

CAPTIVE MANAGEMENT AND CONSERVATION OF GIBBONS IN CHINA AND VIETNAM, WITH SPECIAL REFERENCE TO CRESTED GIBBONS (*HYLOBATES CONCOLOR* GROUP). GEISSMANN, T.

Abstract

This paper presents the first census of captive gibbons in selected zoos and other institutions of China and Vietnam. All institutions which were suspected to keep gibbons of the *Hylobates concolor* group were visited by the author in 1990 and/or 1993. In Chinese institutions, *H. hoolock* was relatively common, whereas in Vietnam, *H. gabriellae* was the species most frequently seen in captivity. Some of the other gibbon forms distributed in these countries were particularly rare in captivity (*H. concolor*, *H. leucogenys siki*) or not seen at all (*H. sp. cf. nasutus*, *H. lar yunnanensis*). Their numbers in captivity probably reflect the status of these taxa in the wild. The surveyed captive population is characterised by: 1. virtual absence of breeding, 2. high influx of young animals from the wild, and 3. probably low survival rate. Although it may be possible to build up self-sustaining captive gibbon populations in China and Vietnam – at least for *H. hoolock* and perhaps *H. gabriellae* – this goal cannot be reached in the near future without an improvement of captive management. Some suggestions for improvement are discussed.

Introduction

Information on the status of the captive population of crested gibbons (*Hylobates concolor* group) is difficult to obtain from those countries where these species occur in the wild, i.e. Cambodia, China, Laos, and Vietnam. As a result, the first edition of the International Studbook of *Hylobates concolor* (LERNOULD, 1993) did not contain a single entry from any of these countries, although it is to be expected that crested gibbons are frequently held in these countries.

The author is currently working on a long-term project on "Evolution and Conservation Biology of Crested Gibbons (*Hylobates concolor* group)" (GEISSMANN, 1989, 1990). For the present report, the author visited all institutions which were suspected to keep crested gibbons in Vietnam and China. This study presents information on the number, age, sex and housing conditions of the gibbons kept in each of these institutions. The information presented here was collected during two trips, one to China (26 July -7 Sept. 1990), and one to Vietnam (10-30 Sept. 1993) and China (1 Oct.-14 Nov. 1993).

Methods

In this study four species of crested gibbons are recognised: *Hylobates concolor*, *H. gabriellae*, *H. leucogenys* (including the subspecies *siki*), and an as yet unnamed species *H. sp. cf. nasutus* (including the subspecies *hainanus* and cf. *nasutus*). This classification is based on the analysis of large samples of tape-recorded songs from each taxon and on the study of museum specimens in all major museum collections (GEISSMANN, in prep.). Representative sonograms of *H. concolor*, *H. gabriellae* and *H. leucogenys* have been presented by GEISSMANN (1993). A description and colour photographs of males and females of these three species can be found in GEISSMANN (1994).

The age classes for captive gibbons are here defined as follows: infants 0-2 years; juveniles 2.1-4 years; subadults 4.1-6 years; adults > 6 years. These age classes differ considerably from those defined for wild gibbons and siamangs (GITTINS & RAEMAEKERS, 1980, p. 70), which

assume a slower maturation rate. A modification of previous age classes was necessary, however, because the present author has demonstrated in an earlier study that – at least in captivity – gibbons can attain sexual maturity much earlier than previously assumed (GEISSMANN, 1991).

The age classes attributed to the gibbons in this study are only tentative estimates. With one exception, all captive gibbons encountered during this study were wild-born. Their exact age was, therefore, unknown and had to be estimated. Estimates were made on the basis of size and fur colouration, information on the date of the animals' arrival in captivity and on their size and fur colouration on arrival.

Adult-sized female crested gibbons and hoolocks in the light colour phase were considered adult. Young female crested gibbons or hoolocks with traces of the light natal coat were considered infants.

