

Tigers (*Panthera tigris*, *P. sondaica* and *P. sumatrae*) in the Collection of the Museum für Tierkunde Dresden (Carnivora: Felidae)

Tygři (*Panthera tigris*, *P. sondaica* a *P. sumatrae*) ve sbírkách Zoologického musea Drážďany (Carnivora: Felidae)

Alfred FEILER & Clara STEFEN

Senckenberg Naturhistorische Sammlungen Dresden, Museum für Tierkunde, Königsbrücker Landstr. 159, D–01109 Dresden, Germany; clara.stefen@senckenberg.de

received on 16 November 2009

Abstract. In the Senckenberg Natural History collection Dresden, Museum für Tierkunde Dresden there are specimens of five tiger forms, which are briefly introduced with morphometric data. The material includes four skulls of the extinct Javan tiger *Panthera sondaica sondaica*, one skull of the Sumatran tiger, *P. sumatrae*, six specimens of wild caught Siberian Tiger, *P. tigris altaica*, as well as material of Indochinese tiger, *P. tigris corbetti*, and Bengal tiger, *P. tigris tigris*. The specimens of particular interest are figured, some more tiger specimens mainly from zoos are present.

Key words. Javan tiger, Sumatran tiger, *Panthera tigris*, Senckenberg.

INTRODUCTION

In the case of large mammals often the last representatives of species or populations can be found in collections. The source of these specimens is diverse and they came from expeditions, local markets, local hunters, or from captivity. The trend to keep captive breed animals in zoos renders these animals not as valuable for collections as “old” wild caught ones. One reason for this is that captive breed animals seem to or could undergo more or less morphological changes due to captivity conditions.

The revision of tigers by MAZÁK & GROVES (2006) is an excellent example of taxonomic work with “old” material in collections. This is particularly true for the Javan tiger which has been extirpated in the wild. It has a special taxonomic position within the tigers. Tigers lived on Java for the last 2 million years (KITCHENER 1999).

Tiger is a iconic species for people and conservation of wildlife. Most tiger forms are endangered mainly due to the traditional use of their parts in China and products of wild tigers seem to be still preferred (GRATWICKE et al. 2008). Tiger is characterized by size, the more or less pronounced black striped pattern, the yellowish to reddish-brownish colour and other features listed by MAZÁK (1981, 1983). There is an obvious geographic variation that is detectable based on size, basic skin coloration, stripe pattern and differences in skull morphology, specifically in the occipital region (MAZÁK 1981, 1983; concurred e.g. by GROVES 1995). V. MAZÁK (1983) was able to recognized eight different subspecies. Since then, KIRK (1994) designated *P. tigris bintana* based on historical notes and LUO et al. (2004) named *P. t. jacksoni* from the Malayan

peninsula based on molecular evidence. Both are invalid according to the rules of the International Code of Zoological Nomenclature (KOCK 1995, MAZÁK & GROVES 2006).

Interpretation of geographic variability of the tiger is somewhat controversial. For example, KITCHENER (1999) rather interpreted tiger subspecies as clinal only, but recent molecular data sets of living subspecies support genetic distinctiveness of six groups, named as subspecies (LUO et al. 2004). Only *P. t. virgata* and *P. t. altaica* might be a single subspecies as their genetic difference in mtDNA haplotypes is very low and it is suggested that less than 10.000 years ago the ancestors of the Caspian/Asian tiger colonized Central Asia from eastern China (DRISCOLL et al. 2009).

Recently and based on the morphological evidence and phylogenetic species concept, MAZÁK & GROVES (2006) separated the continental tigers *Panthera tigris* from the island tigers and elevated them to the specific level as *P. sumatrae* and *P. sondaica*. Moreover, they suggested that the Sumatran tiger might be of hybrid origin (mainland x Java). We follow the species differentiation of *P. sondaica* and *P. sumatrae* herein, the hybrid origin of the Sumatran tiger will not be discussed.

As has been shown with the morphological analysis of MAZÁK (1981) and MAZÁK & GROVES (2006) as well as by the genetic studies of DRISCOLL et al. (2009) and LUO et al. (2004) collection material is very important especially in extinct or highly endangered species. Knowledge of more specimens in collections (e. g. also BUZÁS & FARKAS (1997) might help to increase known samples significantly in further studies. Therefore, here we briefly report on material of tigers in the collection of the Senckenberg Natural History Collection Dresden, Museum for Tierkunde (MTD) even though not in all cases skull and skin are present and recorded data vary greatly in quality and detail.

