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## Unusual pelvic adaptations in the insular ape *Oreopithecus bambolii*

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*Oreopithecus bambolii* Gervais, 1872 is a Late Miocene (Turolian, 9-6 Ma) large-bodied hominoid endemic from the Miocene islands of Maremma and Sardinia (Moyà-Solà & Köhler, 1997; Köhler & Moyà-Solà, 2003). Recent studies (Köhler & Moyà-Solà, 1997; Moyà-Solà *et al.*, 1999; Rook *et al.*, 1999) on the abundant material recovered by Johannes Hürzeler from the old lignite mines of Monte Bamboli, Casteani, Ribolla and Baccinello (Hürzeler, 1956) reopened the discussion on the postcranial adaptations of this fascinating fossil insular primate.

Two opposing hypotheses have been proposed. The classical view holds that the basic orthograde pattern of *Oreopithecus* is an adaptation to climbing and below-branch locomotion (Harrison, 1987; Susman, 2004). The more recently proposed hypothesis suggests that *O. bambolii* shows, superimposed on these basic orthograde features, specific adaptation to bipedal locomotion (Köhler & Moyà-Solà, 1997; Moyà-Solà *et al.*, 1999; Rook *et al.*, 1999). These adaptations have been interpreted in the context of evolution under insular conditions (Moyà-Solà & Köhler, 1997; Köhler & Moyà-Solà, 2003).

In this communication we report the results provided by the study of the ischiopubic ramus of the pelvic specimen BA71 (Basel Museum), which preserves parts of the left and right pubis with symphysis, as well as the medial rim of the obturator foramen. This specimen most likely belongs to a female individual because of the slight concave inferior pubic ramus. The well-preserved proximal half of the left ischiopubic ramus shows on its inferior surface a ligamentous/muscular insertion area enclosed by an anterior and a

posterior crest. This pattern is very peculiar as it strongly contrasts with that of other primates, especially with that of extant apes, but resembles the pattern of extant *Homo sapiens*.

In extant apes, the lower surface of the ischiopubic ramus between the ischial tuberosity and the pubic symphysis shows no evidence of muscular or ligamentous insertion (Elftman, 1932), but is smooth and usually covered by fat pads. In contrast to extant apes, *Homo sapiens* shows an attachment area for muscular/ligamentous insertion, bordered by an anterior and a posterior crest that extend from the pubic symphysis to the ischial tuberosity. In humans, these osseous structures serve as attachment areas for the urogenital diaphragm. The central part of the latter is composed by a thick fibrous sheet of connective tissue, the so-called perineal membrane, which attaches laterally to the pubic arch. The superficial and deep spaces of the diaphragm contain the superficial and deep perineal muscles (DeLancey, 1999; Barber, 2005; Schimpf & Tulikangas, 2005).

The perineal membrane is a uniquely human adaptation that provides support for the sexual organs during bipedal posture and locomotion. In gibbons, in spite of the vertical postures that they habitually employ during brachiation, similar supporting structures are lacking (Elftman, 1932). The presence in *O. bambolii* of a long ischiopubic ramus, with insertion areas for the attachment of fibrous/muscular structures, suggests the existence of supporting structures for the sexual organs analogous to those of humans. This finding is consistent with the bipedal adaptations previously described for this insular ape.

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## Reconstructing *Oreopithecus*' paleoecology by means of stable isotopic analyses: preliminary data

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*Oreopithecus*, the last Miocene ape found in Europe, is commonly referred to as the most enigmatic of the Miocene apes (Rook *et al.*, 2000), for its head and tooth morphology suggest an animal unlike any ape known from present day or from the Miocene (Köhler & Moyà-Solà, 2003). In fact it is endemic, as are the associated vertebrate fauna. This extinct insular faunal complex is referred to as Tusco-Sardinian palaeobioprovince (*Oreopithecus* faunal assemblages or 'OZF' in Bernor *et al.*, 2001).