

Fossil Folklore from India: The Siwalik Hills and the *Mahâbhârata*

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Abstract

All over the world, from antiquity to the present, people have often explained fossil discoveries as proof of the historical truth of legends and myths, or used them as a basis for a new legend. Most often, large vertebrate fossils have been explained as bones and teeth of giant humans, dragons and monsters, saints and heroes. Smaller invertebrate fossils were often interpreted as sacred or curious relics based upon their resemblance to familiar or sacred objects. India is no exception to this practice. Fossil ammonites (*salagramas*), for example, are worshipped as the disc (*chakra*) of the Hindu god Vishnu. The Siwalik Hills, below the Himalayas, are strewn with impressive Plio-Pleistocene vertebrate fossils. This paper suggests that the region was seen as the historical stage for the legendary battle as described in the Indian epic *Mahâbhârata*, during which hundreds of mighty, and sometimes gigantic, heroes, horses, and war elephants are said to have died. Their remains are seen in the fossil bones, skulls, jaws, and tusks of hippopotamuses (*Hexaprotodon*), proboscideans (*Stegodon*, *Archidiskodon*), four-horned giraffes (*Sivatherium*, *Giraffokeryx*), giant tortoises (*Geochelone*), sabretoothed cats (*Paramachairodus*), camels (*Camelus*), and other species found on the surface of the Siwalik Hills. Moreover, thousands of ancient bronze javelins and spears are also found there after rains. These archaeological artefacts, along with the paleontological remains, appear to have influenced the setting and context of the great battle in the Indian epic.

Introduction

There are detailed accounts in the scholarly literature of mythological interpretations of fossils in Europe (for overviews, see Oakley 1965; Dermitzakis and Papadopoulou 1989; Thenius and Vávra 1996; Mayor 2000), where their existence has been explained in a variety of ways. They have been used as proof of biblical floods (Woodward 1695; Scheuchzer 1726; Buckland 1836; Tollmann and Tollmann 1993), and have been considered the remains of giants and monsters (Kircher 1664; Brückmann 1728; Abel 1939), of saints (Boeckschoten and Sondaar 1972), dragons (Symeonides, Bachmayer, and Zapfe 1974; Ucik 1990), and unicorns (Valentini 1704; 1714), or as petrified snakes (Rätsch and Guhr 1992), the petrified urine of a lynx (Abel 1939; Hegele 1997), or even as thunderstones (Abel 1939; Thenius and Vávra 1996). With regard to fossil myths from the Americas, Adrienne Mayor has provided an extensive overview of this topic in her book *Fossil Legends of the First Americans* (2005).

Geomythology from Asia is much less well known. Exceptions to this state of affairs concern the mistaking of Plio-Pleistocene fossils from China for dragon

bones (*long gu*) and dragon teeth (*long chih*) (Owen 1870; Granger 1938; Kahlke 1961; Prothero and Schoch 2002). Both of these are still used abundantly in traditional medicine throughout eastern and south-eastern Asia, and similar kinds of fossil bones called “lightning bones,” renowned for their perceived medicinal power, are sold in the bazaars of Lhasa in Tibet (Montgomerie 1868). Another exception is the possible mistaking of fossil bones of *Protoceratops* for the mythical griffin (Mayor and Heaney 1993; Mayor 2000, 15–53). Other evidence is sparse. Some examples from China make mention of, or describe ammonites as horn stones (*jiao-shih*); cross-sections through straight nautiloids as pagoda stones (*bao-ta-shih*) (after the seven-storey tower); belemnites as sword stones (*jien-shih*); certain brachiopods as stone swallows (*shih-yen*); long-spined trilobites as butterfly stones (*hu-die-shih*); and spiny tailed trilobites as bat stones (*bien-fu-shih*) (Bassett 1982). Su Song in his pharmacological treatise *Ben Cao Tu Jing* (1061–70 C.E.) refers to the *jiao-shih*, or horn stones (ammonites), as follows (in translation):

... the stone-serpent appears in rocks which are found beside the rivers flowing into the southern seas. Its shape is like a coiled snake with no head or tail-tip. Inside it is empty. Its colour is reddish-purple. The best ones are those which coil to the left. It also looks like the spiral shell of a conch. We do not know what animal it was which was thus changed into stone (Su Song, trans. Casanova 1983).

Apart from the use in Japan of ammonites as chrysanthemum stones (*kiku-ishi*), which are a class of water stones (*suiseki*), there is also a thread of Japanese mythology woven around the ammonites, based on their spiral form. Buddhists regard them as a symbol of enlightenment, and, as such, they function as meditation objects, and are kept in a box made from precious wood and filled with sand (Thenius and Vávra 1996). Another Japanese fossil myth concerns fossil shark teeth, which are considered to be the extremely long and sharp nails of a long-nosed or bird-beaked goblin (*tengu-no-tsume*) (Thenius and Vávra 1996). They are enshrined in temples as a sacred treasure.

In this paper, we investigate the possibility of yet another Asian fossil myth. It has already been suggested by scholars that there might be a connection between the abundant fossils found on the surface of the Siwalik Hills of the Himalayas (see Figure 1) and an epic description of a battlefield with abundant remains of heroes and war elephants (see Van der Geer, Dermitzakis, and De Vos 2006, 124; Mayor 2007, 246). We will, however, first of all provide an account of other fossil myths from the Himalayan region, in order to show the significance of fossils in India as in the rest of the world, and then give an overview of facts and background regarding the epic battlefield description just mentioned.

