Find of a *Ramapithecus punjabicus* premolar from a palaeosol unit exposed near Village Dangar, Dist. Bilaspur, HP

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I report a well preserved upper right third premolar (P^3) recovered from mudstone layers (approx. 7.40 m.y. old) exposed near Village Dangar. The hominoid-bearing mudstone layers have yielded evidence for pedogenic modifications (palaeosols).

THE Siwalik sediments exposed around Villages Hari and Talyangar have yielded several specimens of hominoid primates during the last 100 years[1–7]. Besides Haritalyangar, Indian fossil hominoids are known from Ramnagar (J & K)[8,9] and Kalagarh (UP)[10] areas. A large number of Siwalik hominoids come from Potwar Plateau of Pakistan[1,4,6,8,9,11,12]. The Haritalyangar hominoids include *Ramapithecus punjabicus*, *Sivapithecus indicus*, *Sivapithecus sivalensis* and *Gigantopithecus bilaspurensis*. Based on magnetic polarity stratigraphy *Sivapithecus* and *Ramapithecus* have been assigned 7–7.5 m.y. age and that of *G. bilaspurensis* is given 6.3 m.y.[13]. Any find of hominoid primate is significant for studies concerning inter and intraspecific variation, taxonomy and evolutionary history.

Ramapithecus was earlier thought to be a hominid (human-like) owing to its reduced canine, reduced anterior dentition and thick tooth enamel (similar to that of *Australopithecus*)[4,14–16]. It was believed that feeding on seeds and roots and staying away from forests would have eventually led to the evolution of bipedal walking[17,18]. Later it was found that *Sivapithecus* (closely related to *Ramapithecus*[18,19]) is strikingly similar to orangutan in cranial anatomy[20]. Therefore it was suggested that enamel thickness and megadonty in *Ramapithecus*, *Sivapithecus* and *Australopithecus* may have occurred due to parallel evolution[20].

The present premolar was collected from a locality near Village Dangar, which is situated about 1 km east of Villages Hari and Talyangar (Figure 1). The stratigraphic level from which the P^3 was recovered is designated as the 'hominoid interval'[13] (Figure 2 *a*).

The right P^3 (VPL/RP-H1) most closely resembles that of the maxilla YPM 13799 (see Figure 2 of Simons[14]), initially named as *R. brevirostris* by Lewis[4]. Later Simons[15] assigned this specimen to *R. punjabicus*. The present tooth is thick enamelled and subrectangular in occlusal outline. It bears a single buccal and a single lingual root. The anterior margin is not parallel to the posterior margin as there is a forward prolongation of the antero-external angle, which in turn has made the

