

Trade Data and Some Comments On the Distribution of *Mauremys annamensis* (Siebenrock, 1903)

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Abstract. - This trade survey of Annam Pond Turtle reveals that this species is likely to have larger distribution than previously thought. The records in the trade in Quy Nhon and Ho Chi Minh City suggest its range could extend much further south. In addition, given the one way south-north trade route, the absence of *Mauremys mutica* in the trade south of Hai Van Pass and the reported absence of *M. annamensis* in the trade north of the Pass support the hypothesis that the Pass is the natural barrier for the two species ranges. This hypothesis combined with the long existence of the Pass might indicate that the speciation between the two species happened when their ancestors dispersed across the Pass, and were subsequently isolated, by the means of rafting or walking through narrow land strip emerged during the low sea level period. In terms of conservation, *M. annamensis* has become much rarer even in the trade, suggesting immediate conservation measures to protect it.

Key words. - *Mauremys annamensis*, Bataguridae, Hai Van Pass, Truong Son Range, distribution, biogeography.

Distribution of *Mauremys annamensis*. - The Annam Pond Turtle, *Mauremys annamensis*, was first described by Siebenrock in 1903 based on a specimen collected from Phuc Son or Phuoc Son (15° 33' 00" N; 108° 04' 00" E) (southwest of Tourane, now known as the city of Da Nang) in Central Vietnam. Another specimen was collected by Bourret from Fai Fo (Hoi An), an ancient city about 50 km from Da Nang (Bourret, 1941). Since then, it seems that little effort has been made to record the distribution of this species in the wild. Iverson (1992) and Iverson *et al.* (1999) cite only the above records from Bourret for their maps of global turtle distribution.

According to Bourret (1941), this species was very abundant in the marshes and slow-moving water bodies in the lowland areas of the cities of Hoi An and Da Nang. Both Hoi An and Da Nang, however, are now very populated cities surrounded by rice paddies, which are unlikely to be suitable habitats for this species. This is because the intensive use of chemicals, such as herbicides and pesticides, in rice paddies through out Vietnam makes it difficult for turtles to survive in this environment.

To better understand its distribution, we did a 6-day trade survey in the August of 1996. The survey covered three cities, namely Quy Nhon (13° 46' 00" N; 109° 14' 00" E), Da Nang, and Hue (16° 28' 00" N; 107° 36' 00" E), and their surrounding areas. We interviewed turtle dealers at the collecting points, where turtles were bought from collectors and awaited to be shifted to

China. We used the book Turtles of the World (Ernst and Barbour, 1989) for identification key. In addition, since the initial purpose of the survey is to determine the trade status of *M. annamensis*, we identified, but did not record the availability of other turtle species in the collecting points.

We observed that this species was still common in the trade in Quy Nhon and Da Nang. In Quy Nhon and its outskirt, we visited three collecting points. In the first one, we identified 2 adult *M. annamensis*. In the other two collecting points, we found 3 and 4 juveniles, respectively. In Da Nang and its surrounding areas, we visited four sites with three to four specimens in each sites. They were all young and juvenile turtles. From the interviews with local people in Quy Nhon and Da Nang, it was apparent that this species could well survive in the human-modified environment, such as lakes and fishponds, if there were no collecting activities by local people. Local trade dealers and collectors, encountered in collecting points in Quy Nhon and Da Nang, suggested that this species still existed in the water bodies in the nearby region. Le and Trinh (2001) also indicated that the species could occur in Tra My, Tien Phuoc, and probably Hiep Duc Districts, Quang Nam Province.

