

A REASSESSMENT OF THE DISTRIBUTION OF *Cuora flavomarginata* Gray 1863 ON MAINLAND CHINA

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The geographic distribution of *Cuora flavomarginata* Gray 1863 is poorly known, but an examination of the Chinese literature and museum records helps elucidate its historic range. According to these data, there are two clusters of localities, one on the eastern coast of China near and along the Fuchun and Yangtze River drainage and another in southern China along the Pearl River drainage. The localities in southern China are probably invalid due to the turtle trade. The best estimate of the historical distribution of *C. flavomarginata* is along the eastern Yangtze River and its associated tributaries as well as the Fuchun drainage. The identification of viable *C. flavomarginata* populations in these areas, if they still exist, is necessary for their conservation.

Key words: *Cuora flavomarginata*, China, distribution, turtle trade.

INTRODUCTION

The distribution of Chinese turtles, critical data for their effective conservation, is poorly known. The main reasons for this are the turtle trade (van Dijk et al., 2000), the lack of scientists researching Asian turtles in Asia, and the inaccessibility of the Chinese scientific literature to western researchers (Buskirk, 1989; Parham and Wang, 2000). For centuries, turtles have been extremely popular in China as food, medicine, and pets. In the past few years, many Chinese people have begun to earn more money and the demand for turtles has increased sharply (Behler, 1997). Today, the turtle trade is a very lucrative business. But even prior to this recent surge, turtles have been taken from their habitats and shipped around China to local markets by the thousands for decades or even centuries. This has effected our knowledge of turtle distributions in the following ways: 1) wild populations have been decimated and so it is difficult to procure specimens with locality, and 2) the natural distribution of turtles has been distorted through the unnatural dispersal and introduction of turtle species to non-native habitats by man. As it stands, most of our knowledge of Asian turtles is based almost entirely

on purchased specimens, and this has led to substantial confusion regarding the distribution (Buskirk, 1989; de Bruin and Artner, 1999; Parham and Li, 1999) and even the validity of species (Artner et al., 1998; van Dijk, 2000; Lau and Shi, 2000; Wink et al., 2000; Shi and Parham, 2001; Parham et al., in press). Parham and Wang (2000) illustrate how the reported distribution of a turtle species can differ between Chinese literature and compendia compiled by western herpetologists (e.g., Iverson, 1992).

We chose to study *Cuora flavomarginata* because of the large gaps reported in its distribution. Iverson (1992) provides data for all three subspecies: *C. f. flavomarginata* Gray 1863 from Taiwan, *C. f. evelynae* (Ernst and Lovich 1990) from the Ryukyu Islands of Japan, and *C. f. sinensis* (Hsu 1930) from Mainland China. The insular subspecies, *C. f. flavomarginata* and *C. f. evelynae*, have many specimens with locality so their ranges are relatively well established. However, for the mainland species, *C. f. sinensis*, data are lacking. In addition to the type locality, Iverson (1992) gives only four other locality points which range from as far south as Guangdong and as far north as Shandong (Fig. 2). These localities are broadly scattered over a distance of approximately 1500 km. The closest point to the type locality is over 600 km away. Iverson (1992) places many question marks where data are lacking. It was these question marks that prompted us to gather additional data from the Chinese literature and collec-

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Fig. 1. A live specimen of *Cuora flavomarginata*. Photo by Ulrich Hennen.

tions in order to better establish the distribution of *C. flavomarginata*.

METHODS

Our sources come in the form of literature records and museum specimens. Data on Chinese museum specimens was collected during Jinzong Fu's survey of Chinese herpetological collections. Each reported locality datum was scrutinized in order to determine its reliability.

Locality data from specimens bought in markets are considered unreliable since these turtles, as a result of the turtle trade, could have been transported over large distances to its point of discovery in the market. Farkas and Sasvári (1992) suggested that "...an organized trade within, and especially from outside China seems unlikely," but since that time it has become apparent that an extensive trade network extends from the local food markets throughout Asia (van Dijk et al., 2000). For example, *Cuora amboinensis*, *Malayameys subrijuga*, and *Callagur borneensis* (all Malay-Indonesian species) can be found in the live animal markets of Chengdu, Sichuan Province, far from their natural range (Fig. 3). In addition to market bought specimens, many specimens have no locality data more specific than what province they were collected in. These records are also considered unreliable, due to the uncertainty of their origin.

