

components mentioned above during his professional career. It is high time that the science education community wakes up and embarks on such a programme. There is no doubt that within a few

years the products of such a programme would radically transform our country and make it one of the most powerful nations in science, technology and social development.

*B. M. Deb is in the Department of Chemistry, Panjab University, Chandigarh 160 014 and Jawaharlal Nehru Center for Advanced Scientific Research, Bangalore 560 012, India.*

## SCIENTIFIC CORRESPONDENCE

# Discovery of a middle Holocene sub-fossil bone from Tiruvallur Taluk, Chingleput District, Tamil Nadu

We record here the discovery of a sub-fossil bone of *Boselaphus tragocamelus* (nilgai) in the upper Kortallayar basin, Chingleput district, Tamil Nadu (Figure 1) and examine its significance in terms of dating, relation to the archaeological record in this region and in the understanding of past climatic conditions. The Kortallayar basin forms a part of the Palar basin, Tamil Nadu. Geologically, the Upper Gondwana sandstones and shales of the Sriperumbudur and Satyavedu formations are capped by Quaternary formations in the form of fluvial/

erosional features of ferricretes, pebbles, cobbles and boulders (Middle Pleistocene to Holocene) and alluvial deposits of sands, silts and clays<sup>1</sup>.

The region falls in an area of wet tropical moderate bioclimate and dissymmetric rainfall regime with 330 mm in the south-west monsoon and 803 mm in the north-east monsoon<sup>2</sup>. The vegetation consists of the *Albizia amara* and *Acacia* series of the semi-evergreen series consisting of scrub woodland, closed and discontinuous thorny thickets and scattered shrubs<sup>3</sup>

Ever since the discovery of the first palaeolithic artifact at Pallaveram in Tamil Nadu<sup>4</sup>, the Kortallayar basin has been an important centre for prehistoric research in India. More than sixty Lower, Middle and Upper Palaeolithic and Megalithic sites have been discovered here. Recent investigations in order to reconstruct the Quaternary palaeoenvironment and human settlement patterns are being conducted by the first author in the upper Kortallayar basin, in the light of new theoretical and methodological advances. However a major lacuna in the understanding of past ecology lies in the absence of a suitable sample of Quaternary fossils. The earliest discovery of a fossil in this region was made by R. B. Foote in 1863, in the Attrambakkam nullah (Tiruvallur taluk, Chingleput district), which was apparently washed out of the 'lateritic conglomerate' and which was associated with palaeoliths. It was identified by Busk and Boyd Dawkins as possibly forming a part of the human tibia with the platycnemid deformation found in people given to squatting on the ground. However due to the loss of articulations and imperfect condition this was not confirmed. The fossil was subsequently misplaced<sup>5</sup>.

As part of the field exploration undertaken by the first author, a fossil bone was discovered in the canal cutting forming part of the Telugu Ganga project located near the village of Nambakkam (79° 53' E; 13° 14' N). The bone was located in compact Holocene clay at a depth of 1 m below the surface. The compact clay extends for a depth of 2 m and overlies the Upper Gondwana shales. It is capped in turn by ferricrete lag (Figure 2) In general, the composite stratigraphic sequence in this region