Fossil Folklore in the Himalayas: Salagramas

The only thoroughly studied fossil myth from the Himalayas is that regarding the *salagramas* or *saligramas*—ammonites worshipped as divine symbols—which have been extensively studied by S. K. R. Rao (1996). The majority of these ammonites are found near the village of Salagrama in the Gandaki district of Nepal, not far from Muktinath (Kunz 1915; Figure 1, no. 14). The ammonites are named after the village, which in turn took its name from the abundant *sala* trees (*Vatica robusta*). The stones are considered holy and are worshipped as symbols of Vishnu—the

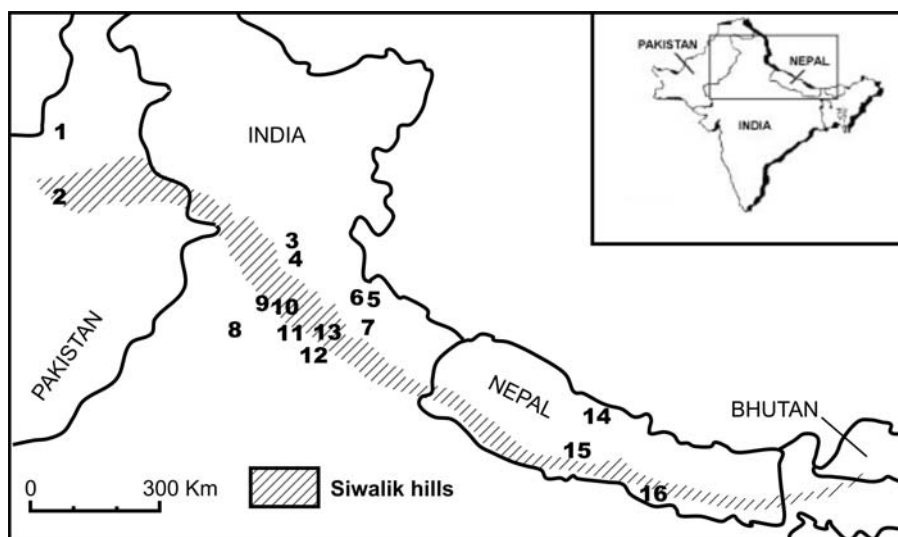


Figure 1. Map of South Asia (inset) with Siwalik Hill Range from Pakistan to Bhutan. Legend (numbered from left to right): 1, Peshawar; 2, Salt Range; 3, Beas Kund; 4, Naggar; 5, Bhimpul; 6, Tapovan; 7, Karnaprayag; 8, Rakhigarhi; 9, Pinjore Valley; 10, Nahan; 11, Thanesar; 12, Hastinapur; 13, Kurukshetra; 14, Muktinath; 15, Byas Gupha; 16, Janakpur.

four-armed Sustainer of the Universe who holds a disc or wheel (*chakra*) in one of his hands (Kunz 1915; Oakley 1965; Hagn 1977; 1988; Messerschmidt and Sharma 1981; Bassett 1982; Thenius and Vávra 1996; Monks and Palmer 2002). They were, therefore, originally, referred to as *Ammonites sacer* by Blumenbach (1803); today, however, they are known as *Aulacosphinctus* and *Aulacosphinctoides*, and these fossils are still held in high regard by Hindus throughout India. For Buddhists in Nepal and Tibet, the ammonites represent the eight-spoked wheel of the law (*dharmachakra*), and they worship them as such (Thenius and Vávra 1996), using them not only as meditation objects but also offering them to mountain gods at *chorten*-that is, small shrines high up in the Himalayas. For a very small group of *sakti*-worshippers (cult of the Goddess), the ammonites are symbols of the female principle in nature and, as such, represent the goddess Prakrti. A particular type of *salagrama* is considered to represent Shiva; these, however, are not fossil ammonites, but fossil spiralled shells (see further below).

The myth behind the Vishnu's petrified disc is told in the *Shiva Mahapurana* (3rd–12th century C.E.) (2007, chaps. 22–3 of the book *Yuddhakhanda*), and can be summarised as follows. Once, there was a quarrel between the god Shiva and the demon Jalandhara. Whichever one of them whose wife would lose her chastity, would lose the fight. Thus Jalandhara disguised himself as Shiva and approached Parvati, Shiva's wife. Parvati recognised him and called upon Vishnu. Vishnu, disguised as Jalandhara, went to Vrinda, Jalandhara's wife. She did not recognise him and it was too late when she realised her mistake. She put a curse on Vishnu that he would become stone, grass, tree, and plant. Since then Vishnu resides in the *salagrama* stone, the *kusha* grass, the *pipal* tree and the *tulsi* plant (basil).

Other evidence for the perceived sacredness of the ammonite stone is found in the allegorical drama *Prabodha-candrodaya* by Krishnamishra, dating to the latter half of the eleventh century C.E. (*Prabodhacandrodaya*... 1971). The connection between Vishnu and a stone called *salagrama* is referred to in the *Mahâbhârata* (c. 500 B.C.E.–500 C.E.) (1981, chap. 84, 123–5 of the book *Vanaparvan*). Both Oakley (1965) and Bassett (1982) are probably referring to this text when they say that the *salagrama* and Vishnu cult can be traced back, on literary evidence, to the fifth century B.C.E. The first part of the *Garuda Mahapurana* (c. 200–1200 C.E.) (1984) relates that Hari (another name for Vishnu) resides in many places in which he may be worshipped, but of all these places the *salagrama* is the most important. The *Padma Purana* (c. 200–1200 C.E.) (1988–92) states that a single act of worship of a *salagrama* is as meritorious as worshipping a *linga* or *lingam* (an aniconic, phallic form of Shiva) thousands of times. The *Skanda Purana* (c. 200–1200 C.E.) (1992) relates that Shiva will not accept worship and obeisance from someone who does not also worship the *salagrama* stone. In this text, the *salagrama* is a symbol for Shiva, not for Vishnu.

Not all *salagramas* are ammonites; the *salagram stotra mantra*, a form of praise of the *salagrama* as chanted by Krishna to Yudhisthira in the *Mahâbhârata*, enumerates the extant types of *salagramas*, of which those bearing a *chakra* (the ammonites) are only one type. Apart from these, there are *salagramas* with the sign of a conch, with white lines, with the marks of a cow's feet, and they can be turtle-shaped or umbrella-shaped, and so on. A comparable listing can be found in the *Brahma Purana* (c. 200–1200 C.E.) (1987), where Narayana (another name for Vishnu) informs Brahma about the different names of the stones in which he resides. It seems logical to assume that some of them are actually fossils. The list of existing *salagrama* types includes stones for worship of Shiva. Invariably, they resemble the *linga*, a symbol for his ithyphallic manifestation. The goddess is represented by breast-shaped pebbles (*devi salagramas*). Partial ammonites are often considered to represent part of the god Ganesha's elephant trunk (*ganesha salagramas*) instead of a broken Vishnu *chakra*.

Lastly, fossil corals may take the place of *salagramas* or accompany them, as described in the *Brahma Purana*. They are known as *dvaraka shilas*, named after the flooded city of Dvaraka (present-day Dvaraka, Gujarat), and bear the *chakra* mark as well. Their use is much more limited than that of the *salagramas*, as they are worshipped only in Saurashtra, Bengal, Maharashtra, and possibly also by the Madhva sect in Karnataka (Rao 1996).