ANNOTATED CATALOGUE

Panthera sondaica sondaica (Temminck, 1844) – Javan tiger

MAZÁK & GROVES (2006) analysed 20 skulls, MAZÁK (in press) mentions 35 skulls of this form in different museums. Additionally four skulls of this subspecies are in our collection. The collector of most of them is Wolf CURT von Schierbrand (31. 1. 1807 – 23. 2. 1888), who worked on Java for several decades (MARTIN, 1999). Already VAN STRIEN (1986) assumed the Javan tiger “probably extinct” and MELISCH (1992) “endangered or extinct”. According to CORBET & HILL (1992) the last record dates from 1979. SODY (1949) compiled the measurements of 23 specimens of the Javan tiger and showed the sexual size difference. This has been supported by the larger dataset of MAZÁK & GROVES (2006). The Bali tiger is referred as a subspecies of *Panthera sondaica* (MAZÁK & GROVES 2006). Only few specimens of the Bali tiger are preserved in collections: SODY (1949) listed three, MAZÁK et al. (1978) four skins and 7 skulls, and BUZÁS & FARKAS (1997) made an additional skull known. There are four skulls of *P. sondaica sondaica* in the collection in Dresden (A. S. 1687, B2169, B2170, B7470).

A. S. 1687 is from the “Alte Sammlung” (old collection) prior to the inventory started by A. B. MEYER in 1874 and no further data on specimens of the old collection are available any more but the information on the old labels or on the skull, and so the age of the specimen remains unknown. The specimen comes from Java from Schierbrand as written on the bone.

The location of **B2169**, **B2170** dating from 1892, is only given as Java by SCHIERBRAND. Also for the oldest skull dating from 1858 (**B7470**), male, only Java is given (Figs. 1, 2). Some basic measurements of the skulls are given in Table 1. B2170, which according to the fusion of skull bone sutures is the youngest of the skulls present, falls within the range of females given by MAZÁK & GROVES (2006) and the male



Fig. 1. Skull of *Panthera sondaica sondaica* MTD A.S. 1687. Distal (a) and lateral view (b). Scale = 1 cm.

Obr. 1. Lebka tygra javánského (*Panthera sondaica sondaica*) MTD A.S. 1687. Týlní (a) a boční pohled (b). Měřítko = 1 cm.

B7470 is rather small compared to other males. The individual age is not given and cannot be estimated, but as the parietal-interparietal as well as occipital-mastoid suture are still unfused, the specimens might be younger than others (Table 1). The permanent dentition is complete, so they can be assumed “adult” but might be younger than other specimens of which the data are known.



Fig. 2. Skull of *Panthera sondaica sondaica* B7470 dating from 1858.

Obr. 3. Lebka tygra javánského (*Panthera sondaica sondaica*) B7470, datována z roku 1858.

Table 1. Measurements (in mm) of the skulls of *Panthera sondaica sondaica* and cf. *P. s. sondaica* in the Museum für Tierkunde Dresden. Abbreviations: Coll. nr. – collection number; GSL – greatest skull length; CB – condylobasal length; ZYG – zygomatic width; RB – width of rostrum; IOB – interorbital breadth; SOB – supraorbital breadth; MB – mastoid breadth; GLN – maximal length of nasal; LP4 – length of upper P4; Lm1 – length of lower m1. Measurements as illustrated in BUZAS & FARKAS (1997). Specimens are listed according to probable increasing age due to fusion of cranial sutures: B2170 parietal-interparietal suture open, occipital mastoid suture open, basoccipital-basisphenoid suture open; B7470 parietal-interparietal suture, occipital mastoid suture just visible, also parietal-squamosum suture visible; B2169 fronto-parietal suture just visible. cf. *Panthera sondaica*, no further data are available; B16441 fronto-parietal suture visible, parietal-squamosum suture visible, parietal-interparietal suture visible; B 16443 fronto-parietal suture still visible, parietal-squamosum suture fused