Below is a comprehensive list of the specimen data collected. We list the museum number (if available), reference, locality, and any additional notes. Each locality is listed under its respective province of origin, and these are listed in alphabetical order.



Fig. 2. *Cuora flavomarginata* localities in Mainland China based on Iverson (1992). The numbers refer to localities listed in the Results section of the text.

Figure 4 summarizes the available locality records of *C. flavomarginata*. In cases in which only a province was listed (e.g., "Sichuan") the locality is not plotted. In many cases it is not possible to determine the conditions under which the animals were collected so we report every record with locality data in order to uncover an underlying signal of the true range of *C. flavomarginata*.

RESULTS

Anhui

1. Shanghai Natural History Museum No. 82VII031-32

Locality. Anhui Province

2. Fudan University (Shanghai) Biology Department (no specimen No.)

Locality. Guangde County.

Notes. Collected 4/64.

3. Anhui Normal University Herpetology Collection No. 81001, 81004 – 81006; 85001; 900901, 900902

Locality. Guangde County.

4. Shi and Yao (1983)

Locality. Henan/Hubei/Anhui border intersection; Dabie Shan.

5. Xia et al. (1983)

Locality. Southern Anhui.

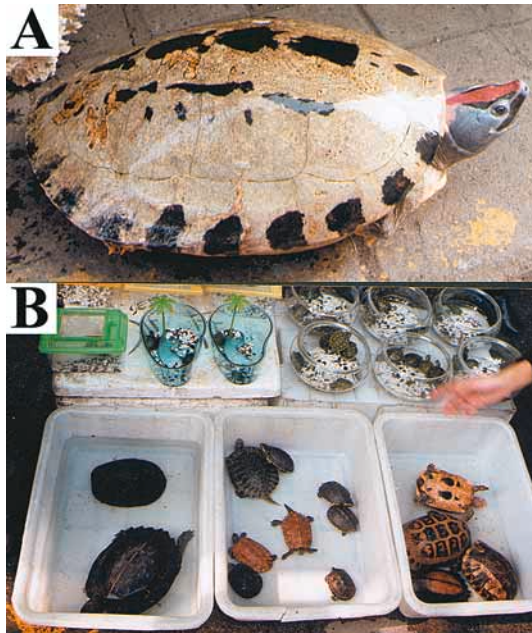


Fig. 3. Turtles far from the natural range in the Chengdu live animal markets observed in October, 1999. a) A male *Callagur borneoensis*; b) far left tub: *Cyclemys dentata* and *Cuora amboinensis*. Middle tub: five *Malayemys subtrijuga*, two *Geoemyda spengleri*, and one *Trachemys scripta elegans*. Far right tub: two *Indotestudo elongata*, one *Pyxidea mouhotii*, and one *Cuora galbini-frons*. Above: hatchling *T. s. elegans*. None of these turtles have been verified in Sichuan province and most are restricted Malay – Indonesia. Photos by J. F. Parham.

Fujian

- 6. Herpetology of China (Zhao and Adler, 1993)
Locality. Fujian Province

Guangdong

- 7. Mell (1922)
Locality. Tung Kiang region (lat: 23.033, long: 113.517).
Notes. Bought in Canton market.
Comments. Since bought in a market, this locality is probably invalid. Karsen et al. (1986) claim that *C. flavomarginata* does not occur in Guangdong.

Guangxi

- 8. Guangxi Medical College No. 81014 (Buskirk, 1989; Wen, 1983).
Locality. Wuzhou (lat: 34.833, long: 119.117)
Notes. “1st provincial record.”
- 9. Chengdu Institute of Biology No. 105066.
Locality. Guangxi Province.
Notes. Bought in Canton market.