Other Fossil Traditions in the Himalayas

Philostratus the Athenian (c. 170–247 C.E.) describes the life and acts of the ascetic philosopher Apollonius of Tyana (c. 2–c. 97 C.E.). In Book II he informs us that Apollonius visited India to meet the “naked philosophers” (gymnosophists), who are known in India as *yogis* and *sadhus*. In this context, Philostratus refers to *drakondes*, which were supposed to live beneath the Himalayas, and which had crests and bore sparkling jewels in their skulls. The dragon skulls were displayed in the city of Paraka (Mayor 2000, 130, quoting Philostratus 1912). This city remains as yet unidentified, although Mayor suggests that it might be Peshawar (Figure 1), arising from its ancient name, “Parasha” (Mayor 2000, 130).

Although this suggestion is reasonable from a linguistic point of view, it is unlikely to be correct since Peshawar is derived from the Hindu name, "Purushapura" (mentioned by Strabo and Ptolemy), and was changed into its modern form by the Mughal emperor, Akbar the Great (1542–1602), presumably on religious grounds. The noun *paraka* means "distance, far-away place" in Sanskrit, the *lingua franca* of that time, and, therefore, might refer to a mere description rather than a real city name. In any case, it is of interest to note that "dragon" skulls were known and displayed somewhere in the Siwalik Hills. The description of the dragon skulls in Philostratus are applicable to the skulls of extinct giraffes (*Sivatherium*, *Giraffokeryx*) and elephants (*Elephas hysudricus*) found in the region (for a detailed discussion and a description of these dragon skulls, see Mayor 2000, 130–5).

Drakon in Apollonius's time referred to something like a huge, toothed serpent, which, in rare cases was thought to be winged and drawing flying chariots like those of the goddess Demeter and the sorceress Medea. A few centuries earlier, however, the term denoted a kind of seer, or wise creature. The Hebrew *seraphim* provides some analogue; these were originally celestial fiery serpents that came down to test humans and to devour them, if necessary, at the command of Yahweh. Jesus is said to have instructed his disciples to "be as wise as serpents" (*Matthew* 10:16), the latter word being translated into Greek as *drakones*. It might, therefore, be that Apollonius was referring to *nagas*, which, together with their consorts *naginis*, were described as being half-snake, half-human, often with multiple heads (five or seven), living in pools and below the earth, especially beneath the Himalayas of Nepal and Tibet, and in the netherworld called Patala. They were not regarded as being monstrous or evil serpents, but rather wise and benevolent semi-divine beings, who are still worshipped all over India as bringers of wisdom and protection. Today, the king cobra (*Ophiophagus*) is regarded as being the *nagaraja*, the *naga* king; and the scientific name for the true cobras is *Naja*, a Latinised version of the Sanskrit word. They are believed to be able to fly, and to possess magical powers and wisdom, just like the Greek *drakones* and the Hebrew *seraphim*. The deep caverns in the Himalayas where they live are said to contain treasures of sparkling precious stones. Since *nagas* are snakes, and the Himalayas are full of ammonites, it may be that some of Apollonius's *drakones* were fossil ammonites since Pyritised ammonites have a sparkling, golden appearance. Another possible source giving rise to the sparkling effect may be found in a Pakistani part of the Siwalik Range called the Salt Range (Figure 1). Situated along the Jhelum River are the oldest and largest rock-salt mines of the world, which provide the fascinating spectacle of light filtering through solid walls of salt. While this is a popular tourist attraction today, it must, in the past, have been appeared to be a magical spectacle. It may thus be that it was stories about findings of fossil ammonites, combined with those about the sparkling treasure halls, that gave rise to the magical *drakones* of Philostratus.

Hugh Falconer (see Murchison 1868, vol. 1, 388) suggested that the giant tortoise that supports the primordial world, as described in an Indian cosmogonic myth, might very well be based on the actual fossils of the giant tortoise *Colossochelys*, found in the Siwalik Hills (see for an extensive account of Falconer's idea, Nair 2005, 381–2). However, in making this suggestion Falconer

conflated at least three Hindu myths. One of these is a cosmogonic myth, and is described in the *Vishnu Purana* (c. 200–1200 C.E.) (1864–87) and *Brahma Purana*, but Falconer took the version as narrated in Jayadeva's *Gita Govinda* (Nair 2005, 382). According to this, the gods and demons wanted to churn up the ocean in order to produce *amrta*, the elixir of immortality. For this purpose, they used the *naga* Vasuki as the rope and use mount Meru (or Mandara) as the stick spun by the tortoise king. The rope was wrapped around the stick, and one of its ends was held by the gods, while the other end was held by the demons. By pulling alternately, the stick spun on the support and the friction energy produced all kinds of marvels, including the desired elixir. The scene took place in the Himalayas. Another myth he used was that of the earth-supporting elephants, standing on a huge tortoise (Nair 2005, 381). In this cosmogonic myth, eight celestial elephants are each appointed to carry one of the eight guardians (*astadikpalas*) of the eight wind directions. Each guardian (*dikpala*) stands on his own celestial tortoise. The guardians were actually the main gods of the previous Vedic period, such as Indra, who had to give way to the present-day Hindu gods. The third myth Falconer made use of describes a fight between a giant tortoise and an elephant (Nair 2005, 381), as narrated in the *Mahābhārata* (1981, book 1, section 29). This can be summarised as follows. According to a Hindu myth, Garuda, the eagle of Vishnu, once went to Chandraloka. On his way, he visited a lake in the Himalayas in which the tortoise Vibhvasu and the elephant Supritika were ferociously fighting each other. Because they had been cursed to do so in a previous life, even Garuda, a demigod, was not able to stop the fighting, but being clever he devoured them both and thus ended the conflict. Falconer asked his audience whether the Indian gigantic tortoise really existed, or was a mere fiction, like the minotaur, the chimera, the griffin, and the dragon. As modern scholars have already found a basis for the griffin (Mayor 2000, 15–53) and the dragon (see, for example, Thenius and Vávra 1996), Falconer may very well have been close to the truth. The fossil myths about battle remains in the Siwaliks are dealt with below.

