The *Pongo* faunas from Java and Sumatra and their significance for biostratigraphical and paleo-ecological interpretations

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ABSTRACT

The fossil faunas from Punung (Java) and the Sumatran Caves are reinvestigated. Biostratigraphically the cave faunas from both islands are intermediate between the Ngangdong and the Wadjak faunae. Both faunae are indicators of a humid forest climate, which probably is correlated with an interglacial period.

INTRODUCTION

In the literature the Sumatran cave material collected by Dubois between 1887 and 1890 has always been considered to belong to the Holocene (Dubois, 1888; Hooijer, 1947). Later Dubois (1908, p. 1255) suggested that the fossils from the Sumatran cave fauna could be much older. The Punung fauna was first described as a normal Trinil assemblage (Middle Pleistocene) by Von Koenigswald (1939, 1940), but Badoux (1959) separated the Punung fauna from the Trinil fauna and considered it to be Upper Middle Pleistocene. If we consider the composition of the Punung fauna, we can observe great differences with Trinil s.s. In Punung the relative frequencies of suids and pongo's are high. In Trinil the first group is present, but not abundant, while *Pongo* is absent (De Vos & Sondaar, 1982a). The Punung fauna shows a remarkable resemblance to the Sumatran cave fauna, which fact has never been brought forward, nor has it ever been discussed in the literature. This resemblance points to a similarity in age or in paleo-ecology. The purpose of the present paper is to discuss the biostratigraphical significance of the differences and resemblances of the various faunal assemblages.

The Dubois excavation in the Sumatran caves

The various caves of Sumatra excavated by Dubois were listed by Hooijer (1947, p. 253). The bulk of the material originates from three caves, viz., the Lida Ajer Cave near Pajakombo, the Sibrambang Cave and the Djamboe Cave near Tapisello. The Lida Ajer Cave is of special interest, because the excavation of this deposit is well documented by Dubois in one of his reports.

Lida Ajer Cave

Of the excavation of the Lida Ajer Cave (Ngalau Lida Ajer, West Coast of Sumatra), started on the 15th of July 1888, a report was made by Dubois, which is still present in the files of the Dubois Collection. From this report we can learn that the Lida Ajer Cave is situated in a limestone deposit South of the village of Sitoedoeh Batoe, as indicated in the geological Atlas of Verbeek. The entrance of the cave is about 150 m above the valley of the river Batang Babuwe. Most of the collected material are teeth, bones being rare. Almost all bones and teeth-roots show the traces of gnawing activities, presumably by porcupines. In most cases only the crown of the teeth is left. The following taxa have been identified in the fauna from the Lida Ajer Cave.

Homo sapiens L.

A right upper central incisor (Coll. Dub. no. 11471) and a left upper molar (Coll. Dub. no. 11472) were identified by Hooijer (1948, pp. 182–187, Pl. I figs. 1–5) as *Homo sapiens* L. subsp.

Pongo pygmaeus (Hoppius)

Material from *Pongo* of the Sumatran Caves, including the Lida Ajer Cave has been described and figured by Hooijer (1948) as a new subspecies *(Pongo pygmaeus palaeosumatrensis)*. According to Badoux (1959, p. 118) this subspecies must be placed in the synonymy with the living species.

Symphalanges syndactylus (Raffles)

Material from *Symphalangus* of the Sumatran Caves, including the Lida Ajer Cave has been described by Hooijer (1960) as a new subspecies *(Symphalangus syndactylus subfossilis)*.

Hylobates spec.

Hooijer (1960, pp. 37–39) described the material from the Sumatran Caves, including Lida Ajer as *Hylobates* spec.

Presbytis spec.

Hooijer (1962, p. 25) described the material from the Sumatran Caves, including Lida Ajer as *Presbytis* spec.

Trachypithecus cristatus (Raffles)

Material of this species from Sumatra, including Lida Ajer Cave, has been described by Hooijer (1962).

Macaca sp.

According to Hooijer (1962, p. 61) the *Macaca* material from Sumatran Caves, including Lida Ajer, is mainly *Macaca nemestrina*, while *Macaca fascicularis* appears to be present in the Sumatran Cave deposits, too, but it is much less common than the larger species.

Ursus malayanus Raffles

Subfossil (early Holocene) remains of the Malay bear from the deposits of the Sibrambang, Lida Ajer, Djamboe and other caves of the Padang Highlands in Sumatra have been mentioned by Hooijer (1948) as *Helarctos malayanus* (Raffles) subsp. No measurements were published. According to Erdbrink (1953, p. 74) these early Holocene Bruangs from a site near the type locality of the recent species do not show enough morphological differences to warrant subspecific separation.

Dicerorhinus sumatrensis (Fischer)

Hooijer (1946) described material of this species from the Lida Ajer Cave.

Tapirus indicus Desm.

Hooijer (1947) described the *Tapirus* remains from the Sumatran Caves, including the Lida Ajer Cave as *Tapirus indicus intermedius* Hooijer. Badoux (1959, p. 38) considered the subspecific status, based on 120 isolated teeth, insufficiently demonstrated.

