Journal of Human Evolution 88 (2015) 15–24

Contents lists available at ScienceDirect

Journal of Human Evolution

journal homepage: www.elsevier.com/locate/jhevol

A new small pliopithecoid primate from the Middle Miocene of Thailand

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ARTICLE INFO

Article history:
Received 3 July 2014
Accepted 29 August 2015
Available online 8 October 2015

Keywords:
Catarrhines
Southeast Asia
Miocene
Biogeography
Evolution

ABSTRACT

Pliopithecoids represent a monophyletic group of putative stem catarrhines whose evolutionary history is incompletely known. They have been recorded from Europe and Asia, between the late Early Miocene and the Late Miocene. Asian pliopithecoids are less well documented than their European counterparts, often being represented by a fragmentary fossil record. New discoveries are therefore critical to reconstruct the evolutionary history of the whole group. Here, we describe two isolated molars from Ban San Klang, a late Middle Miocene locality in northern Thailand, which confirms the presence of pliopithecoids in Southeast Asia. The lower molar had originally been described as being that of a dendropithecoid, but it was later recognized as pertaining to a pliopithecoid. The discovery, in the same locality, of an additional upper molar attributed to the same species confirms the pliopithecoid status of this taxon and highlights its distinctiveness with respect to other known Asian pliopithecoids. However, the mosaic of primitive and autapomorphic features characterizing this Thai fossil, as well as its limited anatomical representation, preclude us from assigning it to either of the known pliopithecid subfamilies. Nevertheless, it represents the only pliopithecoid in Southeast Asia and displays a mosaic of unique characters which emphasizes the peculiarity of that province, as suggested previously with respect to its hominoid primate.

1. Introduction

The superfamily Pliopithecoidea unites an extinct group of stem catarrhines. Its taxonomic status is still controversial. Initially, Andrews et al. (1996) proposed one single family, Pliopithecidae which they divided into two subfamilies, Pliopithecinae and Crouzeliinae. Later on, Begun (2002) subdivided Pliopithecoidea into two families, Pliopithecidae, which included subfamilies Pliopithecinae and Dionysopithecinae, and Crouzeliidae. In contrast, Harrison (2005) elevated the Dionysopithecinae to the family level and subdivided the Pliopithecidae into two subfamilies, Crouzeliinae and Pliopithecinae. According to the disputed phylogenetic relationships and the uncertainty concerning the relationships between Asian and European pliopithecoids, we will adopt here the classification proposed by Moyà-Solà et al. (2001) which distinguished Pliopithecinae, Crouzeliinae and Dionysopithecinae as distinct subfamilies within a single family Pliopithecidae.

The evolutionary history of pliopithecoids in Asia remains poorly understood because of the group's incomplete fossil record on that continent. In fact, according to Begun (2002) the evolutionary relations within the pliopithecoids are so poorly defined that it is possible that the Asian taxa evolved independently from the European taxa. Pliopithecoids presumably originated in Africa sometime during the Oligocene and dispersed into Asia during the Early Miocene (Harrison, 2013). They diversified regionally, across Eurasia, during the Middle and Late Miocene. The extinction of pliopithecoids in Asia may be related to climatic changes (Begun, 2002). In Europe, their Late Miocene extinction has been also attributed to the disappearance of suitable forests, associated with the development of a strong seasonal climate caused by the retreat of the Paratethys Sea (Mosbrugger et al., 2005).

In Asia, pliopithecoids have been previously reported from the late Early Miocene to the Late Miocene from several localities in China, India, Pakistan and Thailand. In China, the earliest Asian

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http://dx.doi.org/10.1016/j.jhevol.2015.08.007
0047-2484/

pliopithecoids, the dionysopithecines, represented by two distinct genera, *Dionysopithecus* and *Platodontopithecus*, are recorded from the late Early Miocene (~18–17 Ma) of Sihong County, Jiangsu Province (Harrison and Gu, 1999). In slightly younger deposits, (~17–16.5 Ma), some pliopithecoids displaying affinities to crouzeliines have also been reported from Fanchang, Anhui Province (Harrison and Jin, 2009a,b; Harrison, 2013). Several Middle Miocene (~15 Ma) pliopithecines, *Pliopithecus zhanxiangi*, *Pliopithecus bii* and *Pliopithecus* sp. have been described from Tongxin County and Junggar Basin (Harrison et al., 1991; Wu et al., 2003). Recently, Zhang and Harrison (2008) described a new large pliopithecid from the late Middle Miocene of Inner Mongolia, which they referred to the crouzeliines based on its morphological characters. The Late Miocene (~7–6 Ma) *Laccopithecus*, the youngest Asian representative, from Shihuiba, Lufeng County, Yunnan has been identified as a crouzeliine (Wu and Pan, 1985; Pan, 1988; Pan et al., 1989; Andrews et al., 1996). The affinities of a specimen referred to "*Kansupithecus*" from the Late Miocene of Gansu Province are still uncertain (Harrison and Gu, 1999). In northern India, only a single M^3 was described as *Pliopithecus krishnai* from the Late Miocene of Haritalyangar (Chopra and Kaul, 1979) which was subsequently assigned to the genus *Krishnapithecus* by Ginsburg and Mein (1980). However, the taxonomic and phylogenetic position of this taxon is now regarded as uncertain (Harrison and Gu, 1999). In Pakistan, a few isolated teeth of small catarrhines from the early Middle Miocene of Manchar Formation, were described as *Dionysopithecus* by Bernor et al. (1988) and an isolated upper molar described as M^1 or M^2 from the Kamlial Formation (Barry et al., 1986), later referred to dP^4 of *Dionysopithecus shuangouensis* by Harrison and Gu (1999), is now taxonomically unassigned (Harrison, 2005).