The occurrence of *M. annamensis* in Quy Nhon is very interesting since this species had been believed to have very restricted distribution. More remarkably, Le and Broad (1995) reported that *M. annamensis* even extended far south to Ca Mau, Minh Hai Province inhabiting *Melaleuca* forests (around 9° 29' 00" N; 105° 20'

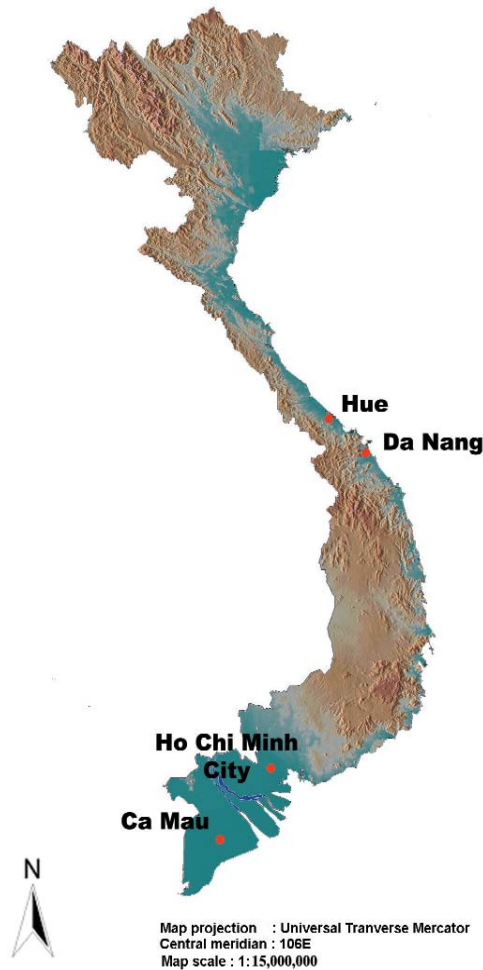


Figure 1. Topographic map of Vietnam.

00" E;) situated at the southern tip of Vietnam. It is possible that Le and Broad misidentified this species in their survey (Jenkins, 1995). However, Peter Paul van Dijk, Le Trong Dat, and Douglas Hendrie on May 30, 2000 found this species in Ben Chuong Duong Street shops in Ho Chi Minh City (Hendrie, 2000a). This evidence combined with the one-way trafficking of turtles (from south to north) (Le and Broad, 1995) indicates that *M. annamensis* may have much wider distribution than previously thought.

This hypothesis is also supported by Le and Trinh (2001). Their interviews with local dealers, in May 2001, in Quang Nam Province revealed that one dealer in Thang Binh District bought this species from the shipments transported from the south. Le and Trinh (2001) also suggested that *M. annamensis* is naturally distributed in Tra My, Tien Phuoc, and probably Hiep Duc Districts, Quang Nam Province. These authors also indicated an interesting fact that turtle hunters only sell their animals to the local dealers. This manner of trade

demonstrates that the local trade data can be informative in determining the limit of the natural ranges of some species.

It is noted that we did not encounter any *M. mutica* in the areas in Quy Nhon and Da Nang. Le and Trinh (2001) also did not find any *M. mutica* in their trade investigation, which covered seven districts and one town in Quang Nam Province, and the city of Da Nang. According the pattern of turtle trade in Vietnam plotted by Le and Broad (1995), turtles have been collected from the south and transported to the north. They are finally destined in the border between Vietnam and China, where they are traded in an enormous volume. The one-way south north trafficking leads to the conclusion that *M. mutica* does not occur in Da Nang, located in the southern side of Hai Van Pass, or southern areas of the city.

In the survey, we found no evidence for *M. annamensis* distributed in the northern side of the Hai Van Pass. Interviews with turtle dealers from two collecting points in the city of Hue (north of Hai Van Pass) revealed that this species was only transported to the city from the south and there was no record of this species in the surrounding areas. It is also interesting that the dealers called this species Rua Dep Nam (Beautiful Southern Turtle) as compared to Rua Dep Bac (Beautiful Northern Turtle), here referred to *Mauremys mutica*. According to them, *M. mutica* came only from areas north of Hai Van Pass. In the house of a trader in Hue, we observed about 20 *M. mutica* from 1 to 2 kg, but no *M. annamensis*. In the other site, we did not find any *M. mutica* or *M. annamensis*.