There are two further vague references to possible fossil myths. The first involves fossil belemnites, which are collected in the Siwalik area for their perceived magical powers. Because of their phallic shape they are thought to have been given by Shiva (Hegele 1997), as the phallus (*linga*) is the aniconic representation of Shiva. In Muslim areas, the belemnites are seen as bullets, as is evident from the habit children in Pakistan have of sorting them according to their "calibre," as is done with real bullets (Mayor 2005, 369, note 7). The second reference to a fossil myth is even more vague and concerns fossil sea urchins. They are found in Neolithic graves in Pakistan's Salt Range, which indicates that people of the past attached some magical or ritual value to these petrified remains (Seilacher 1991), as did, apparently, the ancient Germanic tribes (Thenius and Vávra 1996), and Early Bronze Age people in Britain whose burial in Dunstable Downs, north of London, indicates this. There is another reference to fossil sea urchins from the Narmada Valley (Madhya Pradesh). They are found in the Cretaceous Bagh Beds, named after the small town of Bagh. The local people call them "five grooves" (*pancha khadda*), obviously inspired by the five radiating ambulacral rays on the urchin's ventral surface (Taylor 2000). Whether these fossils figure in any myth or legend is not known to us at this point.

Fossil Folklore in the Narmada Valley

The Cretaceous Beds of Madhya Pradesh are rich in dinosaur bones and have been explored in this context since 1818. In recent times, three amateurs found more than one hundred dinosaur eggs and footprints on the surface in the Lameta Beds (*Hindustan Times*, 13 June 2007), indicating that the dinosaur remains may have been known to the locals for centuries. In this respect, it is worthy of note that, according to the *Vishnu Purana*, there once was a conflict in that region when the underworld was said to have been occupied by the *gandharvas*—celestial beings of some kind. These did not follow the rules of the lawful inhabitants, who were the *nagas*, and even stole their jewels. The *nagas* went to king Purukutsa, an incarnation of Vishnu, for help. They sent the river Narmada to bring Purukutsa to their underworld, where he killed all the *gandharvas*. Although the myth does not explicitly mention bones or snake eggs, it is possible that the dinosaur bones and eggs were considered to be remains from that conflict, given the explicit reference in the myth to the river Narmada and the extermination of celestial beings. A hint that dinosaur bones in the Narmada valley are still thought of as giants' bones is found in Nair (2005, 367). A local carpenter found the skeleton of a "giant" with fingers three feet long, which led to the discovery of the Jabalpur Beds, famous for their dinosaur bones.

In 2003, a horned or crested theropod dinosaur (*Rajasaurus narmadensis*) was discovered by Paul Sereno and Indian colleagues in the Narmada Beds, after earlier reports of the finding of dinosaur eggs ("large balls") by workers in a limestone quarry. An eighteenth-century temple painting in the Pahari/Kangra style from Himachal Pradesh (now in the Philadelphia Museum of Art) depicts the *sharaba* as a hybrid creature, with a beaked tiger's head, a tiger's body and legs, and large wings. The creature is an incarnation of Shiva, who came to calm Vishnu in his form as Man-Lion (Narasimha). A painting from Rajasthan, dating from around 1720, in the Philadelphia Museum of Art (catalogue no. 1994-148-430) depicts a similar theme in a more natural way. In this work the *sharabha* has a winged tiger's body with an eagle head. It is tempting to suggest that there may be a direct connection between these beaked *sharabhas* and the beaked *Rajasaurus* from the Narmada Beds, as is the case with the griffin and the *Protoceratops* (Mayor and Heaney 1993; Mayor 2000, 15–53). However, Himachal Pradesh and Rajasthan yield no *Rajasaurus* bones. The miniature paintings in question are very rare, however, and they can also be explained in terms of the post-sixteenth-century artistic motif of animal-blending, which probably originated in Persia.

It should also be pointed out that the description and depiction of the *sharabha* is inconsistent. In the earliest sources (*Atharvaveda Samhita* [c. 1200–900 C.E.], 1989), it is a fabulous eight-legged deer. Later on, it became a giant bird with two heads and four legs (*Bhagavata Purana* [c. 200–1200 C.E.], 1987–9v), but it never became a reptile. Scenes including the *sharabha*, on the other hand, are very popular in South India, probably illustrating the victory of the Shiva cult over the Vishnu cult. At the sixteenth-century Virabhadra temple in Andhra Pradesh, the *sharabh* is depicted as a lion with two eagle heads and as many as twenty arms; at the Kampaharesvar temple (twelfth–thirteenth century) in Tamil Nadu, it is half man, half bird; and at the Airavateshvara temple (c. 1146–73 C.E.), also in Tamil Nadu, it is depicted as part man, part lion, part bird. It would seem that a fantastic

blend of mythical and existing life forms underlies the concept of modern *sharabha*, rather than a real extinct animal. All of these southern temples are distant from the Narmada valley and its beaked dinosaur fossils. To add to the diversity, it can be mentioned that the logo of the University of Mysore consists of two *sharabhas* flanking the mythical bird *Gandabherunda*, and that the *sharabas* in question are lions, each with an elephant head (<http://www.uni-mysore.ac.in/unity/about/emblem>. Accessed 22.01.08)—an obvious confusion with the *gajasimhas* (“lion-elephants”) mentioned in Van der Geer (2008).

Mahâbhârata, the Great War

The longest epic of India, the *Mahâbhârata*, tells the history of the descendants of King Bharata. This enormously-long strophic poem consists of more than 100,000 two-line stanzas divided into eighteen books (see the editions of Van Nooten 1871 and Buck and Van Nooten 2000). With regard to its importance, it can be compared with Homer’s *Iliad* and *Odyssey*. The epic was immortalised in many temple reliefs, either on a large scale (Figure 2) or in detail. In the course of time, the *Mahâbhârata* spread further to the east and became part of the common legendary past of Cambodia, Thailand (Figure 3), Vietnam, and even Indonesia (Roveda 2001).