In Thailand, an isolated lower molar of a Middle Miocene catarrhine primate was initially described by Suteethorn et al. (1990) as a new species of dendropithecoid, *Dendropithecus orientalis*, from Ban San Klang locality, Pong Basin, Phayao Province, northern Thailand. Later on, Harrison and Gu (1999) refuted this attribution to *Dendropithecus* and referred it provisionally to *Dionysopithecus orientalis*.

Here we provide a more detailed description of the holotype (lower molar), together with that of a new upper molar subsequently discovered from the same locality. These two molars of a small catarrhine primate come from the same locality and same stratigraphic level. They were collected on the surface by the authors within about 10 m of each other. According to their corresponding size and shared morphological characters, we tentatively consider them as belonging to the same taxon. This Thai locality has delivered a low diversity of fossil mammals and is the only one in Southeast Asia to have delivered teeth of a small catarrhine. This constitutes additional support to consider them as probably belonging to the same taxon, pending confirmation by the discovery of additional, more complete material.

2. Geology and age

The Pong Basin is a small intermontane basin, lying in a north-south direction along the Yom River, located in Phayao Province, northern Thailand. The sediments consist mostly of sands, clays and conglomerates that are fluvial in origin. Several fossil mammal remains have been discovered from this basin, at three distinct localities (Fig. 1). The first record was reported from Ban Sop Kham, east of Amphoe Pong by Sickenberg (1971) as *Deinotherium* sp., resembling *Deinotherium pentapotamiae* of the Chinji Formation in the Siwaliks, associated with some other remains of Rhinocerotoidea, Proboscidea? and Anthracotheriidae? Sickenberg (1971) proposed a Middle Miocene age for these fossil-bearing sediments. Later, Ginsburg and Thomas (1987) reported an additional site at Huai Siew, 5.5 km north of Amphoe Pong, yielding a diversified vertebrate and mammal fauna. The assemblage includes a mastodon, a rhinocerotid similar to *Gaindatherium*, a chalicotheriid close to *Chalicotherium brevirostris*, the anthracotheriid *Brachyodus* sp., a suid, rodents, and several specimens of tragulids. They also suggested a Middle Miocene age for this basin on the basis of the occurrence of tragulids, chalicotheres and rhinocerotid remains. The skeletal and dental remains of a new tragulid from that site were later described as *Siamotragulus sanyathanai* by Thomas et al. (1990). Suteethorn et al. (1990) reported the discovery of the first

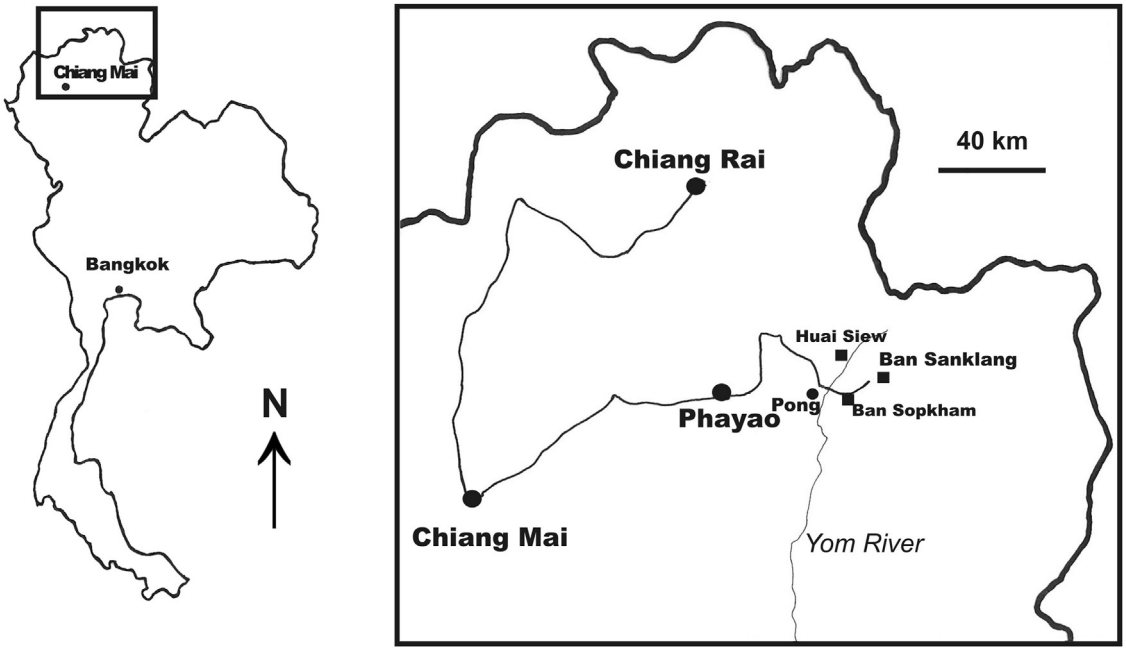

Figure 1. Map showing the location of fossil localities (black squares) in Pong Basin. Cities are shown as a black circle.