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On a skin and skull of the Bali Tiger, and a list of preserved specimens of *Panthera tigris balica* (Schwarz, 1912)

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Abstract

Data on a skin and skull of a Bali Tiger specimen kept in the Museum Zoologicum Bogoriense, Bogor, Indonesia, are summarized in the present paper, and compared to the other known material on this tiger subspecies. A list of all the known specimens of the Bali Tiger preserved in various museums is given. It includes 4 skins and 7 skulls. Notes on the possibility of the present occurrence of tiger on the island of Bali are added.

Two of us (P. J. H. v. B. and C. P. G.) were able in the course of their trips to Indonesia to examine separately in the collections of the Museum Zoologicum in Bogor a specimen of the Bali Tiger.

Though briefly mentioned already by Sody (1949: 166, 168; quoted also by Mazák, 1976: 181, 187), the specimen in question has, until now, never been properly described. As museum material as well as any other evidence on the Bali Tiger are extremely scarce, we would like to present below a more detailed report on the Bogor Museum specimen, and to add a list of all the specimens of *Panthera tigris balica* (Schwarz, 1912) preserved in various zoological institutions that are known to us.

The Bogor Museum specimen of the Bali Tiger

1. The Bali Tiger specimen preserved in the collections of the Museum Zoologicum Bogoriense under the No. 6834 is represented by a skin and a skull of an adult female, collected by Mr. Th. Voorstad[1] on September 27, 1937 near the kampung (= village) of Sumber Kima in West Bali. The female was pregnant and four rather small foeti were removed when the body was dissected.

   Both the skin and skull are intact and very well preserved. The external measurements noted by the collector were as follows: Total length, 2460 mm; length of tail, 690 mm; length of ear, 81 mm. From these measurements we can calculate a head-and-body length of 1770 mm. This dimension however hardly reflects the actual head and body length measured "between pegs" in the flesh.

   In a previous paper (Mazák, 1976: 190) it was confirmed that the Bali Tiger is the smallest of all the tiger subspecies. Yet, the above mentioned head-and-body length of the Sumber Kima tigress corresponds, in fact, to a head-and-body length, measured "between pegs", of a fairly large female of the biggest tiger subspecies, viz. *Panthera tigris tigris* (Linnaeus, 1758), *Panthera tigris virgata* (Illiger, 1811) and, of course, *Panthera tigris altaica* (Temminck, 1844) (cf. Mazák, 1967: 550; Mazák, in press). It may thus be claimed that the head-and-body length of the female Bali Tiger, the skin and skull of which are deposited in the Bogor Museum, shows the

[1] Van Bemmel (in Simon, 1969) states that the tigress was shot by a certain Mr. Wehlburg; similarly Sody (1949: 166) notes on the tigress concerned "leg. A. F. Wehlbrug, 27. 9. 1937". The last given spelling of the name of the hunter seems to be the correct one.

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Measurements of all the known skulls of the Bali Tiger, *Panthera tigris balica* (Schwarz, 1912)