Tab. 1. Rozměry (v mm) lebek tygra javánského (*Panthera sondaica sondaica*), včetně jedince cf. *P. s. sondaica*, ze Zoologického muzea v Drážďanech. Vysvětlivky zkratk: Coll. nr. – invetární číslo; GSL – supraorbitální šířka; SOB – supraorbitální délka; ZYG – zygomatická šířka; RB – šířka rostra; IOB – interorbitální šířka; MB – mastoidální šířka; GLN – mastoidální délka; MB – mastoidální délka; IOB – největší délka nasální; LP4 – délka 4. horního premoláru; Lm1 – délka 1. dolní stoličky. Rozměry byly měřeny podle BUZÁSE & FARKASE (1997). Exempláře jsou vzestupně seřazeny podle věku odhadovaného na základě splyvání lebečních švů

Coll. nr	sex	GSL	CB	ZYG	RB	IOB	SOB	MB	GLN	LP4	Lm1
<i>Panthera sondaica sondaica</i>											
B2170	?	–	–	181.0	77.0	51.9	44.3	110.7	–	31.8	23.1
B7470	♂	292.0	272.0	196.0	89.3	57.8	57.3	116.6	99.6	34.8	26.9
A.S. 1687	?	327.0	287.7	221.0	90.7	62.2	47.8	124.1	105.3	33.9	26.2
B2169	?	295.1	–	171.8	79.9	57.1	45.9	115.4	96.3	29.9	23.7
MAZÁK & GROVES (2006)											
range	min	306.0	269.0	198.0	88.4	56.0	50.0	114.0	100.4	31.9	23.5
	max	338.0	297.5	243.7	99.4	66.5	62.4	131.0	110.0	36.0	27.0
mean		321.3	284.1	218.4	93.2	61.4	–	123.4	106.2	34.3	25.8
range	min	260.0	234.0	166.0	75.5	47.0	44.0	101.5	84.0	30.0	21.0
	max	292.0	262.0	200.0	86.5	59.0	52.5	115.0	95.5	32.5	24.0
mean		278.2	248.9	186.28	80.2	53.5	48.6	109.3	90.4	31.4	22.8
cf. <i>Panthera sondaica</i>											
B16441	?	279.6	248.3	164.0	76.0	54.3	43.1	107.4	90.8	29.7	ca. 23
B16443	?	266.0	225.0	167.0	75.2	50.4	50.0	103.1	84.6	30.7	21.2

Panthera cf. sondaica

Two skulls are considered as cf. *P. s. sondaica* (B16441, B16443). There are no data for these two skulls which came from the Zoological Institute in Leipzig in the early 1970s. The two skulls are in the range of female Javan tigers (Table 1).

Panthera sumatrae Pocock, 1929 – Sumatran tiger

There is one skull (B16747) and one skin (B15245) of this species in the collection in Dresden.

B16747 sex ?, skull, was originally in the church research centre Wittenberg and the original label by O. KLEINSCHMIDT indicates that it has been bought from FLEMMING/Hamburg in 1932. Further data on the location are lacking. The measurements are given in Table 2. It falls in the range of females of *P. sumatrae* given in MAZÁK (1983) in ZYG, RB and IOB, but is very small in CB and large in MB.

B15245, ♂ juv., skin, was wild caught on Sumatra north of the Mairinjao-lake and died 10 November 1987 in the Zoo Frankfurt. Data on the age were not available. The overall colour of the skin a dark brown-yellow, the black stripes are close and few doubles occur. At the root of the tail the upside down “U” formation is visible. The ventral side is white, cheek barb present.

Panthera cf. sumatrae

There is also the skull of a tiger named “Sumatra” (B7408) ♂ ad., which came from the Zoo Dresden 26 March 1934 (Fig. 3). As the name is “Sumatra” it might come from Sumatra, but locality data are missing in the catalogue. The occipital region is rather narrow (Fig. 3).

Panthera tigris tigris (Linnaeus, 1758) – Bengal tiger

There are five specimens and three of those are from zoos. There are four skulls (B5813, B6364, B15116, B12825), one skin (B12825) and one mounted skin (B16131).

B6364, ♂, skull, Zoo Dresden, died in April 1928.



Figs. 3, 4. Occipital regions of the tiger skulls. 3 (left) – the tiger skull B7408, which had been called “Sumatra” but no locality data are known. Therefore here assigned to cf. *P. sumatrae*. 4 (right) – Skull of *Panthera tigris tigris* B12825, listed as from Dsaktalgur East India.

Obr. 3, 4. Týlní oblasti lebek tygrů. 3 (vlevo) – lebka tygra B7408 zvaná “Sumatra” ovšem lokalita původu není známa – proto je uvedena pod cf. *P. sumatrae*. 4 (vpravo) – lebka tygra indického (*Panthera tigris tigris*) B12825, s uvedenou lokalitou Dsaktalgur East India.