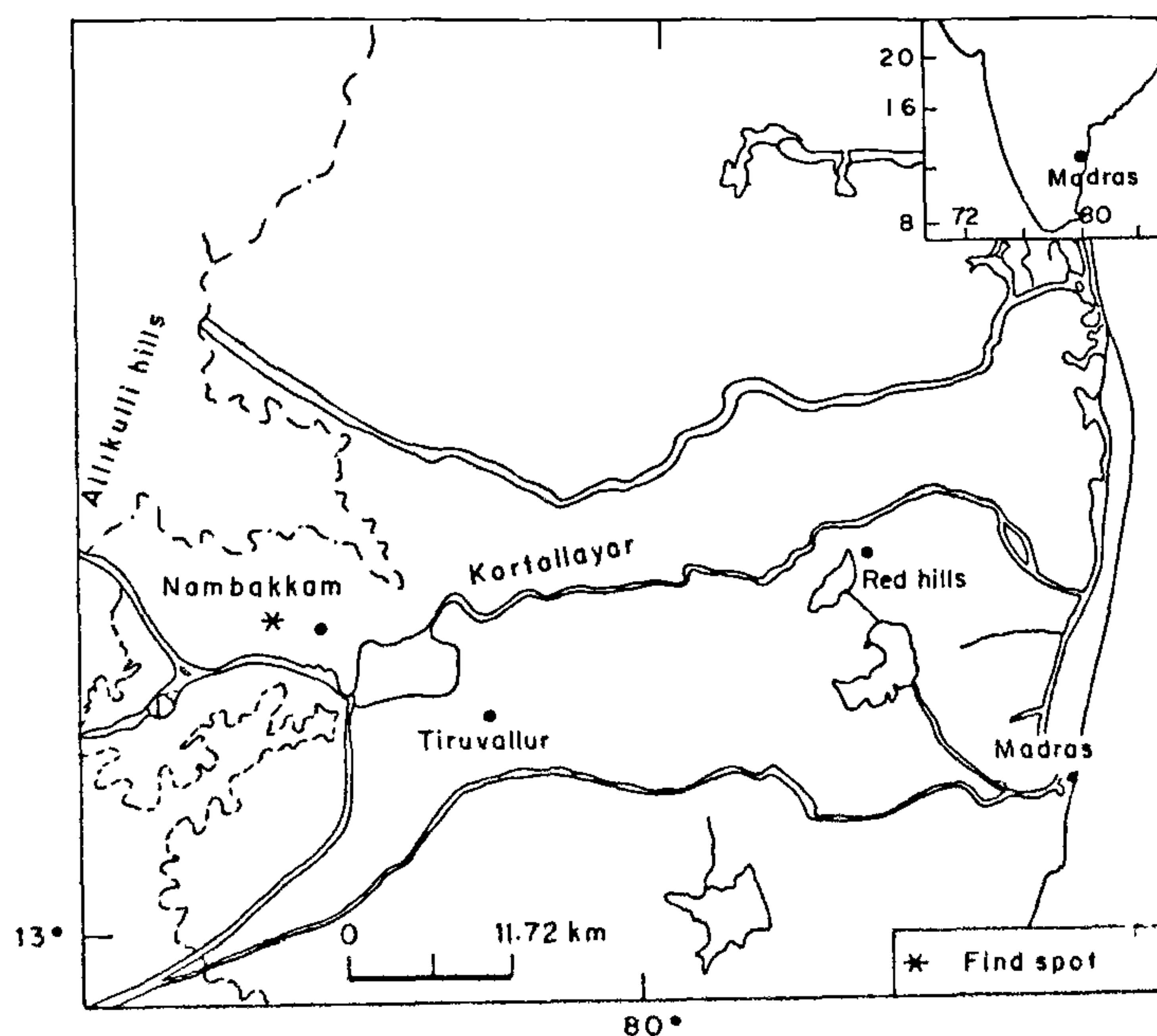


Figure 1. Location of fossil bone, Tiruvallur taluk, Chingleput district, Tamil Nadu