Given the fact that Hue and Da Nang is only 100 km apart, it is very likely that Hai Van Pass (at around 16°N) forms the natural boundary of these two species since the Pass stands in between two cities. Records from previous studies also support this hypothesis (Iverson, 1992; Nguyen and Ho, 1996). Thus, the mountain range, which cuts through the country, is most certainly the northern boundary of *M. annamensis*' range and southern boundary of *M. mutica*'s range. Because they are the lowland inhabitants, the Pass (1712m above sea level at the summit) seems to be a significant barrier.

Some studies have suggested that the Pass is the border between two zoological regions, Northern Central Vietnam (Northern Truong Son) and Central Vietnam (Central Truong Son) for such groups as rodent, bird, fish, and lizard (Bobrov, 1993; Dao, 1978; Cao, 1989). In addition, Fooden (1996) showed in Fig1i that the distribution two closely related gibbon taxa, *Hylobates gabriellae siki* and *H. gabriellae gabriellae*, has been separated by the Pass. Even though primate is more likely to possess higher dispersal ability, the barrier seems significant enough to block their expansion. In

fact, the Truong Son Mountain Range in general has established dispersal barriers for *Cuora galbinifrons* species complex (Stuart and Parham, 2004).

Hai Van Pass is a part of Truong Son Mountain Range (Annamite Mountains), which runs throughout most of the country's length. The Pass meets the South China Sea and effectively divides the country into two different sections. It is formed by aluminous granite, and probably emerged about 250 Mya in the early Triassic (Lepvrier *et al.*, 1997). If the Pass is actually the natural boundary of these two species' ranges, it can be hypothesized that the speciation between *M. annamensis* and *M. mutica* was occurred when their ancestors dispersed across the Hai Van Pass and then were subsequently isolated. Since these turtles are good swimmers, one possible scenario is that they rafted on the sea to get to the other side of the Pass. Another possibility is that they traveled south through a narrow land belt exposed during the low sea level period. According to Prentice and Denton (1988), before from 6 Mya to 0.9 Mya the sea level fluctuated at an average of 70m below the present sea level. At this level, a few kilometers of the continental shelf could be opened to the east of the Pass (Voris, 2000) and well served as a travel route for these turtles. However, these hypotheses are very preliminary and, therefore, should be carefully tested in a much more comprehensive study in the future.

Trend in the trade of *M. annamensis*. - In recent years, turtles in the Southeast Asian region, especially in Vietnam, have been critically threatened by the trade with China. The trade has been driven by the Chinese long tradition of using turtles as food and medicines. Many species might go extinct in very near future unless urgent protection measures are implemented (van Dijk, 2000; Hendrie, 2000). In Vietnam, species such as *Cuora trifasciata*, believed to be able to cure cancer, is at considerable risk due to its significant economic value (about 1000 USD per individual or even more (Lovich *et al.*, 2000; Le and Trinh, 2001)). For *M. annamensis*, in addition to the general demand from China, there are also interests in keeping them as pets in countries such as the U.S. The United States Fish and Wildlife Service indicated that from 1996 to 1999 small numbers were imported to the U.S. from Vietnam (Consideration of Proposals for Amendment of Appendices I and II). Weissgold (2002) even maintained that the imports increased during 1999-2001. Due to the risk posed by the trade and habitat destruction, this species has been listed in the Appendix II and in the critically endangered category by CITES and IUCN, respectively.

It is clear that the number of *M. annamensis* has declined dramatically in recent years. The market value of this species, approximately \$5 to \$7 per kg (Le and

Broad, 1995; Le and Trinh, 2001; and this survey), can generate substantial interests among poor local people. In our survey in 1996, this species was still pretty common in the trade. My personal observation in Dong Xuan market, Hanoi, in 1998 also confirmed the commonness of this species. More recently, Hendrie (2000b) reported that the occurrence of this species in turtle confiscated shipments is less frequent compared to the previous years. Le and Trinh (2001) reported that this species was very rare in the trade compared to other species – only second to Golden Turtle (*Cuora trifasciata*). In fact, they only encountered only one juvenile in the whole period of the survey. Thus, this species should be given the highest priority in conservation programs in the near future.

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