Table 2. Measurements (in mm) of the skulls of *Panthera sumatrae* and cf. *P. sumatrae* in the Museum für Tierkunde Dresden. Abbreviations as in Table 1. In B16747 the parietal-interparietal, parietal-squamosal, occipital-parietal and basoccipital-basishenoid sutures still open, in B7408 fronto-parietal suture fused

Tab. 2. Rozměry (v mm) lebek tygra sumatránského (*Panthera sumatrae*) včetně jedince cf. *P. sumatrae* ze Zoologického muzea v Drážďanech. Vysvětlivky zkratek viz tab. 1

Coll. nr	sex	GSL	CB	ZYG	RB	IOB	SOB	MB	GLN	LP4	Lml
<i>Panthera sumatrae</i>											
B 16747		280.0	248.0	176.5	83.0	50.4	63.5	112.8	91.0	35.1	24.0
MAZÁK & GROVES (2006)											
range	min ♂♂	292.4	263.0	202.5	87.5	59.0	60.5	90.0	90.0	32.0	23.0
	max	339.0	299.6	238.0	100.5	70.0	83.4	103.5	103.5	35.5	28.4
mean		316.2	281.1	216.5	93.5	63.2	68.1	97.0	97.0	33.8	26.0
range	min ♀♀	263.0	253.3	168.0	72.5	48.0	53.0	81.0	81.0	29.0	21.0
	max	294.0	264.5	199.7	88.2	57.6	68.2	93.6	93.6	33.0	32.2
mean		276.7	246.9	183.2	80.0	52.8	59.8	86.6	86.6	30.8	23.5
cf. <i>Panthera sumatrae</i>											
B7408	♂ ad.	322.8	218.9	226.53	92.93	66.21	65.41	123.51	104.45	33.83	27.42

Table 3. Measurements (in mm) of the skulls of *Panthera tigris corbetti* in the Museum für Tierkunde Dresden. Abbreviations as in Table 1. B2275 and B16438 fronto-parietal suture fused

Tab. 3. Rozměry (v mm) lebek tygra indočínského (*Panthera tigris corbetti*) ze Zoologického muzea v Drážďanech. Vysvětlivky viz tab. 1

Coll. nr	sex	GSL	CB	ZYG	RB	IOB	SOB	MB	GLN	LP4	Lml
B2275	♂ ad.	289.2	258.2	195.6	82.5	83.5	55.7	110.2	101.4	32.2	22.7
B16438	♂ ad.	310.0	272.0	216.0	92.9	65.3	65.7	119.5	99.0	34.9	24.9
MAZÁK & GROVES (2006)											
range	min ♂♂	294.2	266.0	184.6	85.5	52.0	60.5	115.0	101.0	33.4	24.0
	max	365.0	312.5	247.4	101.9	75.0	78.0	140.0	121.0	37.2	28.1
mean		328.6	288.9	223.0	92.6	66.5	69.8	126.1	109.5	35.6	26.4
range	min ♀♀	273.3	243.0	178.0	77.0	48.2	56.5	106.6	85.8	30.0	21.9
	max	304.8	272.0	207.4	92.7	66.5	72.5	118.8	104.5	35.0	26.8
mean		290.5	259.0	195.6	83.1	58.8	62.4	113.0	97.6	32.9	24.7

B15116, ♀, skull and skin, 15 years old, Zoo Görlitz, fronto-parietal suture and maxillary-frontal suture fused. The body measurements are: total length: 285 cm, tail length 95 cm, withers 92 cm, hind foot 35 cm.

B5813, ♂, skull, Zoo Dresden, fronto-parietal and maxillary-frontal suture fused. There are several pictures of this tiger form (e.g. BERG 1935) and the upside down “U” at the root of the tail is often quite well visible.

The skull **B12825** closely resembles *P. sumatrae*, but is labelled as from East India, Dsaktalgur (Fig. 4). The specimen was bought by RIEMER on 21 June 1932 from W. SCHÜTZ/Baden. The skin has a relative dark, more brownish colour. The black stripes are very close and reach far forward. This might support an origin from southern India as BERG (1935: 41) notes: “In den Dschungeln Südindiens ist sein Fell viel dichter gestreift als bei nördlichen Tigern”.