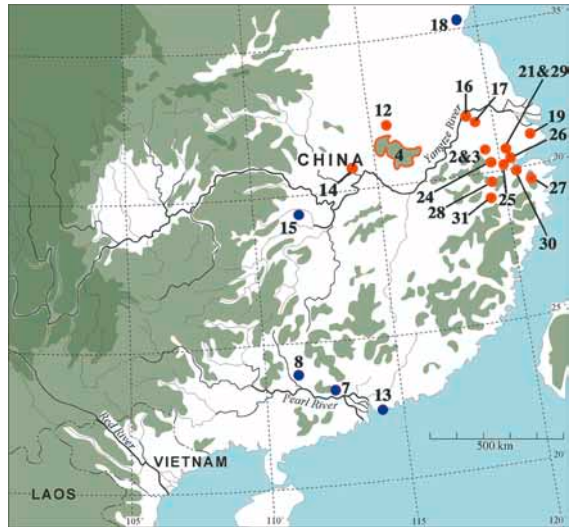


Fig. 4. *Cuora flavomarginata* localities in Mainland China based on Iverson (1992; in blue) and this study (in red).

Comments. Since this specimen was bought in a market, this locality is probably invalid.

- 10. Chengdu Institute of Biology No. 105067
Locality. Guangxi Province.

Hainan Island

- 11. Fujian Normal University (Fuzhou) Biology Department.

Locality. Hainan Island.

Comments. This record is probably from a market. Dr. Haitao Shi, a chelonologist working on Hainan for many years has never encountered a single record of this species (personal communication). Other surveys of Hainan turtles (e.g., Smith, 1923; Schmidt, 1927; de Bruin and Artner, 1999) do not report this species as occurring on Hainan.

Henan

- 4. Shi and Yao (1983).
Locality. Henan/Hubei/Anhui border intersection; Dabie Shan.
- 12. Zhou (1961).
Locality. Gu Shi County (lat: 32.1; long: 115.7).

Hong Kong

- 13. Karsen et al. (1986).
Locality. Tai Mo Shan (complex) (lat: 22.2, long: 114.5).
Comments. Karsen et al. (1986) actually reports *C. flavomarginata* from three different localities in Hong Kong, but states that these records are for ani-

mals that are “almost certainly escapees from captivity or deliberately released.”

Hubei

14. Chengdu Institute of Biology No. 7145161.

Locality. Suixian.

Notes. Field collected..

4. Shi and Yao (1983).

Locality. Henan/Hubei/Anhui border intersection; Dabie Shan.

Hunan.

15. Biological Lab. Sci. Soc. China (MBLSCC) No. 1174 – 1175 (Hsu, 1930; Pope, 1935).

Locality. Tungting, Kunshan Island (lat: 29.167, long: 112.883).

Notes. Type locality; Pope (1935) confirmed the locality with local people.

Jiangsu.

16. Chengdu Institute of Biology No. 639084.

Locality. Nanjing.

17. Chen (1962).

Locality. Hu Shu (lat: 31.8; long: 118.9).

Notes. collected 20km from the city.

18. Hirayama (MS), cited in Iverson et al. (web site).

Locality. Gan Yu (= Chingkou) (lat: 34.883, long: 119.117).

Shanghai.

19. Shanghai Natural History Museum No. 797115.

Locality. Qingpu.

Notes. Collected 6/79.

Sichuan

20. Zhao and Adler (1993).

Locality. Sichuan Province.

Comments. Zhao (personal communication) claims there are reports of *C. flavomarginata* in eastern Sichuan Province.

Zhejiang

21. Museum of Vertebrate Zoology (MVZ) No. 230464.

Locality. Long Wang Shan, Anji County: Jiaxing prefecture.

Notes. Hatched in 1997 from an adult pair collected in 1988 by Huiging Gu.

22. Shanghai Natural History Museum No. 720217.

Locality. None.

Notes. Collected 1963.

23. Shanghai Natural History Museum No. 740309.

Locality. None.

Notes. Collected 1973.