The hoolock subspecies occurring in China is *H. hoolock leuconedys*, the eastern hoolock. All adult males of this subspecies have a light genital tuft (GROVES, 1972), the colour of which varies between whitish, greyish and buff (own observation). The tuft is usually black in juvenile animals. The age at which the tuft becomes lighter in colouration in maturing males is unknown. The colouration of the genital tuft may not, however, be a very good indicator of adulthood in eastern hoolocks: The genital tuft of the adult male at the Beijing Zoo (estimated to be 9 years old) was very large, but only slightly buffy, whereas it was of clearly light buff colouration in a hoolock at Guangzhou Zoo (in 1990) which was obviously not adult, judging by the animal's body size and facial physiognomy. In two adult sized hoolocks kept together in the same cage at the Guangzhou Zoo (in 1993), the tuft was light in one individual but black in the other.

Results

All captive gibbons encountered during this study are listed in Table 1. Gibbons are kept in 11 of the 12 visited institutions (no gibbons were held at the Breeding Station of the Shanghai Zoo).

Table 1: Numbers of gibbons in the institutions visited in China and Vietnam¹

Species in Zoos	Age class					Total
	ad.	subad.	juv.	inf.	indet.	
China						
Gejiu Zoo, Aug. - Sept. 1990						
<i>H. concolor</i>	2,2					2,2
<i>H. leucogenys leucogenys</i>	2,1			5		2,1 +5
<i>H. hoolock</i>	0,1		1,1			1,2
Kunming Institute of Zoology, Aug. 1990						
<i>H. hoolock</i>			0,2	1,0		1,2
Kunming Zoo, July-Sept. 1990						
<i>H. concolor</i> (x <i>H. leucogenys</i> ?)	0,1					0,1
<i>H. hoolock</i>	0,2	3,1	4,4			7,7
Yunnan National Laboratory Primate Breeding Center of China, Jinghong, Aug. 1990						
<i>H. hoolock</i>					3	3

Table 1 (ctd.)

Species in Zoos	Age class					Total
	ad.	subad.	juv.	inf.	indet.	
Guangzhou Zoo, Sept. 1990, and Oct. 1993						
<i>H. hoolock</i> , 1990		(1,0)	(1,1 +5)			(2,1 +5)
<i>H. hoolock</i> , 1993	2,2	2,0				4,2
<i>H. agilis albibarbis</i> , 1990 + 1993	1,0					1,0
Shanghai Zoo, Oct. 1993						
<i>H. hoolock</i>	1,0	1,0				1,0
Beijing Zoo, Oct.-Nov. 1993						
<i>H. gabriellae</i>			1,0 +2			1,0 +2
<i>H. leucogenys leucogenys</i>			1,0			1,0
<i>H. leucogenys siki</i>			0,1			0,1
<i>H. hoolock</i>	1,2		1,0			2,2
<i>H. lar</i>	1,0					1,0
Beijing Center for Breeding Endangered Animals, Nov. 1993						
<i>H. hoolock</i>		1,0	1,0			2,0
Vietnam						
Saigon Zoo, Nov. 1993						
<i>H. gabriellae</i>	1,1	2,0				3,1
<i>H. pileatus</i>			0,1			0,1
Hanoi Zoo, Nov. 1993						
<i>H. gabriellae</i>			1,0			1,0
<i>H. leucogenys leucogenys</i>		1,0	2			1,0 +2
Primate Rescue Station, Cuc Phuong, Sept. 1993						
<i>H. leucogenys siki</i>				0,1		0,1
Total ²						
<i>H. concolor</i>	2,2					2,2
<i>H. concolor</i> (x <i>H. leucogenys</i> ?)	0,1					0,1
<i>H. gabriellae</i>	1,1	2,0	2,0 +2			5,1 +2
<i>H. leucogenys leucogenys</i>	2,1	1,0	1,0 +2	5		4,1 +7
<i>H. leucogenys siki</i>			0,1	0,1		0,2
<i>H. hoolock</i>	4,7	7,1	7,7	1,0	3	19,15 +3
<i>H. agilis albibarbis</i>	1,0					1,0
<i>H. lar</i>	1,0					1,0
<i>H. pileatus</i>			0,1			0,1
China	10,11	7,1	9,8 +2	1,0 +5	3	27,20 +10
Vietnam	1,1	3,0	1,1 +2	0,1		5,3 +2
China and Vietnam	11,12	10,1	10,9 +4	1,1 +5	3	32,23 +12

¹ Commas separate males, females, gender unknown.