The epic, however, was not always so extensive. The version as we now have it is based on oral tradition, and it grew into its present form over a long period of

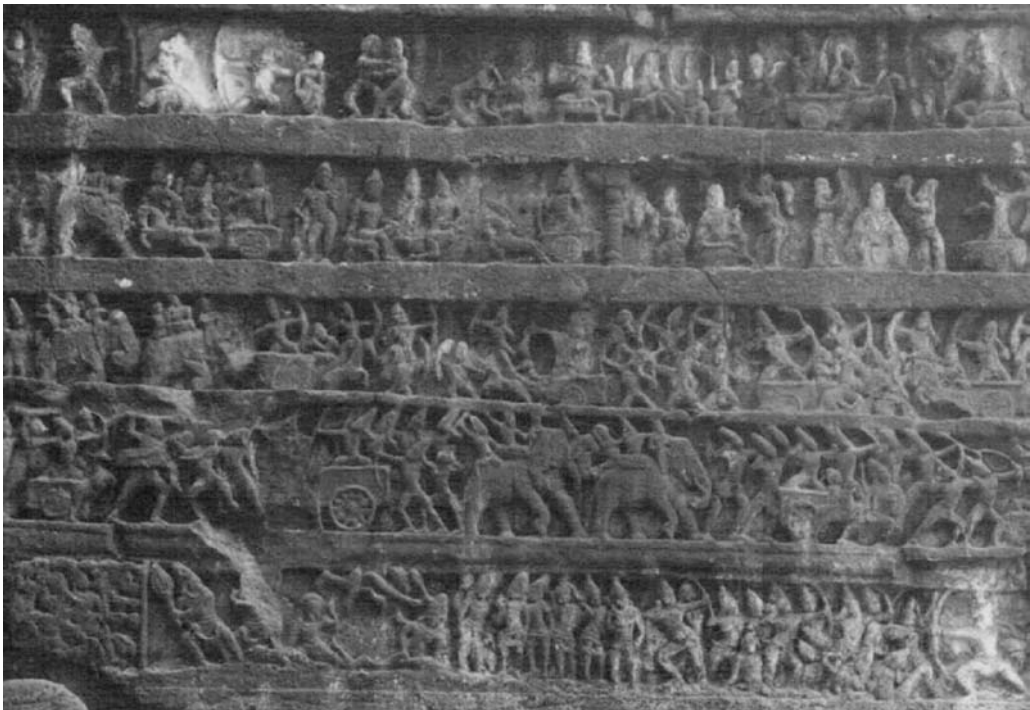


Figure 2. Bas-relief with scenes from the Great War as described in the *Mahabharata*. Ellora, Kailasanatha Temple (Cave 16), northern wall of the main hall. Dated to between the eighth and tenth centuries C.E. (Photograph: Archeological Survey of India 1910–11. Courtesy Kern Institute, Leiden, the Netherlands.)



Figure 3. Bas-relief with *Mahâbhârata* scenes at the temple of Angkor Wat, Siem Reap (Cambodia). Large panel no. 1 of the third enclosure gallery. Dated to the eleventh century C.E. or the first half of the twelfth century. Top: Bhishma on his arrow bed. (Photograph: Archeological Survey of India, 1900–20. Courtesy Kern Institute, Leiden, the Netherlands.)

time, from about 400 B.C.E. to 400 C.E. This famous story of an important battle that once took place in the region was passed down through the generations, and in the process of transmission it became increasingly elaborate and acquired many additions.

No matter how much the text of the *Mahâbhârata* changed during the two and a half millennia of its existence, the main core—the battle of Kurukshetra as described in book 1, especially verses 184–92 (see for example Dange 1997)—remained stable. According to the story, the battle was fought between two branches of a North Indian dynasty and included the armies of all known kingdoms. It all started, as many wars do, with a conflict about rights to the throne. Apparently, Yudhishthira, the eldest of the five Pândava brothers and legal heir to the throne, was challenged to a game of dice—in which he was defeated. In this way he lost the throne for a period of thirteen years to the other branch, the hundred Kauravas, led by their eldest brother, Duryodhana. After the agreed thirteen years of exile, the Pândavas returned, but Duryodhana bluntly refused to return the kingdom to the Pândavas. Negotiation failed and war was thus inevitable. After the death of thousands of heroes, horses, and war elephants, the war finally culminated in a duel between the gigantic Bhima and the champion of the Kauravas, Duryodhana. The end result of the battle was unwonted carnage, and one of the books (book 11, or *Striparvan*) describes the lamenting of the women who had lost their husbands and sons.

The descriptions of the battlefield in the *Mahâbhârata* itself (books 7–9) and in later sources—*Bhasanatakacakram* (c. 200–1400 C.E.) (1937), especially the dramas entitled *Urubhanga* and *Karnabhara* (c. 400–600 C.E.; for dating, see Van der Geer 1998)—all refer to remains of elephants, horses and men, some of them decapitated. The presence of vultures on the battlefield is mentioned, and it is also carefully described in Dingal heroic poetry of medieval Rajasthan (Kamphorst 2004). The descriptions of the battlefield after the carnage are lengthy and interwoven with all kind of similes, and can be summarised as follows. Interesting to note is the emphasis on decapitated corpses, isolated heads and broken weaponry.

- The earth of Kurukshetra's plain is strewn with fallen steeds, some deprived of their tongues, others with their tongues protruding. Steeds are slain in hundreds and in thousands. Broken cars and mighty weapons broken into fragments are scattered around; there is a confused mass of torn mail, skins, umbrellas, chowries, javelins, arrows, spears, and armour mixed with headless trunks, and a litter of every sort of weapon. Trunkless elephants are lying prostrate (book 6).
- Kurukshetra's plain is strewn with fallen heads that are crimson with blood; fallen heads are seen everywhere, lifeless heads with upturned eyes. The ground is soaked with the blood of horses, men, and elephants, wounded and slain (book 9).
- Duryodhana's muscular shoulders, hard as the trunk of Indra's elephant, are torn open. His adversary pulls out one of his mighty arms, then tears open his chest and finally beheads him, and drinks his blood (book 9 and *Urubhanga* Act 1).
- Thousands of men had fallen down deprived of life, innumerable headless trunks stood up and fell down again. When heads are severed, trunks rush on by force of habit (book 10 and *Urubhanga* Act 1).

- Drona mangles the backs of some of the fallen men, cuts off the heads of some, cuts some bodies in half and presses down the heads of some into their trunks (book 10).
- The ground is rugged with heaps of elephant's carcasses like huge boulders. On every side are vultures' nests (book 11 and *Urubhanga* Act 1).
- The earth shows clearly all around in the pitiless rays of the sun slaughtered warriors and kings, elephants and chargers; it seems to support a host of fallen stars, covered as it is with darts and lances, arrows, javelins, and swords (*Karnabhara* Act 1).
- Bhîma, matchless in battles, huge as a mountain, sinks on the earth like the Golden Peak (= peak in Himâlayas) struck by a thunderbolt (*Karnabhara* Act 1).
- Drona, the king of the Kurus, has crossed the ocean of war and lies amid a rampart of broken chariots and the carcasses of men, elephants, and horses (*Karnabhara* Act 1).