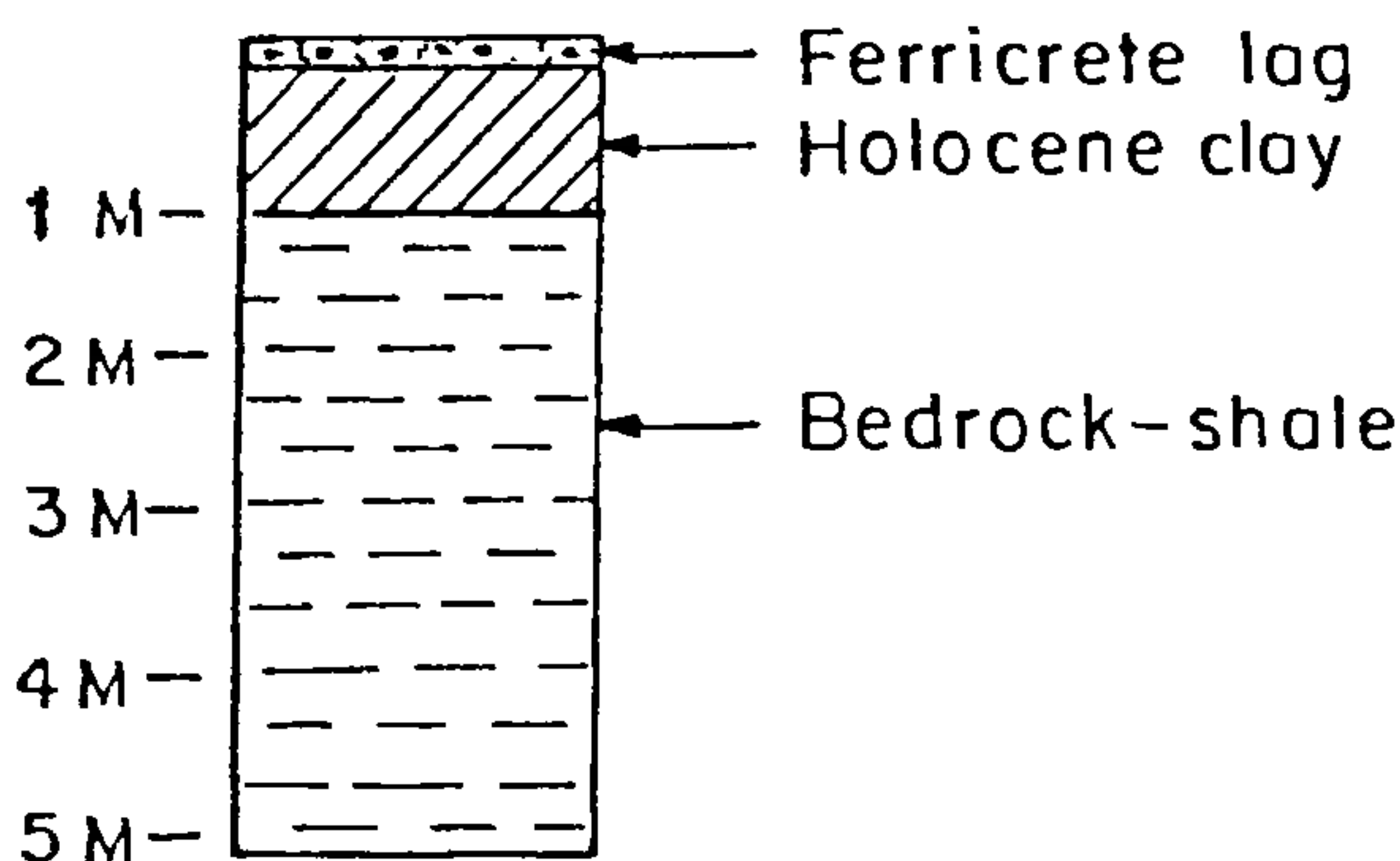


Figure 2. Stratigraphic section.



Figure 3. Femur of *Boselaphus tragocamelus* showing absence of epiphyseal ends.