² Guangzhou Zoo was visited twice, i.e. in Sept. 1990 and Oct. 1993. The more recent data are used for the totals in this table.

Primates kept as pets were not frequently encountered. The author was especially interested in seeing pet gibbons, but, despite inquiry, found evidence of only two such pets. One young crested gibbon was reportedly kept in Ninh Binh, northern Vietnam (not seen), another pet crested gibbon, a female *H. gabriellae*, was held at Dak Lua Market in the Nam Bai Cát Tiên National Park (Đông Nai Province, southern Vietnam).

Discussion

Hoolock Gibbons (*H. hoolock*):

In China, hoolocks are the most frequent captive species (8 of 9 institutions). Only 30% of these animals are adult (Fig. 1). The large number of captive immature hoolocks seen during this study (26 of 37 animals) permits several conclusions: 1. There appears to be a large supply of young gibbons of this species available on the pet market. 2. In view of the few hoolocks estimated to survive in their natural habitat in China (about 50-200: HAIMOFF et al., 1986, 1987; TAN, 1985; TAN & POIRIER, 1988; YANG et al., 1987), the supply of captive hoolocks may, at least in part, come from eastern Burma. 3. The relatively large number of hoolocks held in Chinese institutions would seem to hold some promise for breeding this species. On closer examination, the road to a self-sustaining captive population may still be out of sight: Apparently this species has never bred in captivity in China. Most animals are kept in solitary confinement or are too young to breed, and the author saw only one adult pair (Beijing Zoo).

Crested Gibbons (*H. concolor* Group):

In contrast to hoolocks, captive gibbons of the *concolor* group are relatively rare in the institutions visited during this study (kept in 6 of 12 institutions).



Fig. 1: Adult female hoolock (*Hylobates hoolock*) "Gui-Gui" at Kunming Zoo (5 Aug. 1990).



Fig. 2: Adult black crested gibbons (*H. concolor*) at Gejiu Zoo: male "Dong-Dong" (with female "Hong-Hong" in the background).

It may be significant that all reliably identified captive black crested gibbons (*H. concolor*) live in one zoo and all are adult (Fig. 2). It appears that these gibbons are so rare in the wild, that, even in their home countries, they have nearly disappeared from the animal market and the supply of young animals may be exhausted. All captive animals can be identified as *H. concolor*, i.e. they were caught west of the Red River. No captive animal of the unnamed species east of the Red River (GEISSMANN, in prep.) was seen, which suggests that the status of this species in the wild may be even more critical. The last animals on the mainland which can be reliably identified as belonging to the unnamed species were collected in June 1965 in Cao Bang Province.

An adult female crested gibbon kept at the Kunming Zoo was of particular interest (Fig. 3): She had reportedly arrived from Mengla County. The author was told independently by two staff members that this female was a white-cheeked gibbon (*H. leucogenys*) and that the juvenile coat of this animal had included white cheeks, as in *H. leucogenys*. In contrast to this information, the fur colouration and the song vocalisations of the adult animal resembled *H. concolor*. As one solution to the contradictory evidence on this female, one could disregard all information provided by the zoo and consider her a pure *H. concolor*.