***Panthera tigris corbetti* Mazák, 1968 – Indochinese Tiger**

There are two skulls (B2275, B16438) and three skins (B12947, B12978, B11703).

B16438, ♂ ad., skull, Zoo Dresden, parents imported from Thailand.

B2275, ♂ ad., skull, Maliwun, southern Burma, from Dr. EGER/Vienna 1893. Some measurements of the skulls are given in Table 3. B2275 is rather small for a male and falls within the range of females.

B11703, ♂, skin, Mai-son (western northern Vietnam), was bought by RIEMER in 1933 from the taxidermist W. SCHÜTZ/Baden and the Museum für Tierkunde obtained it in 1976 (Fig. 5). The skin is very similar to the one depicted by MAZÁK (1983: 146). The basic colour is reddish-ochre-brown. The black stripes



Fig. 5. Skin of *Panthera tigris corbetti* B11703 from Vietnam.

Fig. 5. Kůže tygra indočíského (*Panthera tigris corbetti*) B11703 z Vietnamu.

Table 4. Measurements (in mm) of the skulls of *Panthera tigris tigris* and *P. t. altaica* in the Museum für Tierkunde Dresden. Abbreviations as in Table 1. Skulls of *P. t. tigris*: B5813 fronto-parietal suture and maxillary-frontal suture fused; B6364 fronto-parietal suture fused; B 15116 fronto-parietal suture and maxillary-frontal suture fused and nasal-frontal suture starts to fuse, ca. 15 years old; B16440 fronto-parietal suture fused, maxillary-frontal suture not really visible; B12825 fronto-parietal suture is fused. In *P. t. altaica* the fronto-parietal suture is fused and not visible in all specimens, therefore they are of comparable age and all well adult

Tab. 4. Rozměry (v mm) lebek tygra indického (*Panthera tigris tigris*) and tygra sibiřského (*P. t. altaica*) ze Zoologického muzea v Drážďanech. Vysvětlivky viz tab. 1

Coll. nr	sex	GSL	CB	ZYG	RB	IOB	SOB	MB	LN	LP4	Lml
<i>Panthera tigris tigris</i>											
B5813	♂, ad.	358.5	303.5	238.0	100.7	74.7	71.4	131.2	120.8	35.4	26.9
B6364	♂, ad.	347.0	305.0	233.0	95.7	67.9	69.4	131.3	126.3	33.9	26.7
B15116	♀, ad.	291.0	268.0	200.0	81.0	58.9	65.5	128.4	97.8	28.9	22.4
B12825	♂, ad.	310.0	257.0	213.0	90.6	64.5	71.8	119.3	101.4	34.5	–
MAZÁK (1983)											
range min	♂	329.0	288.5	222.4	90.8						
range max	♂	378.0	334.7	264.8	106.0						
mean		353.4	310.8	244.2	98.6						
range min	♀	275.0	248.5	186.2	74.6						
range max	♀	311.0	279.0	214.0	87.0						
mean		297.2	265.37	200.05	83.25						
<i>Panthera tigris altaica</i>											
B16733	♂?, ad.	350.6	320.8	234.7	105.9	69.7	74.4	140.4	113.1	34.5	25.4
B16561	♂, ad.	340.1	295.6	243.5	95.1	72.6	81.7	134.8	111.1	33.8	25.1
B19712	♀?, ad.	–	234.7	209.2	86.2	63.8	63.4	117.8	92.5	32.2	22.4
B25395	♂, ad.	372.6	327.2	255.0	108.2	76.4	76.8	151.5	123.7	30.0	26.6
B22863	♀, ad.	298.5	271	199	88.30	62.8	67.2	117.1	95.3	32.6	23.4
MAZÁK (1983)											
range min	♂	341.0	304.0	231.0	98.9						
range max	♂	383.0	342.0	268.0	113.0						
mean		367.1	325.4	248.4	106.5						
range min	♀	279.7	252.5	185.0	76.4						
range max	♀	318.0	280.0	214.6	93.0						
mean		298.5	267.65	199.19	84.06						

are close, sometimes double and decrease from cranial to caudal. The root of the tail has several bands in form of an upside down “U”. This is also the case in other skins (B12947 and B12948) from Siam (= Thailand) and is depicted by BERG (1953) for Bengal tigers.

B12948, ♂, skin, Thailand, “Rai” came to Germany via the company RUHE/Hannover, since 25 May 1956 in the Zoo Dresden, died on 8 January 1969.