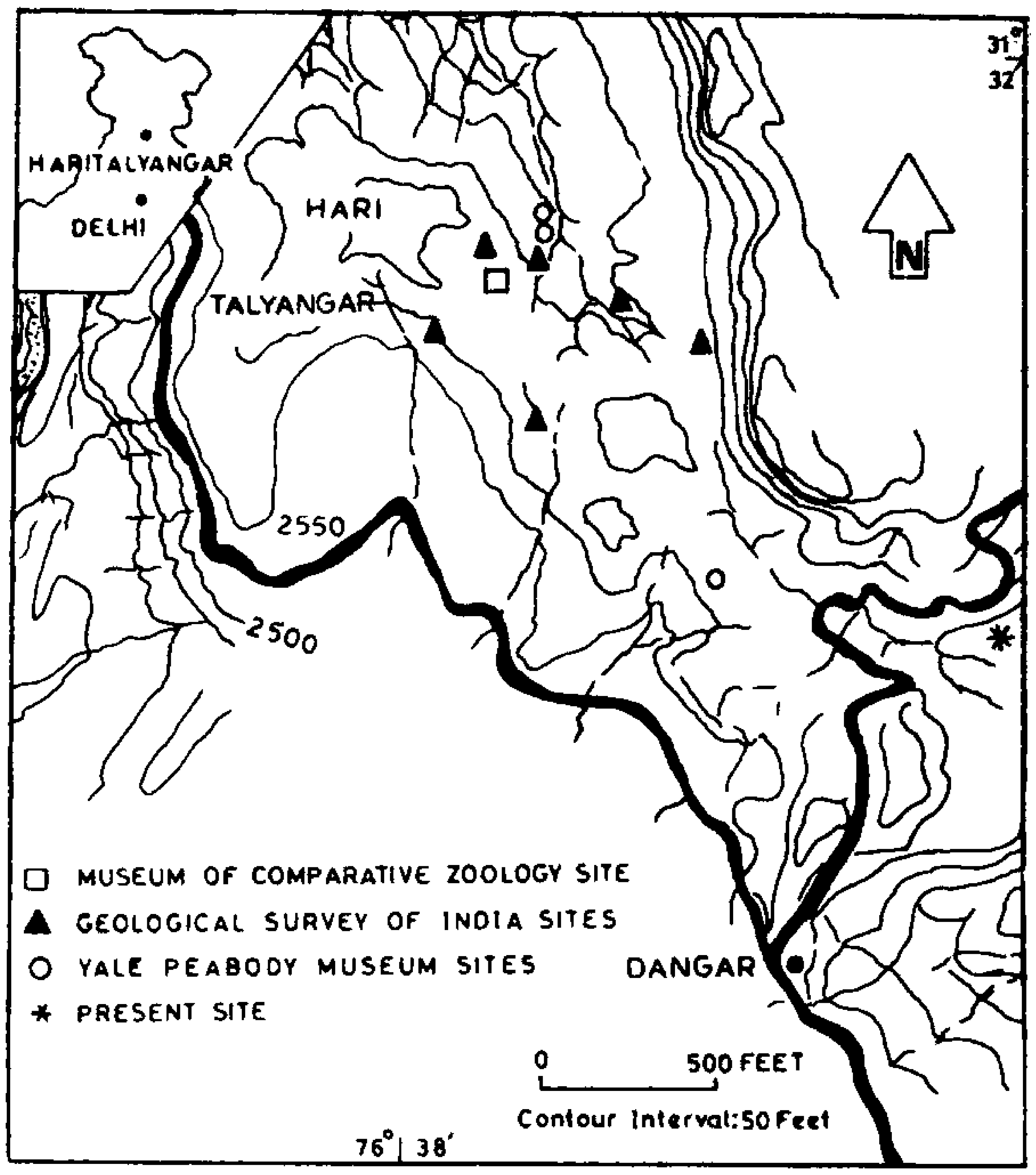

Figure 1. Map showing various hominoid-yielding sites.