Alternatively, this gibbon could be a hybrid between *H. concolor* and *H. l. leucogenys*. Like the Kunming female, all true hybrids *H. concolor* x *H. leucogenys leucogenys* bred at the Twycross Zoo resembled *H. leucogenys leucogenys* when in the black coat stage (Figure 4). Among these hybrids, an adult female did not retain black underparts, however, but had a light belly, like *H. leucogenys* (Mr. S. Eddie, pers. comm.). It is unknown whether this trait is variable in these hybrids. In addition, the Twycross hybrids are all from the first hybrid generation, while the Kunming animal's hybrid line could be several generations long. Because



Fig. 3: Possible hybrid between *H. concolor* and *H. leucogenys*: Adult female "Xiao Shuang" at Kunming Zoo (5 Aug. 1990).



Fig. 4: Juvenile female hybrid (*H. concolor* x *H. leucogenys*) "Zilla" (Hencott Farm, Shrewsbury, 5 Oct. 1988).

the interviewees both reported the white cheeks independently, their information can be regarded as a strong support for the identification of the Kunming female as a hybrid. The information about the animal's provenance (Mengla County), however, is almost certainly wrong, independently of whether the animal is a pure *H. concolor* or a hybrid. Only *H. leucogenys* is known to occur in Mengla County, but not *H. concolor* (FOODEN et al., 1987; MA & WANG, 1986; YANG et al., 1987). On the other hand, a zone of overlap between the distribution ranges of both species has been reported to occur in the Huanglian mountains in Luchun County, southern Yunnan (MA & WANG, 1986; MA et al., 1988). The population of *H. leucogenys* in that region is probably now extinct (ZHANG et al., 1992: their Fig. 6). Two other regions of overlap may occur in Vietnam (DAO VAN TIEN, 1983). The Kunming female may, therefore, have been caught in one of these regions, if she is a hybrid.



Fig. 5: Juvenile female of the southern white-cheeked crested gibbon (*H. leucogenys siki*) at Beijing Zoo (12 Nov. 1993).

In contrast to the black crested gibbon (*H. concolor*), light-cheeked crested gibbons do not appear to be short in supply, especially in Vietnam. The large number of crested gibbons (mostly *H. gabriellae*) available until recently at the animal market in Ho Chi Minh City has been mentioned in previous publications (ANONYMOUS, 1992, EAMES & ROBSON, 1993). The animal market in Ho Chi Minh City was closed in 1993, but not the one in Hanoi, where gibbons are frequently available (Mr. T. Nadler, pers. comm.). An infant gibbon (*H. leucogenys siki*) obtained there during the present study was transferred to the Primate Rescue Center in Cuc Phuong, as mentioned above. No gibbons were seen in the animal markets of Kunming (1990) or Jinghong (1990), and no primates at all were seen in the animal market of Guangzhou (1993).

Some of the captive crested gibbons at the Beijing Zoo were identified as *H. gabriellae* and *H. leucogenys siki* (Fig. 5). These taxa do not occur in the wild in China. They were obtained by Beijing Zoo from Kunming in Yunnan Province, which shares

borders with both Laos and Vietnam. There appears to be a successfully operating route for gibbon traffic from one or both of these countries through Yunnan Province.

H. lar Group:

Gibbons of the *lar* group were found in only 3 of the 12 institutions visited during this study. The distribution of the *lar* group occurs mainly outside China; only *H. lar* is found in a small region of Western Yunnan (FOODEN et al., 1987; MA & WANG, 1986; MA et al., 1988; YANG et al., 1987). The species may now be extinct in this region (Yang, 1993). No gibbons of the *lar* group are known to occur in Vietnam in the wild. It has been repeatedly mentioned that one

species of the *lar* group, *H. pileatus*, occurs on Phu Quoc island (i.e. Vietnamese territory) (BÔ KHOA HOC, 1992; van PEENEN et al., 1969), but there is, as yet, no reliable evidence for this claim. This idea apparently originated from BOURRET (1946?), who suggested that the type locality of *H. pileatus* ("a small island near Camboja", GRAY, 1861, p. 135) probably referred to Phu Quoc. Later, SIMONETTA (1957, p. 64) simply changed the type locality to Phu Quoc, without revealing his source of evidence. All gibbons of the *lar* group seen during this study are, therefore, likely to have been imported (1 *H. lar* via Japan, 1 *H. agilis albibarbis* from southwest Kalimantan, and 1 *H. pileatus* possibly from Cambodia or Laos).

