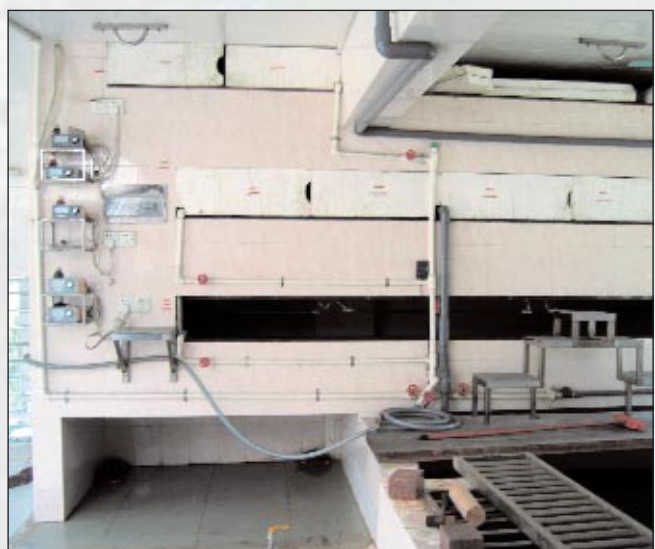
Large indoor maintenance pond with nesting area (Yi Li indoor facility).
Photo: P. Li



Crowded Subadult *Cuora trifasciata sensu lato* (Yi Li indoor facility).
Photo: T. Zhou



Yi Li with a turtle. Photo: T. Blanck



Incubation room. Photo: T. Zhou



Hatching *Cuora trifasciata* sensu lato (Yi Li collection). Photo: T. Zhou



Beautifully marked hybrid. Photo: T. Zhou



Tiled indoor pool with nesting area in background. Photo: T. Zhou



Tiled pool with nesting area accessible during breeding season. Photo: T. Zhou

reproducing wildlife. A dealer's license is required for wildlife related business, and a transport license is required for the taking and transporting of wildlife. Of the 28 owners interviewed only sixteen had any license at all. It would appear that only breeders keeping 50 or more *Cuora trifasciata* comply with any regulations, probably because the larger collections attract more attention.

As the government of China attaches more importance to wildlife, increases efforts to protect it, and becomes more aware of the *Cuora trifasciata* situation in particular, so too do some of the private turtle breeders. Some breeders report that they would like to release some captive-born *Cuora trifasciata* into the wild if both environmental and man-made factors favor the turtles' survival. It is hoped that the private breeders and institutions involved will work together when considering release of captive-bred offspring — releasing unhealthy animals or hybrids will only make things worse, as exemplified by the high degree of

genetic pollution present today in “wild” Hong Kong turtle populations.

As wild *Cuora trifasciata* sensu lato populations face increasing



Large 4.5-kilogram *Cuora cyclornata meieri* (Zao-liu Ou collection). Photo: T. Zhou

habitat destruction and human demands, informed captive breeding will be needed to save both *Cuora trifasciata* and *Cuora cyclornata* from extinction. ■

Bibliography

BELL, T. 1825. A monograph of the tortoises having a movable sternum, with remarks on their arrangement and affinities. *Zool. J., London*. 2: 305–306 + Tab. XIV Suppl.

BLANCK, T., W. P. McCORD, and M. LE. 2006. *On the variability of Cuora trifasciata (Bell, 1825). Contributions to Natural History Vol. 31.* Edition Chimaira, Frankfurt am Main.

VETTER, H., and P. P. VAN DIJK. 2006. *Terralog Vol. 4. Turtles of the World, East and South Asia.* Edition Chimaira, Frankfurt am Main.

ZHOU, T. 2006a. Captive breeding of *Cuora trifasciata* sensu lato. *Nature in China* 4: 10–11 (in Chinese).

ZHOU, T. 2006b. Status and Problem of Captive Breeding *Cuora trifasciata* sensu lato in China. *Scientific Fish Farming* 11: 3–4 (in Chinese).

ZHOU, T. 2006c. A primary report of captive breeding status of chelonians in Zhejiang Province. *Scientific Fish Farming* 2: 5–6 (in Chinese).

ZHOU, T., and H.-X. GU. 2005. A survey of captive breeding of turtles in Guangdong Province. *Herpetologica Sinica* 10: 347–353 (in Chinese with English abstract).

ZHOU, T., H. ZHAO, and W. P. McCORD. 2005. Captive breeding of Chelonians in Hainan Province, China. *Reptilia (GB)* 41: 39–42.