Even gods like Shiva, Rama-with-the-Axe, and Krishna, were eventually involved, as the imagination of later generations included them all in the original succession conflict, and raised the battle to cosmological proportions. The epic poem became a history of the world, including all conceivable subjects, and absorbed older stories and legends. The central theme was now the decline of cosmic law and order (*dharma*), which was to be restored, and not so much the original conflict. The human urge to interpret and to place everything in a broader context led to introductory parts, insertions, additions, and to the addition of more heroes, gods, demi-gods, demons, and whoever else could play a role. Fantasy also played its part and transformed the actors into giants and muscular heroes, and their animals into extremely gruesome beasts. As a result, the skeleton of the story remained scarcely visible with the march of time.

The traditional locations of the final war as described in the *Mahâbhârata* (3.83.204) are said to be the plains of the mighty rivers, the Ganges and the Yamuna, and also the Kurukshetra area (Ghaggar Valley) in the state of Haryana (North India). This latter location is specified not only in the *Mahâbhârata* itself, but also in other texts—for example, in the *Aitareya Brahmana* (c. 1000–700 B.C.E.) (1976–7, 8.202) and the *Shatapatha Brahmana* (c. 1000–700 B.C.E.) (1983, 11.5.1.4 and 14.1.1.2). Kurukshetra is nowadays nothing more than a small, insignificant town, about one hundred miles north of New Delhi (Figure 1, no. 13), with its name referring both to the town and to the vast surrounding plain. According to tradition, however, the great, eighteen-day battle, between the Pandavas and Kauravas, was fought on its plains. Tens of thousands of heroes twice the size of ordinary men, and with arms as thick as elephant trunks, are said to have died on these battlefields.

Local tradition specifies a number of places in and around Kurukshetra where scenes from the *Mahâbhârata* are supposed to have occurred. These include Asthipura (literally, “town of bones”), where all war casualties were said to have been cremated, and Jyotisar, where Krishna revealed the message of the Gita to Arjuna. Other important places are Chakratirtha (where Krishna killed Bhishma with his disc [*chakra*]); Bhishmakunda in Narkatari village (where Bhishma died on a bed of arrows, and where Arjuna shot an arrow in the earth, and brought forth a spring of fresh water to quench the thirst of the dying Bhishma);

Abhimanyukhera mound at Amin (where a labyrinth trap [*chakravayuha*]) was set, in which Abhimanyu was killed); Raja Karna ka Qila (dying place of Karna); Prithudaksevara (dying place of Duryodhana); Chandrakupa (where Yudhishtira erected his victory pillar); and Bhor Saidan (dying place of Bhurirara). Most places in Kurukshetra are directly linked to a duel and the subsequent death of one of the heroes, whose name often forms part of the geographical name.

Nevertheless, only a minor part of the *Mahâbhârata* is set around Kurukshetra—the rest of the battle-stage extends over other states in the Siwalik Hill Range. Hastinapura (“Elephant City”; see Figure 1, no. 12), the dynastic capital and the throne of which was the very reason for the great battle, is situated in nearby Uttar Pradesh. Beas Kund (see Figure 1, no. 3), the source of the Beas River—called after the sage Vyasa, the composer of the *Mahâbhârata* who used to meditate along its banks, is in Himachal Pradesh. In the south-eastern section of the Nepalese Siwaliks close to the Indian border, the *Mahâbhârata* is referred to in some further geographical locations. Janakpur (city of king Janak, father of Sita, is called Mithilnagara in the *Mahâbhârata*; see Figure 1, no. 16); Biratnagar (city of king Virat, who sheltered the Pandava brothers during their exile is named Gograha in the *Mahâbhârata*); Kichakban or Kichakbadh (a forest where king Kichak was killed in a duel with Bhima); and Byas Gupha (a rock shelter, which is the birthplace of the sage Vyasa, the composer of the *Mahâbhârata*; see Figure 1, no. 15) at Damauli. A few more references can be found in Uttaranchal: Drona Gupha (the cave where Drona drilled the Pandavas; also known as Tapkeshwara temple), Tapovan (the forest where Drona did penance; see Figure 1, no. 6) near Dehradun; Bhimphul (Bhima’s bridge to cross the Sarasvati River; see Figure 1, no. 5); Ganesha Gupha (Ganesha’s cave, where he wrote down the *Mahâbhârata*); another Vyas Gupha (Vyasa’s cave), all three of which are near Badrinath (named Badarikashrama in *Mahâbhârata*); and Karnaprayag, where Karna performed his worship (see Figure 1, no. 7). The five Pandava brothers are believed to have spent four of their fourteen years of exile at Katas Raj, along the Jhelum River in Pakistan’s Salt Range (see Figure 1, no. 2). An annual pilgrimage of Hindus from India takes place to the temple pool of Katas Raj to fill pots (*kalash*) with holy water.

Hundreds of geographical references to the *Mahâbhârata*—some of them overlapping—also exist in the Himalayan foothill region situated roughly between the Terai in Nepal and the Salt Range in Pakistan. It is, however, beyond the scope of this paper to enumerate them all. The purpose here is to underline the fact that, traditionally, the legendary hot spots concerning the *Mahâbhârata* are tightly woven into the landscape of the Siwalik Hill Range. The geographical names incorporate either names of heroes, or of the composer, Vyasa (= Byas, Beas), or refer to a passage in the text. None, except maybe Asthipura, explicitly refers to remains in the form of bones, skeletons, or tusks. This might be ascribed to the Hindu view that body parts, fluids and remains, are particularly unclean (see below). This matter, which is beyond the scope of this paper, deserves further investigation.