B12947, ♀, skin, Thailand, “Suleika” came to Germany via the company RUHE/Hannover, since 25 May 1956 in the Zoo Dresden, died on 3 December 1970 and considered juvenile in our catalogue.

LEKAGUL & MCNEELY (1988: 630–632) show the typical pelage coloration as well as the occipital region of Indochinese tigers from Thailand.

***Panthera tigris altaica* (Temminck, 1844) – Siberian tiger**

There are five skulls (B16733, B16561, B25395, B22863, B19712), eight skins (B16733 partial skin, several hairless spots, B16561, B19712, B17310, B17966, B22468, B25395, B26617) and two skeletons (B25395, B22863). Six individuals are wild caught ones (B22468, B22863 which belong to one individual, B12942, B16561, B16733, B19712 and B25395) and B17966 is possibly a wild caught one. Wild tigers were usually caught at the age of 1.5 to 2 years. The specimens from Dresden are listed in the tiger breeding book of the Zoo Leipzig.

B12942, sex?, ad., skin, about 1900, from general HEINE. The skin shows an upside down “U” at the tail base, which is characteristic for all the 9 skins, the basic colour of the skin is ochre, venter white, the face shows little white compared to other skins.

B16733, ♂ ad., skull, wild caught 24 December 1973, Waka Basin, Primorskij Kraj, died on 30 August 1990 about 18 years old, Zoo Leipzig – skull with strong, straight sagittal crest.

B16561, ♂ ad., skull and skin, wild caught Sichote Alin, Eastern Siberia, died on 19 July 1991 – skull with straight sagittal crest.

B17310, ♀ ad., skin, Zoo Görlitz, father wild caught “Irkut”, mother Zoo Leipzig, at least 9 years old, died on 25 September 1979.

B17966, sex?, skin, Zoo Leipzig, possible wild caught one, obtained on 26 March 1993.

B19712, ♀ ad., skull, skin, about 17 years, wild caught in 1981 in Eastern Siberia, obtained on 11 September 1997 – body length 227 cm, tail length 85 cm, ear length 12 cm, hind foot length 34 cm, shoulder height 102 cm, croup 98 cm.

B22468, ♀ ad., skin, about 15 years old, wild caught in 1981 in the Habarovsk area, district Laso, at the river Matai, died about 15 years old 22 April 1998 in Zoo Leipzig, belongs to the same individual as B22863. **B 22863** ♀ ad., skull and skeleton of the same individual as B22468.

B25395, ♂ ad., skull, skin and skeleton, obtained on 14 July 2000, Zoo Halle, wild caught in Eastern Siberia.

B26617, ♀ ad., skin, “Tschara”, captive born on 16 May 1988, died on 14 April 2002, Zoo Hoyerswerda.

The male B25395 is one of the largest Siberian tigers; only one skull from Northeast China in the Museum in Berlin is larger (MAZÁK 1983). Some measurements of the skulls are given in Table 4.

SOUHRN

Ve sbírce Zoologického musea v Drážďanech (Senckenberská přírodovědná sbírka) jsou uchovávány exempláře pěti forem tří druhů tygrů. V katalogu jsou uvedeny popisy a rozměry všech jedinců. Material zahrnuje pět lebek tygra javánského (*Panthera sondaica sondaica*), jednu lebku tygra sumatránského (*P. sumatrae*), šest jedinců v divočině odchycených tygrů sibiřských (*P. tigris altaica*), jakož i material tygra indočínského (*P. tigris corbetti*) a indického (*P. tigris tigris*). Nejvýznamnější exempláře jsou vyobrazeny, další kusy (zejména ze zoologických zahrad) jsou popsány v textu.

ACKNOWLEDGEMENTS

Thanks to Mr. B. GEIDEL (Zoo Dresden) for some help with information on zoo animals and the reviewers for helpful comments.