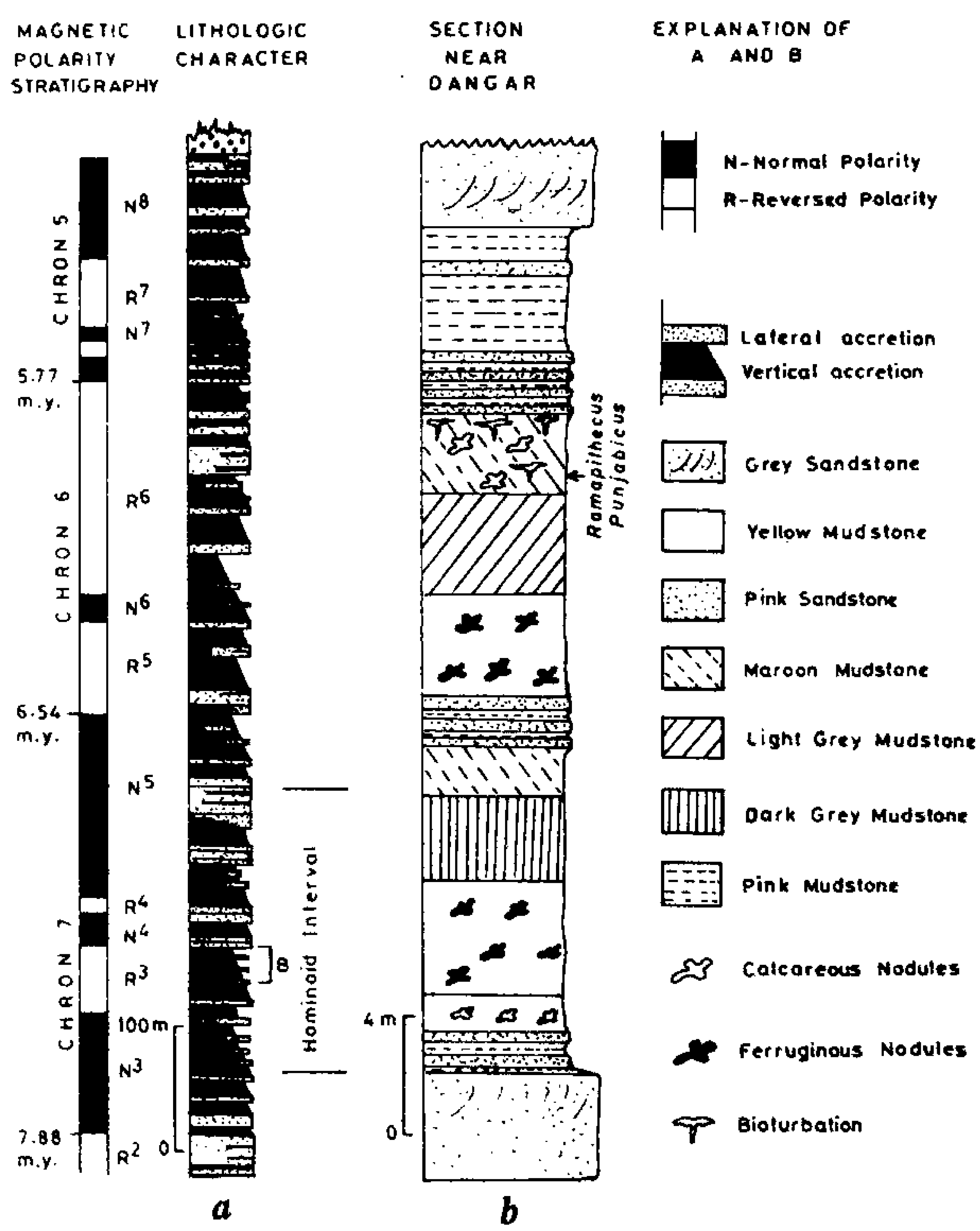

Figure 2. ***a***, Palaeomagnetically dated stratigraphic section near Haritalyangar (modified from Johnson[13]); ***b***, *Ramapithecus* yielding section near Dangar.