Siwalik Fauna

On his first visit to the Siwalik Hills region in the first half of the nineteenth century, the famous palaeontologist Hugh Falconer was struck by the quantity of

fossil bones in evidence—he was able to collect more than three hundred large bones in just one day (Falconer and Cautley 1845–9). He had actually expected to find enormous bones in the region, having read about bone remains in the Pinjore valley (see Figure 1, no. 9) in a history of India (*Tarikh-I Firisht*) written by the Persian-born Ferishta or Firishta (c. 1560–c. 1620), which had been translated into English in 1829 (Ferishta 1829; see also Nair 2005, 370–1). In addition, local people are said to have shown him the remains of the demonic *râkshasas* that had been killed there by an epic hero (Mayor 2000). This could refer to the victory of Krishna over Bana, who was assisted by Shiva with his host of all kinds of demons (see, for example, in this context, *Hariṽamsa* (c. 500 B.C.E.–500 C.E.) 1834–5, 1.175; *Vishnu Purana* 1864–87, 5.33), but also to the *Mahâbhârata*, since Kurukshetra lies nearby (see Figure 1, no. 13). Locals had collected fossil bones for centuries and considered them *bijli ki har* (Hindi for “lightning bones”), which were sold on the plains for their perceived magical powers (Mayor 2000, 133; Nair 2005, 361).

Near the village of Samrota, in the Pinjore valley, a similar story was told about giants who were said to have been destroyed by the hero Ramachandra, as narrated in the epic *Ramayana* (Nair 2005, 370). The Raja of Nahan (see Figure 1, no. 10) had evidence for the myth—a fossil elephant tooth and tusk fragment—in his collection (Cautley 1834 cited in Nair 2005, 370). The fauna that Falconer found in this area became the type-fauna for a much larger region and was referred to as the “Siwalik Fauna” (Falconer and Cautley 1845–9). The Siwalik deposits are of fluvial origin, transported by river systems flowing southwards from the Greater



Figure 4. Excavation of a fossil elephant tusk in the Siwalik Hills. Photograph: J de Vos.

Himalayas since the middle Miocene period. The deposits were afterwards uplifted through tectonic activities, and formed the Siwalik Hills, the foothills of the Himalayas. The Siwalik Range extends over Pakistan, northern India, Nepal, and Bhutan, and varies in width from six to ninety kilometres (Acharyya 1994) (see Figure 1). The Range also varies in elevation and lateral extent from Pakistan to Bhutan. It is not homogeneous, and is divided into early, middle and late parts, each corresponding to a specific geological time unit, ranging from the middle Miocene to the late Pleistocene periods (roughly from 30 million years to 100,000 years ago). The fossils, especially those in the younger layers are exposed for the most part exposed and are thus visible at the surface (Figure 4). Many of the Siwalik fossils are filled with large calcite crystals, which make them even more fantastic to look at. The crystals are reminiscent of Philostratus's claim that the dragons of the Siwalik Hills had jewels in their skulls.

In specified regions mentioned in the *Mahâbhârata*, such as Kurukshetra, and in areas in Himachal Pradesh, and Uttaranchal, the vertebrate remains found at the surface belong to the Upper Siwalik Hills (Parkash, Awasthi, and Gohain 1983). The age of the fossil fauna found here is Late Pliocene and is dated to about 2.48 million years ago (Rajaguru and Badam 1999). Examples of this fauna include a stegodont (*Stegodon insignis ganesa*); elephants (*Elephas [Archidiskodon] planifrons*, *Elephas hysudricus*); horses (*Equus hysudricus*, *Equus sivalensis*); rhinoceroses (*Rhinoceros sivalensis*, *Rhinoceros palaeoindicus*); a hippopotamus (*Hexaprotodon namadicus*); a camel (*Camelus sivalensis*); a giant turtle (*Geochelone atlas*); and many other species—including a pig, a crocodile, and a deer—which are not yet precisely identified (Badam 1979). There are also rare remains of a sabre-toothed cat (*Paramachairodus*) and short-necked giraffids with impressive horns (*Sivatherium*, *Giraffokeryx*). Life-sized reconstructions of some of these extinct animals are shown in Saketi Fossil Park in Himachal Pradesh.

Discussion

In Greek and Latin textual sources, several examples exist of place-names associated with great battles or slaughters, linked directly to locally found petrified bones (Mayor 2007, 245). According to local tradition, remains of the giant Titans, killed in a mythic battle with the gods (the *Titanomachy*), were to be seen in the black lignite of Megalopolis in southern Greece (Dermitzakis and Papadopoulou 1989). The Titans were said to have been killed by Zeus with his lightning bolts; hence the remains were covered with black ashes. In reality, these remains are Pleistocene fossil mammals, such as hippopotamuses, deer, and horses. On the Kassandra peninsula in north-eastern Greece, the alleged remains of another battle (the *Gigantomachy*) were found in the Pleistocene fossil beds at Pallene (Mayor 2000, 129; 2007, 246). Another example comes from the fossiliferous layers of red soil on Samos, described as *Panaima* ("bloodbath") and considered to be the remains of the war elephants of Dionysus, although they are in reality mastodon fossils (Mayor 2000, 54–60; 2007, 246; Solounias and Mayor 2005, 288–93).

With regard to India, the only example in the literature of a place-name connected to a fossil myth is that of Asthipura (Bone Town) (Van der Geer, Dermitzakis, and De Veer 2006, 124; Mayor 2007, 246). Asthipura, as we now

know, is the place where the war casualties of the *Mahâbhârata* were said to be cremated. Both this text and later sources speak of a battlefield with remains of heroes, war horses, and war elephants, scattered in great chaos over a vast terrain. In addition to the Kurukshetra region, many of the place-names mentioned in the epic have been identified in the Himalayan states of North India and in Nepal. As a rule, these geographical names include the name of one of the heroes, or of the composer Vyasa (Byas, Beas). The connection between the ancient place-names and the geomyth has been confirmed by the discovery of the rich Plio-Pleistocene fossil beds in the entire Siwalik Hill Region. In the late nineteenth century, only a small part of the Hills was known to yield abundant fossils. Nowadays, it is clear that the entire Siwalik Hill Range constitutes a rich fossil deposit, covering the period from the middle Miocene to the latest Pleistocene. The fossils are frequently visible to the naked eye and are constantly being weathered. This is especially so after every heavy rainfall, which is often accompanied by thunderstorms—thus probably giving rise to the names like “lightning bones” for the fossils. It is remarkable, however, that apart from Asthipura no other place-name containing a word for bone or skeleton has come to light despite a careful analysis of existing data. Further investigation of this intriguing matter is needed.