Bibos javanicus (d'Alton)

Hooijer (1946, p. 98–99 Pl. IX figs. 5–10) described this species from the Lida Ajer Cave as *Bibos javanicus* (d'Alton) subsp.

Capricornis sumatrensis (Bechstein)

Hooijer (1958, pp. 99–106) reported on this species from the Lida Ajer Cave as *Capricornis sumatrensis* (Bechstein) subsp.

Rusa sp.

Material of a *Rusa* sp. is present in the Lida Ajer Cave.

Muntiacus muntjac Zimm.

Material from *Muntiacus muntjac* Zimm. is present in the Lida Ajer Cave (pers. observation).

Sus species

Sus vittatus and *Sus barbatus* are both present in the Lida Ajer Cave (pers. observation).

Elephas maximus Lin.

Hooijer (1955, pp. 132–137) described material of this species from the Lida Ajer Cave.

Acanthion brachyurus (Lin.)

Hooijer (1946) described material of this species as *Acanthion brachyurus* (L.) subsp.

Sibrambang Cave

No original description of the excavation and the position of this locality is present in the files of the Dubois Collection. The Sibrambang cave contains more or less the same fauna as Lida Ajer Cave. The following species, most of them described by Hooijer, are present in the Sibrambang cave as well as in the Lida Ajer cave.
Pongo pygmaeus (Hoppius); Hooijer, 1948.
Symphalangus syndactylus (Raffles); Hooijer, 1960.
Hylobates spec.; Hooijer, 1960.
Presbytis spec.; Hooijer, 1962.
Trachypithecus cristatus (Raffles): Hooijer, 1962.
Macaca spec.; Hooijer, 1962.
Ursus malayanus Raffles; Hooijer, 1948.
Dicerorhinus sumatrensis; Hooijer, 1946.
Tapirus indicus Desm.; Hooijer, 1947.
Bibos javanicus (d'Alton); Hooijer, 1958.
Capricornis sumatrensis (Bechstein); Hooijer, 1958.
Rusa sp. (pers. observation).
Muntiacus muntjac Zimm. (pers. observation).
Sus vittatus and *Sus barbatus* (pers. observation).
Elephas maximus Lin.; Hooijer, 1955.
Acanthion brachiurus (Lin.); Hooijer, 1946.

The species mentioned above are also present in the Lida Ajer cave. Further Hooijer reported for the Sibrambang Cave:

Rhinoceros sondaicus Desm.; Hooijer, 1946 and
Bubalus bubalus (Lin.); Hooijer, 1958.
Material of *Panthera tigris* Lin. and of small Carnivores is also present in the collection.

PUNUNG (=PATJITAN) DEPOSITS (JAVA)

Localities and Material

Badoux (1959, p. 127) noted that, concerning "The finds of the Punung fauna, Prof. Von Koenigswald told me that the material of the "Punung Collection" originates from two localities, viz. Punung I near Mendolo Kidul and Punung II near Tabuhan. Unfortunately, fossils of both sites have been thrown together. Those of Punung I, however, are said to be distinguishable by their comparatively bright greyish colour, those of Punung II by a dark brown colour. This very subjective criterion seems to be totally insufficient to warrant an exact relocation of the fossils in the collection over both sites. As a consequence I shall consider the fauna as a whole". It is remarkable that most of the roots

Table 1: *Duboisia* from Punung compared with *Capricornis sumatrensis* and *Duboisia santeng*. Measurements in mm.

	Duboisia (Badoux, 1959, p. 47)		*Capricornis sumatrensis* (Hooijer, 1958, p. 105)		*Duboisia santeng* Badoux, 1959, p. 47)	
		N	recent	subfossil Sumatra		N
M^1 length	12.0–13.0	2	12–16	16–19	13.9	1
breadth	14.0–14.5	2	12–16	12–18	14.2	1
M^2 length	15.0–16.0	2	15–18	18–21	15.0	1
breadth	15.0–16.0	2	12–16	14–19	14.0	1
M_1 length	14.0	1	12–16	15–19	15.5	1
breadth	9.5	1	9–10	10–13	10.0	1
M_2 length	14.5–15.5	2	16–18	18–21	14.5	1
breadth	10.0–11.1	2	9–11	11–14	8.0	1
M_3 length	–	–	19–25	23–28	19.0	1
breadth	10	1	9–11	10–12	8.5	1

Sus barbatus Miller
(?) *Sus verrucosus* Temm.
Elephas maximus Lin.

Acanthion sp. indet

Badoux (1959, p. 16) distinguished two forms in the Punung material. One form he indicated as *Acanthion* spec. indet., a smaller form as (cf. *Acanthion) brachyurus javanicum* Cuvier.

According to Bosma (1967, unpublished rep.) only one species is present in the Punung material: *Acanthion brachyurus* cf. *javanicum*.

The dimensions correspond with those of the recent subspecies *Acanthion brachiurus longicaudum* from Sumatra.

Echinosorex sp. indet.

The material referred to this genus was lost during World War II (pers. comm. Von Koenigswald in Badoux 1959, p. 11).