	Senckenberg Museum No. 2576 ♀ sad. Den Pasar, South Bali Holotype	Stuttgart Museum ♀ ad. Medevi, Central Bali (after Hemmer 1969)	Stuttgart Museum ♀ ad. Poeloekan, Central Bali (after Hemmer 1969)	Bogor Museum No. 6834 ♀ ad. Sumber Kima, West Bali	British Museum (Nat. Hist.) No. 38.3.14.6 ♀ ad. Prapat Agoeng, West Bali	British Museum (Nat. Hist.) No. 37.12.1.2 ♂ ad. Sendang, N.C. Bali	British Museum (Nat. Hist.) No. 38.3.14.5 ♂ ad. Bali
Greatest length	252.0	266.0	266.0	266.5	262.7	297.6	295.0
Condylobasal length	229.0	238.0	239.0	240.0	238.5	267.3	266.5
Basal length I	212.0	219.0	221.0	224.0	220.4	248.7	248.0
Basal length II	205.6	—	—	216.0	212.0	239.5	239.5
Rostral breadth	71.0	—	—	75.5	76.1	85.8	87.0
Interorbital breadth	53.0	—	—	55.0	damaged	59.5	58.7
Postorbital breadth	55.0	51.5	51.0	58.5	damaged	55.3	56.2
Bizygomatic breadth	168.5	182.0	182.0	183.5	180.0	210.7	202.7
Mastoidal breadth	99.0	—	—	101.0	101.8	113.5	113.0
Supraoccipital breadth	46.5	—	—	50.0	49.0	52.2	51.4
Occipital height	70.0	—	—	73.5	71.4	84.0	81.0
Greatest length of nasals	78.5	—	—	87.0	88.0	97.0	98.0
Mandible length	166.0	174.0	176.0	181.5	173.5	197.4	196.7
Length of Pm^4	30.7/31.2	31.4/31.9	30.3/30.3	29.7/31.0	31.0/31.3	34.0/34.5	33.8/34.3
Length of M_1	22.0/21.8	23.0/22.5	23.4/22.9	—	22.8/23.0	24.7/23.9	25.3/25.0
C — Pm^4	79.0	—	—	86.0	81.8	88.8	90.0
C — M_1	—	—	—	98.0	95.0	104.0	106.0
Occipital height / Supraoccip. breadth	1.50	—	—	1.47	1.43	1.60	1.58

Remarks: Note a strikingly small individual variation in individual measurements of both the adult males and the adult females. All the measurements are given in millimeters and were taken as described in Mazák (1967, p. 559).

animal was measured either too carefully "over curves" or that the measurements were taken on the dressed and pegged-out skin. This statement is also substantiated by the evidence supplied by the skull measurements that are summarized in the Table, and that show quite explicitly the tigress in question was really a very small specimen. It may be presumed that its actual head-and-body length would had been about 1350 to 1450 mm if properly measured "between pegs".

2. The Bogor skin shows all the characters of colouration and stripe pattern of the specimen. It many be presumed that its actual bead-and-body length would have Mazák, 1976: 189). The ground colouration is very dark, the light coloured areas being limited in their extent and more or less purely white, while in other island tigers, i. e. the Javanese and Sumatran, a shade of the ground colour can be observed in these areas. The black stripes are broader than in an average Javan skin and more frequently duplicated, especially on flanks and hind quarters. Similarly as in other Bali Tiger specimens numerous lines of small dark spots situated between stripes, first of all on the back, flanks and hind legs as well as a somewhat less distinct dark marking on the frontal surfaces of fore legs are present also in the skin of the Sumber Kima tigress. The same may be said, too, of a rather typical marking on the head that is formed by three pairs of short and duplicated transverse stripes and one pair of single transverse stripes located on the forehead. For the pattern of the ventral and dorsal side of the Sumber Kima tigress skin, see fig. 1; for the marking of the head, fig. 2.