Age distribution:

The captive gibbon population of China and Vietnam includes a relatively high percentage of juvenile animals (36 %). This is as high as the percentage of adult animals, as shown in Figure 6. For comparison, the values of the captive population of crested gibbons covered by the first edition of the International Studbook (LERNOULD, 1993, p. 93) are also shown. The studbook sample includes only 11% juveniles, but 64% adults. Almost all of these animals are kept in western countries and there is no overlap with the gibbon sample examined during this study.

The difference in the age class distribution of the two samples can be tentatively interpreted as follows: In the studbook sample, there is a large proportion of adults. Many of these animals were apparently not breeding at the time of the census, but the population appears to have a high survival rate. In contrast, reproduction is virtually absent in the captive gibbon population of China and Vietnam. An apparently constant influx of new, wild-caught animals makes up the high proportion of juvenile animals in this sample, but the survival rate of the juveniles is apparently lower than in the studbook sample.

Recommendations:

The captive gibbon population in China and Vietnam could be of considerable importance for conservation of these species, in view of their critical status in the wild. In the long run, the most reliable action plan should probably consist in building up self-sustaining captive gibbon populations with the ultimate goal of reintroducing captive-bred surplus animals into suitable habitats where a species has become extinct or too decimated to survive.

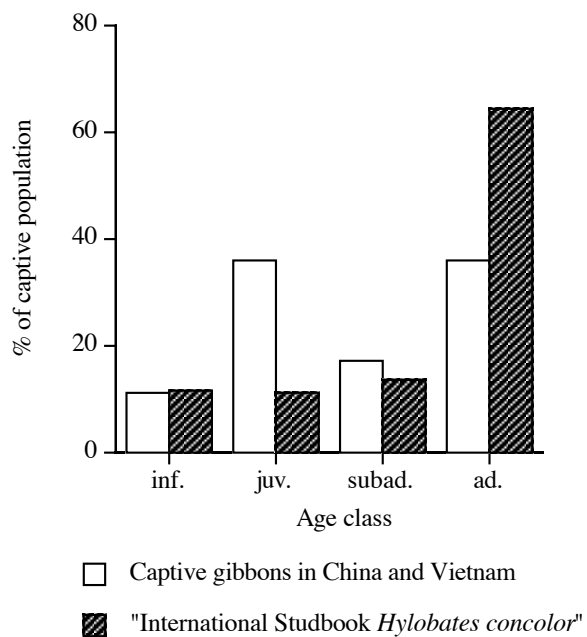


Fig. 6: Frequency (in %) of the four age classes among a) captive gibbons in China and Vietnam (this study, n = 64), b) captive gibbons of the *concolor* group according to the "International Studbook *Hylobates concolor*" (LERNOULD, 1991, n = 181).

It may be possible to build up self-sustaining captive gibbon populations in China and Vietnam, at least of *H. hoolock* and perhaps *H. gabriellae*. This goal is not within immediate reach, however, because the breeding success of gibbons in captivity has been so far practically nil in both countries. The most immediate action should, therefore, be to ensure that the captive gibbons breed. This could probably be facilitated by improving the management and living conditions of captive gibbons. A few suggestions for such improvement are provided below:

1. Cage size: Many enclosures should be larger, in order to accommodate a gibbon group (Figure 7). In a recent gibbon housing survey, MOORE and WHITELEY MOORE (1992, p. 196) recommended "a minimum primary enclosure size of 7x4x4m high for single animals or pairs, with larger areas for reproductive pairs and family groups."



Fig. 7: Gibbon house at Saigon Zoo (25 Sept. 1993).