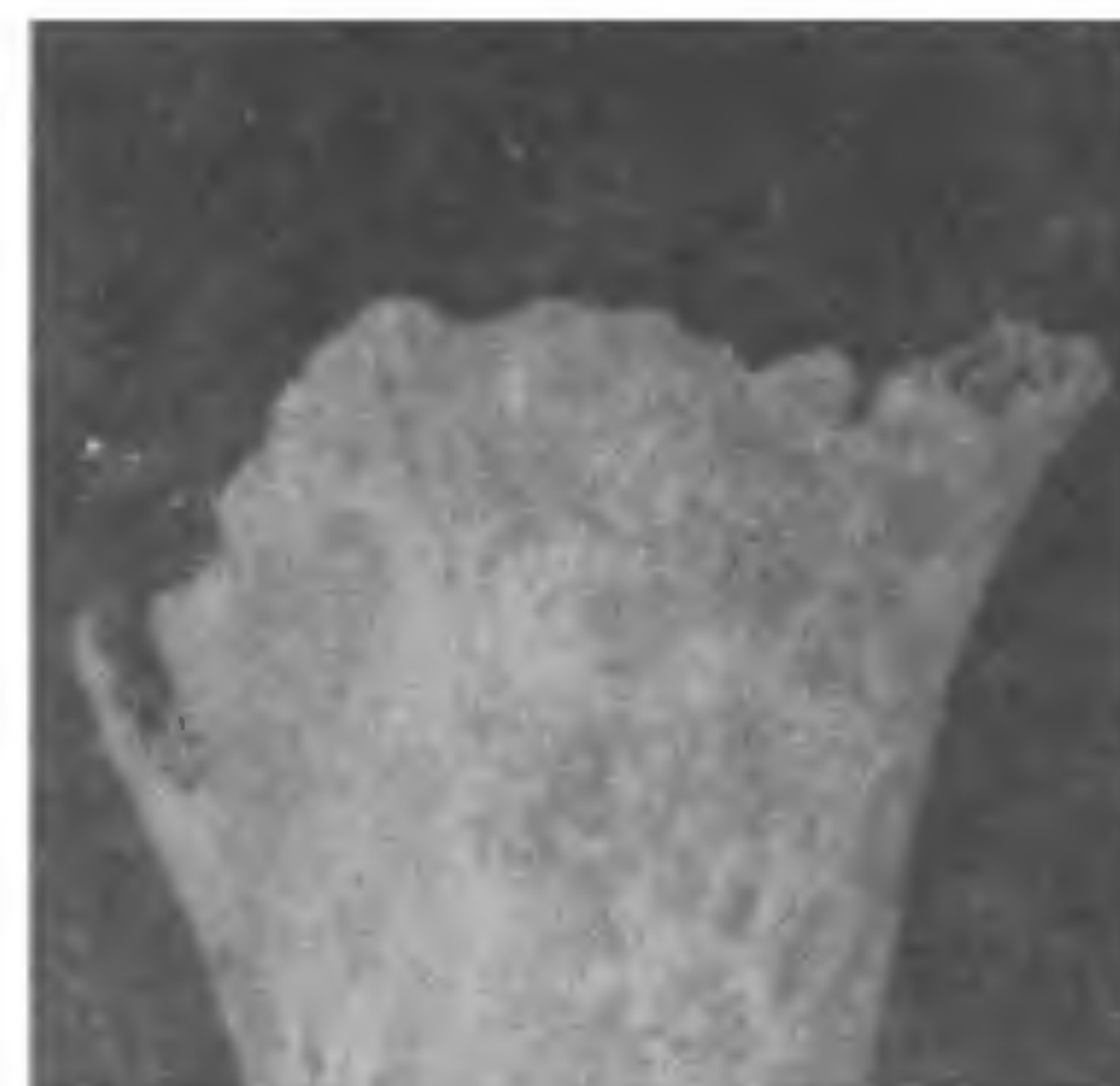


Figure 4. Natural chipping at the proximal end of the femur.

The bone has been identified as belonging to *Boselaphus tragocamelus* (nilgai). It forms the right femur represented by a complete shaft which has lost both the epiphyseal ends. The shaft is medio-laterally compressed, forming a prominent ridge on the anterior side of the bone which merges towards the proximal end of the femur (Figure 3). The trochanter minor is broken at the proximal end. The supracondyloid fossa is shallow. The specimen belongs to a younger individual and the epiphyseal ends were either unfused or just fused and hence could not withstand post-mortem taphonomic activities. There are a few irregular chipping marks on the anterior side of the distal end which appear natural and may be attributed to trampling prior to burial (Figure 4). However, the broken edges of the distal and proximal ends are very fresh and do not show signs of abrasion caused by fluvial activity.