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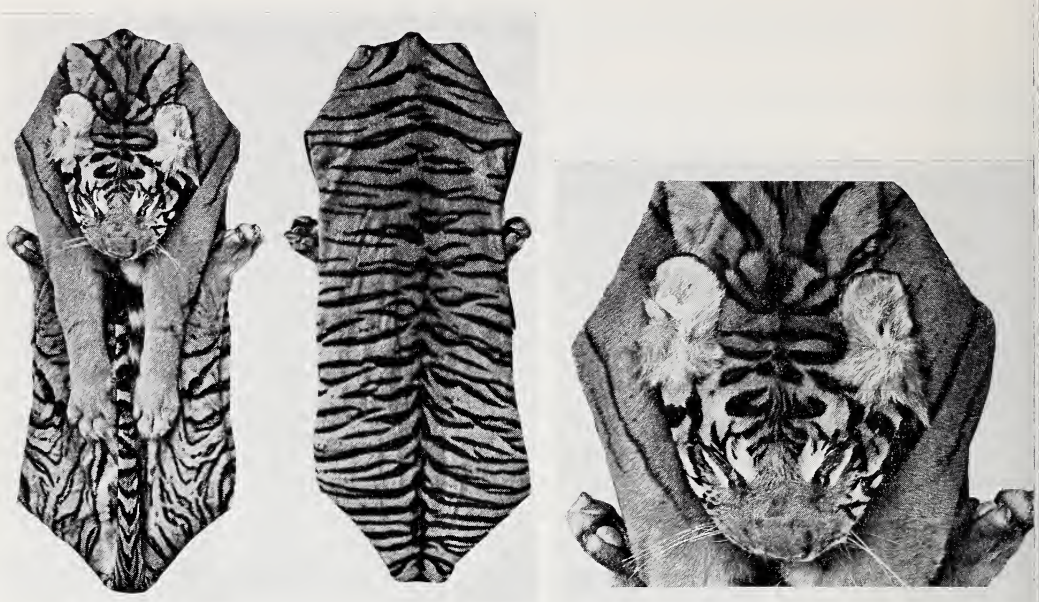

Fig. 1. Dorsal and ventral side of the Bali tigress skin in the Museum Zoologicum Bogoriense (MZB 6834) (after colour slides made by the third author). — *Fig. 2.* Pattern on the head of the Bali tigress skin (MZB 6834). For more details, see text

The hair is smooth and short, being longer however on the nape of neck. On the cheeks there are fine, yet not too distinct whiskers which is evidently due to the sex of the animal since male Bali Tigers the skins of which are kept in the British Museum (Natural History) in London display rather long and distinct whiskers (cf. Mazák, l.c.).

3. The skull of the Sumber Kima tigress, having all its basal sutures completely closed, is certainly that of an adult specimen and shows in its general structure all the typical features of Bali Tiger skulls, especially a narrow occipital plane, with its lateral margins being parallel and its upper margin forming an isosceles triangle.

   An analogous shape of the occiput is displayed also by skulls of the Javan Tiger, *Panthera tigris sondaica* (Temminck, 1844). It however seems that the occiput of the Javan skulls is still somewhat more elongated than that of the Bali skulls, as can be demonstrated by an index calculated as a quotient of the so-called "occipital height" and the "supraoccipital breadth" (cf. Mazák, 1976: 184—185)[2].

   This index shows in the skull of the Sumber Kima tigress a value of 1.47, which is in full accordance with the results found earlier. Values of the ratio "occipital height/supraoccipital breadth" of other Bali Tiger skulls are summarized in Table 1. Let us only add that in 16 skulls of adult males of the Javan Tiger the mean value of the index in question is 1.77, with a variation from 1.66 to 1.94, and s is 0.10. In 12 female skulls from Java the average value is equal to 1.67, with a variation from 1.60 to 1.80, s being 0.06 (cf. Mazák, l.c., Tab. 2).

[2] Occipital height is measured from the lower margin of the foramen magnum to the uppermost point of the occiput; the supraoccipital breadth is then taken as the smallest distance between notches of lateral margins of the occiput; the notch being situated approximately where sutura occipitoparietalis, sutura parietotemporalis and sutura occipitotemporalis meet.

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As to the other features of the structure of the Bogor Museum skull they are, too, in accordance with characters usually quoted as typical for the Bali Tiger, namely the shape of nasals which are long and narrow, and the form of the osseous bullae, which seem to be slightly flatter than in other Sunda island tigers.

The sagittal crest is very low and weakly developed, protruding just some 7 or 8 mm above the level of the parietal bones in its posterior part.