Panthera tigris (Lin.)
cf. (?) *Arctitis*
cf. (?) *Martes*

THE AGE AND THE STRATIGRAPHIC POSITION OF THE PUNUNG DEPOSITS AND THE SUMATRAN CAVE DEPOSITS

Comparison of the Sumatran cave fauna with the Punung fauna.

The following resemblances can be observed between both faunas:

- There is a resemblance in taphonomy; teeth are often gnawed and long bones are rare.
- The fauna assemblages are the same (table 2).
- The number of elements of each species is relatively the same (table 2).

Table 2: Number of specimens of the various taxa in the localities Punung (Java) and Lida Ajer (Sumatra). The dates for Punung are taken from Badoux (1959); the dates of Lida Ajer are own observations.

	Punung	Lida Ajer Cave Sumatra
Homo sp.	4 teeth	2 teeth
Pongo pygmaeus	199 teeth	a few hundred
Hylobatidae	41 teeth	?
Macaca sp.	16 teeth	16 teeth
Ursus	11 teeth	6 teeth
Rhinoceros	37 more or less well preserved teeth	22 teeth with fragments
Tapirus	21 teeth	32 teeth
Bovidae	small part of the collection	28 teeth
Capricornis (Duboisia)	8 teeth	3 teeth
Rusa sp.	12 teeth	42 teeth
Muntiacus muntjak	49 teeth	101 teeth
Suidae	abundant	abundant
Elephas maximus	four fragments	8 fragments
Acanthion	hundreds of isolated teeth and one ramus	hundreds of isolated teeth and some rami
Panthera tigris	15 teeth	–

Concerning *Symphalangus* spec. mentioned by Badoux (1959, p. 98), Hooijer (1960, p. 39) already noted that: "If the small specimen really belongs to *Hylobates*, this would indicate that *Hylobates* is very rare at Punung, making up just about the same very small percentage of the total number of gibbon teeth as at the Sumatran caves, in which, as we have already seen, *Symphalangus* is about seventy-five times more frequent than *Hylobates*."

The similarity between the faunas may indicate a similarity in ecology and/or age. During the glacial periods a dryer climate may have existed whereas during the interglacials a more humid climate may have been prevalent. The abundant quantity of *Pongo* points to a humid climate, a climatological situation evidently present during the deposition of both faunas. That we have to deal with two different interglacials is, however, improbable, as in both faunas the still existing *Elephas maximus* is present, which may be considered a more recent immigrant in this region. Because both faunas show the same taxa, a similarity in age is probable.

Comparison with the Ngangdong fauna

According to Von Koenigswald (1940) the Punung fauna fits in with the Trinil (Middle Pleistocene) biozone. He included this fauna in the Trinil fauna list, so that the fauna lists of Trinil published by Von Koenigswald (1940) and Hooijer (1952, p. 440) included the Punung fauna. Badoux (1959) separated the Punung fauna from the Trinil fauna, and according to Badoux (1959, p. 130) the Punung fauna dates back to Upper Middle Pleistocene times, filling the gap between the Middle Pleistocene Trinil fauna and the Upper Pleistocene and

subrecent Ngangdong and Sampung faunal assemblages. According to Von Koenigswald (1934, p. 191) *Stegodon trigonocephalus* Martin, *Elephas* aff. *namadicus* Falc. (= *Elephas hysudrindicus* Dubois, according to Hooijer, 1955), *Hippopotamus, Cervus (Axis) lydekkeri* Martin are present in the Ngangdong fauna, whereas *Pongo pygmaeus* is absent.

In the Punung fauna the archaic species mentioned above are absent, and *Pongo* is abundantly present. For these reasons we consider the Punung fauna to be younger than the Ngangdong fauna.

Comparison with the Wadjak fauna

In the Wadjak fauna (Van den Brink, 1982) *Pongo, Elephas maximus, Ursus malayanus, Macacus* and *Hylobates* are absent. These genera are still present in the Punung fauna, but absent in today's fauna of Java. Therefore we conclude that the Punung fauna is older than the Wadjak fauna. We already pointed out that the Sumatran cave fauna has the same age as the Punung fauna, and consequently the Sumatran cave fauna is older than the Wadjak fauna.

The Wadjak fauna seems to represent an open woodland fauna, whereas the Punung fauna resembles a humid forest fauna. We assume that the climate during that period became dryer.

Stratigraphic position

I propose the following fauna succession on Java (for Trinil-Kedung Brubus, see De Vos *et. al.*, 1982b).

SUMATRA	JAVA	ENVIRONMENT
	Recent	
	Wadjak	open woodland
Sumatran cave	Punung	humid forest
	Ngangdong	open woodland
	Kedung Brubus	open woodland
	Trinil	open woodland

CONCLUSIONS

- The Punung fauna and the Sumatran cave fauna indicate a similar ecology and the same age.
- Biostratigraphically the cave faunas from both islands are intermediate between the Ngangdong and the Wadjak faunae.
- The Punung and Sumatran cave faunae are indicators of a humid forest climate, which probably is correlated with an interglacial period. The well-known faunas of Java, like Trinil, Kedung Brubus, Ngangdong and Wadjak, represent a much dryer biotope, which probably occurred on Java during a glacial.

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