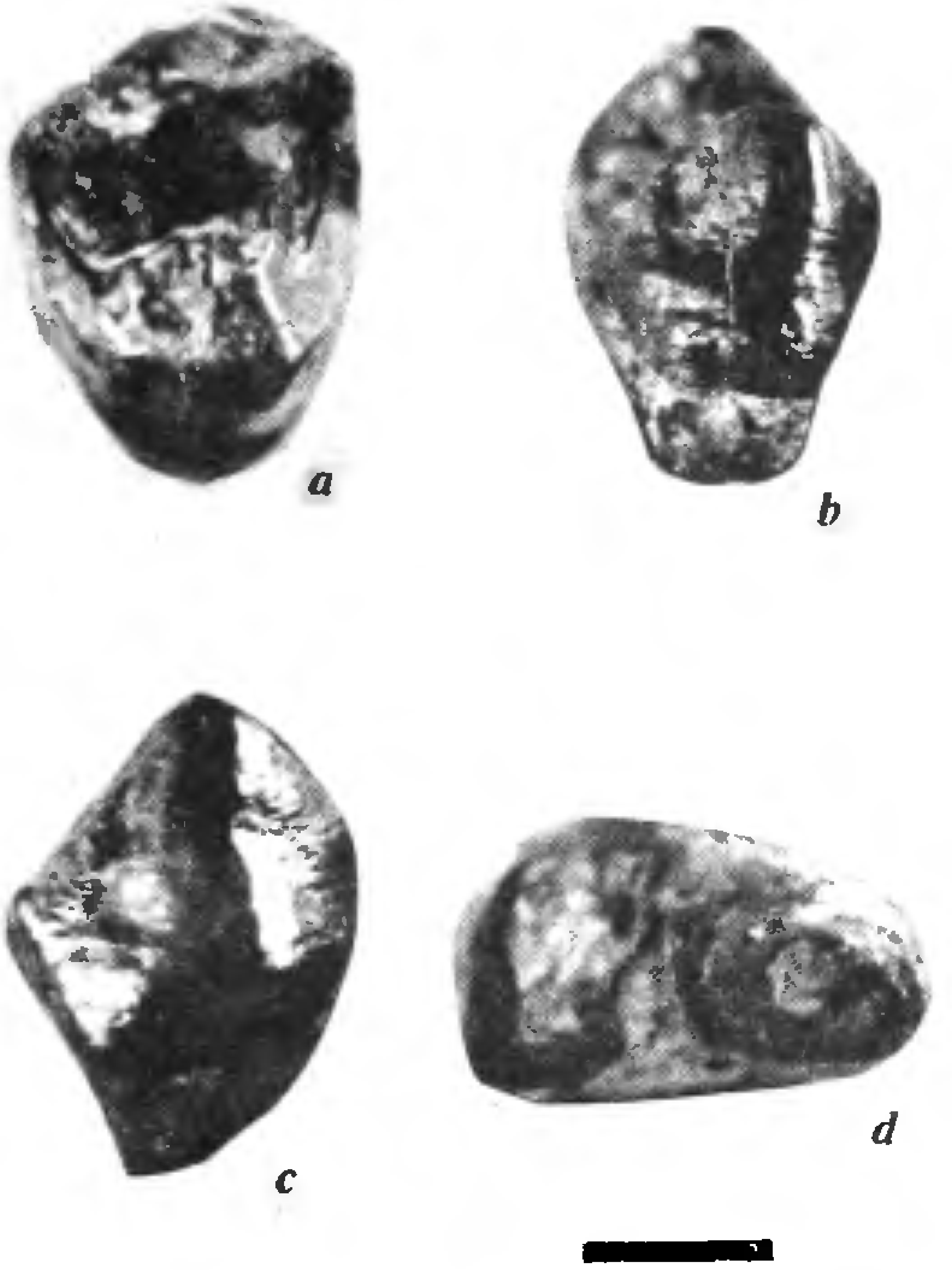

Figure 3. P^3 of *Ramapithecus punjabicus*, *a*, occlusal view; *b*, lingual view; *c*, labial view, *d*, basal view showing roots. Bar represents 5 mm.

buccal side longer than the lingual side (Figure 3). The protocone is situated at a higher level relative to the paracone. The premolar shows anterior, central and posterior foveae.

In recent years palaeosols have been used successfully to understand palaeogeographic, palaeoecologic and palaeoclimatic conditions. Miocene Siwalik sediments exposed near Village Haritalyangar have also been studied for the stratigraphic distribution of palaeosols, which has contributed significantly towards the understanding of palaeoecological conditions of early hominoids like *Ramapithecus* and *Sivapithecus*[21]. Johnson[21] noticed that these Miocene palaeosols show close similarity to extant ferruginous tropical soils of savana-woodland, grassland/semideciduous conditions seen in Ghana, Brazil, Columbia and Sudan.

Apart from the premolar, the mudstone layers have yielded operculi of land snails and turtle carapace fragments. These layers show variegated colouration and lack bedding planes. The coloured bands exhibit microtopographic contact between them. The lowermost profile (Figure 2 *b*) preserves the dark grey layer referred as organic rich 'A' horizon in soils and palaeosols. The mudstone layers have yielded both calcareous and ferruginous nodules typical of palaeosols. Besides these, features related to bioturbation products have also been observed. Colouration in palaeosols may reflect concentration or depletion of certain ions or compounds. For example, pink, red or maroon colouration is normally due to the dominance of dehydrated ferric iron compounds over hydrated iron and manganese compounds, whereas yellow colouration suggests mixing of hydrated and dehydrated ferric iron compounds. Grey mudstones normally have low percentage of free iron and high percentage of organic carbon[22,23]. Ferruginous nodules may indicate local oxidizing condition and presence of calcareous nodules may suggest intermittent dry and wet conditions[24]. Johnson's[21] palaeosols lie around 75 m above and 50 m below the palaeosol unit described here.

Isotopic studies of these palaeosols are being carried out at the University of Utah (USA) and interesting results are expected to emerge, particularly concerning CO_2 content in the palaeoatmosphere and regarding C_4 ecosystem in the Late Miocene time (Cerling and Kohli, pers. commun.).

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