Similarly as in the female Bali Tiger skull kept in the British Museum (Natural History) (No. 37.12.1.2) rudimentary second premolars are present in the both right and left maxillae, whilst in two male Bali Tiger skulls of the British Museum (Natural History) the second upper premolars are missing on both sides. It thus seems that an evolutionary trend towards the disappearance of the second upper premolars can be observed in the Bali Tiger.

A list of preserved specimens of the Bali Tiger

The seven specimens of the Bali Tiger, *Panthera tigris balica* (Schwarz, 1912) listed below are all that are known to the authors of this article to be preserved in various scientific institutions[3].

1. Senckenberg Museum, Frankfurt a. M.
   Museum Nr. 2576, skin and skull of a subadult (or very young-adult) female, shot in 1909 by K. Gründler in Den Pasar region in South Bali (cf. Schwarz, 1913: 73).

   Holotype of *Felis tigris balica* Schwarz, 1912
   First description: Schwarz (1912)
   Figures: Schwarz (1913: 71, 72), Mazák (1965, fig. 69).
2. Naturkunde-Museum, Stuttgart
   Museum No.: sine; skull of an adult female, orginating from Medevi, Central Bali; August 4, 1924.

   First description: Hemmer (1969)
   Figures: Hemmer (1969, fig. 1).
3. Naturkunde-Museum, Stuttgart
   Museum No.: sine; skull of an adult female, originating from Poeloekan (= Pulukan), Central Bali; September 16, 1926.

   First description: Hemmer (1969)
   Figures: Hemmer (1969, figs. 1, 2).
4. British Museum (Natural History), London
   Museum Nr. 37.12.1.2, skin and skull of an adult male from Sendang, N. C. Bali; received in the Museum on December 1, 1937.

   First description: Mazák (1976)
   Figures (of skull only): Mazák (1976, pl. I), Mazák (in press).

[3] After this article had been accepted for publication, we learned from Dr. C. Smeenk of the Rijksmuseum van Natuurlijke Historie at Leiden, the Netherlands, that the Leiden museum very recently obtained the skin, skull and some limb bones of a Bali Tiger. The specimen (sex unknown), reg. nr 26135, was shot at Sendang, N. C. Bali, Indonesia, at the end of the dry season of probably the year 1931. The remains of this animal (leg. E. G. M. Croin, through N. Croin Michielsen, XII—1977), a young adult specimen with a condylobasal length of 236.0 mm, will soon be described and pictured. We are grateful that Dr. C. Smeenk, after hearing of this article, gave us the opportunity to enumerate already the Leiden museum specimen in this review.

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5. British Museum (Natural History), London
   Museum No. 38.3.14.5, skin and skull of an adult male from "Bali Island"; received in the Museum on March 14, 1938.

   First description: Mazák (1976)
   Figures: —

   Note: Though no exact locality is given it is not excluded that the specimen originated from the same region of Bali as the specimen listed sub No. 6 of this list as the both of them came together and on the same date into the British Museum (Natural History).

6. British Museum (Natural History), London
   Museum No. 38.3.14.6, skull of an adult female from Prapat Agoeng, West Bali; received in the Museum on March 14, 1938.

   First description: Mazák (1976)
   Figures: —.

7. Museum Zoologicum Bogoriense, Bogor
   Museum No. 6834, skin and skull of an adult female, shot near the kampung of Sumber Kima, West Bali, on September 27, 1937.

   First description: mentioned by Sody (1949), described in this article.
   Figures: see this article.

Notes on the recent occurrence of tiger on the island of Bali

Though some authors state that tigers did not survive in Bali into the 1940's (cf. van Bemmel, in Simon, 1969) there is some evidence that these carnivores still occurred there at least as late as in the early 1950's (cf. Mazák, 1976: 191—192).