2. Cage furniture: In many of the institutions visited, the enclosures for gibbons (and also for other primates) were completely bare (Figure 8). According to MOORE and WHITELEY MOORE (1992, p. 199), the quality of cage furniture may be at least as important as the quantity, or the size of the enclosure. A diverse environment not only meets the needs of a breeding family group, but can also be furnished by relatively simple and cheap means such as the provision of ropes, bars, poles and branches. In some zoos, gibbons are kept on small islands. This approach may be of particular interest to zoos in the tropics, where the absence of freezing temperatures makes it possible to keep gibbons outdoors the whole year long. Island settings with natural vegetation are not only extremely attractive to visitors but also come closer to imitating a naturalistic environment than most indoor enclosures (Figure 9).



Fig. 8: Infant hoolock (*H. hoolock*) at the Kunming Institute of Zoology (4 Aug. 1990).



Fig. 9: Gibbon island at Saigon Zoo (25 Sept. 1993).

3. Distance between gibbon groups: Keeping gibbon groups in adjacent cages in full view of each other (see Figure 2) may be stressful to many of these territorial animals. Such settings have repeatedly created problems (IBSCHER, 1964), which may eventually lead to stress-related sickness or even death of animals (GEISSMANN, unpubl. observations). Visual contact between gibbon groups in adjacent cages should be made impossible by a sight barrier. Another solution would be not to keep gibbon groups in adjacent cages at all, but only in every second cage of a row.
4. Social unit: The natural social unit of gibbons consists of territorial family groups. By contrast, many zoos visited during this survey kept gibbons alone or in peer groups of up to 6 animals. Clearly, the coordinated exchange of animals between zoos could help to bring pairs together. If peer groups include several subadult or even adult animals of the same sex, extremely violent agonistic interactions may eventually occur, which can lead to the death of the animals involved. This risk is considerably lower when the gibbons are kept in pairs. In addition, it has been suggested that immature animals kept as pairs with a potential mate may reach the age of sexual maturity earlier than animals remaining in their family groups (GEISSMANN, 1990) and possibly also those remaining in peer groups. Because it may be difficult to find suitable mates for gibbon taxa which do not belong to the local fauna, the possibility of exchanging rare gibbons such as *H. leucogenys siki* (Beijing Zoo) or *H. pileatus* (Saigon Zoo) with foreign zoos should also be considered.
5. Confiscation of gibbons from animal markets: Chinese and Vietnamese governments should be urged to enforce the immediate confiscation of all endangered primates from animal dealers. This would not only make the dealing of these animals more difficult, but would also enlarge the number of gibbons available for establishing a self-sustaining captive population and – in the long run – the number of gibbons available for reintroduction into their natural habitat.

Conclusions

1. This paper presents the first census of captive gibbons in China and Vietnam, with special attention being paid to zoos and other institutions which were suspected to keep gibbons of the *Hylobates concolor* group.
2. In Chinese institutions, *H. hoolock* was relatively common; whereas in Vietnam, *H. gabriellae* was the species most frequently seen in captivity. Some of the other gibbon forms with distributions in these countries were particularly rare in captivity (*H. concolor*, *H. leucogenys siki*), or not seen at all (*H. sp. cf. nasutus*, *H. lar yunnanensis*). Their low numbers in captivity probably reflect the status of these taxa in the wild.
3. The surveyed captive population is characterised by: 1. virtual absence of breeding, 2. high influx of young animals from the wild, and 3. a probably low survival rate.
4. Although it may be possible to build up self-sustaining captive gibbon populations in China and Vietnam – at least for *H. hoolock* and perhaps *H. gabriellae* – this goal cannot be reached in the near future without an improvement of captive management. Some sugges-

tions for improvement concern cage size, cage furniture, distance between gibbon groups, the social unit of gibbons, the coordinated exchange of gibbons between zoos, and the confiscation of gibbons from animal dealers.

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