Though palaeoenvironmental reconstruction may not be possible on the basis of a single bone, at the minimum it does indicate the possible existence of savanna grassland within the vicinity of the area of discovery during the early Holocene. Living nilgai inhabit open grasslands interspersed with perennial water bodies and are found grazing in association with their smaller cousins like antelope and gazella. However until more discoveries are made in this area, palaeoecological interpretations are tentative and subject to modification.

The significance of this discovery lies in the fact that it is the first fossil bone dated to the middle Holocene to be discovered in this part of the upper Kortallayar basin; and which has been

involves the progressive accumulation of fluorine in buried bones through time. Thus with increasing age of the bone, the fluorine content increases. Fluorine/phosphate (100 F/P<sub>2</sub>O<sub>5</sub>) ratio is used for relative dating and is immensely successful in establishing the probable age of bones in cases where no other means of dating are available<sup>7-9</sup>.

The specimen was analysed for fluorine and phosphorus content. It was found to contain 0.125% fluorine and 8.75% phosphorus with the 100 F/P<sub>2</sub>O<sub>5</sub> ratio being 0.624. Bone samples from the Neolithic site of Paiyampalli (Tamil Nadu), Hunsgi valley (Karnataka) and Chalcolithic Ramapuram (Andhra Pradesh) as well as those from the Neolithic period at Betamcherla (Andhra Pradesh) have ratios of 0.262, 0.22, 0.214 and 0.335 respectively<sup>10</sup>. Considering the presence of varying geological contexts and fluorine contents in these localities, the ratio of 0.624 for the Nambakkam specimen is considerably higher than those assigned to Neolithic/Chalcolithic bones from Tamil Nadu, Karnataka and Andhra Pradesh. This indicates that the specimen predates the Neolithic/Chalcolithic phase in Peninsular India which is generally considered to have begun around 2500 BC. Thus the fossil can probably be assigned to the mid-Holocene. Although the middle Holocene fossil record in this region is represented by numerous late Mesolithic sites at Red Hills (Figure 1), the fossil bone was not found associated with any artifacts.

consists of ferricrete overlying the bedrock and in turn capped by a ferricretised gravel and ferricrete lag.

The sub-fossil bone has been dated using the method of fluorine analysis. Fluorine analysis of animal bones is a well established relative dating technique and has been successfully used for dating of animal bones from various parts of India<sup>6</sup>. The basic principle

conclusively dated and identified. The search for further fossils, which is in progress, will throw more light on the nature of the palaeoenvironment and its significance in prehistoric studies in Tamil Nadu.

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SHANTI PAPPU  
ANUPAMA KSHIRSAGAR  
VIJAY SATHE

*Department of Archaeology  
Deccan College  
Pune 411 006, India*

## MEETINGS/SYMPOSIA/SEMINARS

Micon International - 94  
and  
35th Annual Conference of Association of Microbiologists of India

Place: Mysore, India  
Date: 9-12 November 1994

The theme of the convention is 'Microbes for Better Living'.

Contact: Conference Secretariat  
Micon International - 94  
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Mysore 570 001, India  
Phone. (821) 22671, 23950, 33052  
Fax: 821-28830; Telex: 846-238  
E.mail: sma@nicfos.ernet.in

Symposium on Intellectual Property Rights

Place: Varanasi  
Date: 10-11 December 1994

Topics include: Philosophical and historical aspects of IPR, categories of intellectual property, IP and Trade, TRIPs in new GATT (94), implications of TRIPs on S & T in technologically underdeveloped countries, Indian Government policy on the IPR, alternative IPR systems, interpretations and analyses of the IPR, knowledge in Indian philosophy, and IPR vis-a-vis Indian philosophy.

Contact: Dr S. C. Tiwari  
Convener, IPR Symposium  
Department of Physics  
Banaras Hindu University  
Varanasi 221 005  
Phone: (542) 310291  
Fax. (542) 312059