There is little cause to hope that the Bali Tiger might have survived to the present and we thus have to regard it as an extinct subspecies. It is not, however, without interest that during his visit to Indonesia in 1975 one of us (C.P.G.) was informed by Mr. I. Made Taman, former Head of Wildlife Tourism, who comes from Bali, that people living in the vicinity of the Bali Barat Reserve, in the Northwest arm of Bali, insisted to him that there were still tigers in the reserve. Another of us P.J.H.v.B.), while staying in Bogor, Indonesia, in June, 1977 was even shown drawings of foot prints of a large cat recently found on Bali which were supposed to have been left by a tiger. Measurements of the foot prints none the less seemed to be too small for a tiger, even of a very small race like the Bali Tiger. They correspond rather to a medium-sized specimen of the Leopard, *Panthera pardus* (Linnaeus, 1758), although as far as our knowledge goes this species has never been recorded from Bali.

It thus seems that all the data on the present occurrence of tiger on the island of Bali are more or less negative. Yet, according to Ir. H. Prijono Hardjosentono, the Head of the Indonesian Nature Conservation Service, there is still an almost unaccessible mountain region in northwest Bali, covered with primary forest, that has not been so far checked for tigers. He doubts nevertheless that there would be enough food for tigers, however limited their population in the area in question might be (pers. comm. to P.J.H.v.B.). To avoid misunderstandings it may be useful to point out that the mentioned mountainous area includes the Bali Barat Reserve.

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At this place we would like to express our most sincere thanks to Mr. Boeadi, MSc., and Dr. S. Kadarsan of the Bogor Museum, Indonesia, whose kind assistance was of the greatest help for our work.

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Zusammenfassung

Über Fell und Schädel eines Bali-Tigers und eine Auflistung des Museums-Materials von Panthera tigris balica (Schwarz, 1912)

Schädel und Fell eines im Museum Zoologicum Bogoriense, Bogor, Indonesien, aufbewahrten Tigers werden beschrieben. Die Daten bestätigen die bisherigen Vorstellungen von den Besonderheiten der Bali-Unterart. Eine Liste aller bekannten Bali-Tiger in den Museen der Erde umfaßt 4 Felle und 7 Schädel. Die Unterart dürfte etwa um 1950 ausgestorben sein. Hinweise auf ein mögliches Überleben werden diskutiert.

References

Hemmer, H. (1969): Zur Stellung des Tigers *(Panthera tigris)* der Insel Bali. Z. Säugetierkunde **34**, 216—223.

Mazák, V. (1965): Der Tiger *Panthera tigris* Linnaeus, 1758. (1st ed.). Wittenberg Lutherstadt: A. Ziemsen Verlag. Die Neue Brehm-Bücherei **356**.

— (1967): Notes on Siberian Long-haired Tiger, *Panthera tigris altaica* (Temminck, 1844), with a Remark on Temminck's Mammal Volume of the "Fauna Japonica". Mammalia **31**, 537—573.

— (1976): On the Bali Tiger, *Panthera tigris balica* (Schwarz, 1912). Věst. Čs. spol. zool. (Acta Soc. Zool. Bohemoslov.) Prague **40**, 179—195.

— (in press): Der Tiger, *Panthera tigris* (Linnaeus, 1758). (2nd ed.). Wittenberg Lutherstadt: A. Ziemsen Verlag. Die neue Brehm-Bücherei **356** (in press).

Schwarz, E. (1912): Notes on Malay Tigers, with Description of a new Form from Bali. Ann. Mag. nat. Hist. (London), Ser. 8, **10**, 324—326.

— (1913): Der Bali-Tiger. Ber. Senckenberg. Naturforsch. Gesellsch. in Frankfurt a. M., **44**, 70—73.

Simon, N. (1969): Bali Tiger. Red Data Book. Vol. 1: Mammalia. I.U.C.N. Publ., Morges, Sheet Code No. MA/102/PANTH/TIG/BAL.

Sody H. J. V. (1949): Notes on some Primates, Carnivora and the Babirusa from the Indo-Malayan and Indo-Australian Region. Treubia, Buitenzorg, **20**, 121—190.

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