REFERENCES

- BERG B., 1935: *Tiger und Mensch*. Dietrich Reimer & Ernst Vohsen Verlag, Berlin, 206 pp.
- BUZÁS B. & FARKAS B., 1997: An additional skull of the Bali tiger, *Panthera tigris balica* (Schwarz) in the Hungarian Natural History Museum. *Miscellanea Zoologica Hungarica*, **11**: 101–105.
- CORBET G. B. & HILL J. E., 1992: *The Mammals of the Indomalayan Region: A Systematic Review*. Natural History Museum Publications, Oxford University Press, New York, 488 pp.
- DRISCOLL C. A., YAMAGUCHI N., BAR-GAL G. K., ROCA A. L., LUO S., MACDONALD D. W. & O'BRIEN S. J., 2009: Mitochondrial phylogeography illuminates the origin of the extinct Caspian tiger and its relationship to the Amur tiger. *PLoS ONE*, **4**(1): 1–8.
- GRATWICKE B., MILLS J., DUTTON A., GABRIEL G., LONG B., SEIDENSTICKER J., WRIGHT B., YOU W. & ZHANG L., 2008: Attitudes toward consumption and conservation of tigers in China. *PLoS ONE*, **3**(7): 1–7.
- GROVES C. P., 1995: Microtaxonomy and its implications for captive breeding. Pp.: 24–28. In: GANSSLOSSER U., HODGES J. K. & KAUMMANN W. (eds.): *Research and Captive Propagation*. Filander Verlag, Fürth, 338 pp.
- KIRK G. 1994: Insel-Tiger *Panthera tigris* (Linnaeus 1758). *Säugetierkundliche Mitteilungen*, **35**: 151–176.
- KITCHENER A. C., 1999: Tiger distribution, phenotypic variation and conservation issues. The evolution of the tiger. Pp.: 20–21. In: SEIDENSTICKER J., CHRISTIE S. & JACKSON P. (eds.): *Riding the Tiger. Tiger Conservation in Human-dominated Landscapes*. Cambridge University Press, Cambridge, 383 pp.
- KOCK D., 1995: Zur Benennung des Tigers, *Panthera tigris* (Linnaeus 1758) auf Sunda-Inseln (Mammalia: Carnivora: Felidae). *Säugetierkundliche Mitteilungen*, **36**: 123–126.
- LEKAGUL B. & MCNEELY J. A., 1977: *Mammals of Thailand*. Association for the Conservation of Wildlife, Bangkok, Kurusapha Ladprao Press, 758 pp.
- LUO S. J., KIM J. H., JOHNSON W. E., VAN DER WALT J., MARTENSON J., YUHKI N., MIQUELLE D. G., UPHYRKINA O., GOODRICH J. M., QUIGLEY H. B., TILSON R., BRADY G., MARTELLI P., SUBRAMANIAM V., MCDUGAL C., HEAN S., HUANG S. Q., PAN W. S., KARANTH U., SUNQUIST M., SMITH J. L. D. & O'BRIEN S., 2004: Phylogeography and genetic ancestry of tigers (*Panthera tigris*). *PLoS Biology*, **2**: 2275–2293.
- MARTIN P., 1999: Was die Natur und der Mensch des merkwürdigen Tropenlandes erzeugen. Wolf Curt von Schierbrand und seine Sammlungen. *Kleine Beiträge aus dem Staatlichen Museum für Völkerkunde Dresden*, **17**: 16–29.
- MAZÁK J. H., in press: Craniometric variation in the tiger (*Panthera tigris*): Implications for patterns of diversity, taxonomy and conservation. *Mammalian Biology*, **75**.
- MAZÁK J. H. & GROVES C. P., 2006: A taxonomic revision of the tigers (*Panthera tigris*) of southeast Asia. *Mammalian Biology*, **71**: 268–287.
- MAZÁK V., 1981: *Panthera tigris*. *Mammalian Species*, **152**: 1–8.
- MAZÁK V., 1983: *Der Tiger Panthera tigris*. 3. Auflage. *Neue Brehm Bücherei 356*. A. Ziemsen Verlag, Wittenberg-Lutherstadt, 228 pp.
- MAZÁK V., GROVES C. P. & VAN BREE P. J. H., 1978: On a skin and skull of the Bali tiger, and a list of preserved specimens of *Panthera tigris balica* (Schwarz, 1912). *Zeitschrift für Säugetierkunde*, **43**: 108–113.
- MELISCH R., 1992: *Checklist of the Land Mammals of Java*. Directorate General of Forest Protection and Nature Conservation, Bogor, 73pp.
- SODY H. J., 1949: Notes on some Primates, Carnivora and the babirusa from the Indo-Malayan and Indo-Australian Regions. *Treubia*, **20**: 121–190.
- VAN STRIEN N. J., 1986: *Abbreviated Checklist of the Mammals of the Australasia Archipelago*. School of Environmental Conservation Management, Bogor, 91 pp.