Apart from the bones, the ancient writers also mention arrowheads and other weapons spread all over the battlefield. This was confirmed in the late twentieth century by the discovery of many settlements dating back to the Harappan period and even earlier (c. 2500–c. 600 B.C.E.) in the same area. Large and artefact-rich settlements include Rakhigarhi (Haryana; see Figure 1, no. 8), Hastinapur (in Uttar Pradesh, the right to the throne of which was said to be the reason for the *Mahâbhârata* battle; see Figure 1, no. 12), Raja Karna ka Qila, now Thanesar (see Figure 1, no. 11), and many more. Tools, weapons, pottery and potsherds emerge on the surface of the Hills after rainfalls. The combination of petrified bones of “giants” (see Figure 5), war elephants, war horses, and ancient weaponry, is precisely what is mentioned in the texts. However, ancient sources linking observations of the weapons with the epic seem lacking; future studies, especially of oral traditions, may fill this gap.

It seems no coincidence that the places mentioned in the *Mahâbhârata* itself, and the places that nowadays refer to *Mahâbhârata*-linked events, are all situated in the vast area in which fossils and artefacts are found. This is not only true for Kurukshetra and Asthipura, where the battle itself is said to have taken place, but also for Katas Raj in Pakistan, where the brothers are said to have spent four years in exile.

Most probably, the *Mahâbhârata* is not entirely made-up. A dynastic battle quite possibly did take place somewhere in the general area, although not necessarily exactly in Kurukshetra itself. In our view, the abundant remains of bones and weaponry found in the same region caused the legend to remain popular. They were considered proof of the truth of the story, which consequently could grow to cosmological proportions. The local myths about remains of giants and demons who were destroyed by epic heroes, referred to by Mayor (2000, 133) and Nair (2005, 370), may, in actual fact, refer to the *Mahâbhârata*. Another link between the fossils and the epic might be provided by the *nagas*, the mythical snakes said to live below the Himalayas in their shining palaces. They figure prominently in the *Mahâbhârata*, especially in book 1, and are shown to assist heroes, or to be



Figure 5. Isolated limb bones of large mammals can be easily confused with those of giant humans: a thigh bone of a fossil elephant next to a human skeleton.

connected to sacrifice. It might also not be coincidence that the city of Naggar (see Figure 1, no. 4), named after the *nagas*, is close to Beas Kund, the source of the Beas River, along which Vyasa is said to have meditated and composed the *Mahâbhârata*. A further hint that fossil remains are interpreted as those of mythical beings comes from a fossil elephant tooth, discovered by a native working for the British irrigation expert Proby Cautley (1802–71) at Nahan (see Figure 1, no. 10). The native interpreted the tooth as a *deo ka sir*, literally a god's head (Nair 2005, 370). How the head of a god could be found there is not told, but it is tempting to link it to the decapitated trunks of heroes and demigods as described in the *Mahâbhârata*.

Traditional worship of the purported battle-remains in local shrines would certainly be a strong point in favour of this hypothesis, but such a thing is not likely to be found in India. As is well known, bodily remains, be it the complete body or parts, such as teeth, hair, nails, skin and bones, are considered unclean by the Hindus. Worship of these unclean materials is not appropriate in Hindu worldview. Only certain groups of outcastes are allowed to deal with dead human and animal materials, but they do so entirely from an economic point of view, without religious attachment. Present-day examples are the Meghwal of Rajasthan's desert, who work with skin, leather and bones, and the Dom of Varanasi (Benares), who cremate bodies. Bone and tooth worship in a Buddhist context, on the other hand, is as old as the religion itself. The *stupas* (mound-shaped religious monuments) generally enclose relics of the Buddha or of one of his monks. For example (as described in the *Dathavamsa* [late 12th century C.E.] 1925), the Thuparama *stupa* contains a right collar bone, the Dalada Maligawa a left upper canine, and the Somavati *vehera* a right upper canine. All three *stupas* are in Sri Lanka, and the fact that many fossils are found in that country may not be mere coincidence.

Conclusion

The dynastic war, as described in the epic *Mahâbhârata*, took place somewhere in the Kurukshetra district (Haryana) of northern India, at the foot of the Siwalik Hill Range of the Himalayas. The ancient writers tell that giant heroes and formidable beasts fought there for eighteen days, and that many lost their lives. Carcasses, skulls, broken weapons, and chariots were all that were left. The war probably would have been forgotten if no artefacts had been left in the area. Bones are constantly visible to the naked eye in the entire Siwalik Hill Range, due especially to weather conditions, especially heavy rainfall, that causes them to become exposed. The abundance of bones is likely to have contributed to the mythologising of the battle and its hundreds of heroes. Gradually, a possibly historical fact moved into a mythical past. The stage of the epic is likely to have extended over the Siwalik Range of Uttaranchal, Himachal Pradesh, Pakistan's Salt Range, and southeastern Nepal, based on the findings of vertebrate fossils.

It is likely that the many petrified bones, molars, and tusks found on the surface of the Siwalik Hills in the same area became integrated into an already existing story of an important battle. Bones of large vertebrates, such as giraffe-like beasts and mastodons, could be interpreted as the limb bones of mighty heroes and gods, because, apart from scale, they look similar. Elephant remains are naturally

interpreted as those of the many war elephants mentioned. Horse remains are also easily recognised. The large incisors of hippopotamuses, unknown to Indian people, and the canines of sabre-toothed cats, might easily have been seen as darts, lances, arrows, javelins, and swords of the hundreds of kings, spread all over the place. Another obvious source of the weaponry is the archaeological finds in the same area, since bronze and iron tools and weapons, together with pottery, are often exposed, especially after periods of rain.

It is evident that additional work needs to be done in order to uncover—if they exist—early Hindu, Mughal, British colonial and modern Indian sources, that relate the observed fossil bones and tusks to the *Mahâbhârata* battle, now that our preliminary research strongly suggests that the Siwalik fossils may have served to keep the memory of the battle alive.

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Relevant publications include: Dermitzakis, M. D., and E. Papadopoulou. "Giants, Dragons, Saints and Geological Phaenomena". *Bulletin of the Geological Society of Greece* 23, no. 2 (1989): 75–100; and Sondaar, P. Y., Dermitzakis, M. D., Drinia, H. and J. de Vos. "Paleoecological Factors that Controlled the Survival and Adaptation of the Pleistocene Man on the Mediterranean Islands." *Annales geologiques des pays Helleniques* 38, A (1998): 25–35. See also <http://users.uoa.gr/~mdermi>; INTERNET.

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