24. Fudan University (Shanghai) Biology Department No. 3.

Locality. Tianmu Shan.

Notes. Collected 5/54.

25. Zhang (1990), Zhejiang Medical University No. 83001.

Locality. Lin'an.

26. Zhang (1990), Zhejiang Medical University No. 83002, 83011 – 83012, 83016.

Locality. Hangzhou.

27. Zhang (1990), Zhejiang Medical University No. 83003 – 83004, 83014.

Locality. Tiantai.

28. Zhang (1990), Zhejiang Medical University No. 83005 – 83006, 83015.

Locality. Jiande (Baisha).

29. Zhang (1990), Zhejiang Medical University No. 83007 – 83009.

Locality. Anji.

30. Zhang (1990); Zhejiang Medical University No. 83010.

Locality. Shaoxing.

31. Zhang (1990), Zhejiang Medical University No. 83013.

Locality. Quzhou.

DISCUSSION

Our results show that the Chinese literature and museum collections have more precise localities for *C. flavomarginata* than reported by Iverson (1992). In fact, we increased the total number of *C. flavomarginata* localities on Mainland China from five in Iverson (1992) to 18. The localities are aggregated into two distinct areas: the eastern coast of China near and along the Fuchun and Yangtze River drainages and southern China along the Pearl River drainage. However, we have reasons to believe that the southern China localities are invalid.

Guangdong and Guangxi provinces are very active in the turtle trade. Zhang et al. (1998) suggests that there is a high probability that the *C. flavomarginata* specimens from these areas are imported by humans. A reappraisal of these reports seems to confirm this. The record from Guangdong (point 2; Mell, 1922) was bought in a Canton market. The Hong Kong records (point 5) were discounted by Karsen et al. (1986; p. 152) who state that these turtles are most probably “escapees from captivity or deliberately released.” Although Wen (1983; repeated by

Buskirk, 1989) reported *C. flavomarginata* as a first provincial record, the locality (Wuzhou) is a port city and one of the major gathering places for animal dealers. Many animals and animal products are first transported to Wuzhou en route to Guangzhou for consumption (Zhang et al., 1998). Even Shi and Yao (1983) lament the large numbers of *C. flavomarginata* that are collected in the Dabie Shan region and shipped to Guangzhou and Shenzhen. While *C. flavomarginata* may occur naturally in southern China, it is not demonstrated by the available data.

In contrast to southern China, eastern China along the Fuchun and Yangtze drainage yields a high number of verified localities. Localities along each of the rivers are in close proximity to one another. The presence of *C. flavomarginata* along the Fuchun River in Zhejiang and Anhui provinces is especially supported by the available data. Although verified localities are sparse and scattered along the Yangtze River, we believe that the historical range of *C. flavomarginata* may have encompassed the eastern Yangtze River and its associated tributaries. Professor Zhao Ermi's personal communication with JFP stating that *C. flavomarginata* has been reported from eastern Sichuan supports this assertion. The absence of western Yangtze records might be the result of poor sampling since scientific survey data for many inland areas are rare or nonexistent. *Cuora pani* was only recently discovered in Sichuan province (Parham and Li, 1999; Li, 2000). Another reason may be human activity. The destruction of habitat caused by the development of the land for agriculture, combined with the collection for food and medicine, may have extirpated populations.

This study provides a basis for future research into the historical and current distribution of *Cuora flavomarginata* in Mainland China. As turtles disappear from the wild, the location of natural populations becomes a conservation priority. Shi and Yao (1983) blame a booming turtle trade for a 63% reduction in the numbers of *C. flavomarginata* over a two year period (1979–1981). Unfortunately, by publishing the distribution of animals, one also runs the risk that collectors for the food or pet trade may use these data to focus their searching (although given the number of wild-caught *C. flavomarginata* that appear in the pet trade every year, it is probably their secret we are trying to reveal). Hopefully this negative effect can be countered by *in situ* conservation measures. We hope that future herpetological surveys of turtles in China will identify viable *C. flavomarginata* populations in these areas, if they still exist.

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