

Table 1 Tissue levels of some mercaptans upon mercury administration

Mercaptan	Group	Liver	Kidney	Blood
GSH ($\mu\text{mol/g}$)	Control	5.24 ± 0.60	2.86 ± 0.31	25.81 ± 1.55^a
	Hg-treated	3.84 ± 0.39 ($P < 0.001$)	1.96 ± 0.34 ($P < 0.001$)	18.26 ± 2.38^a ($P < 0.001$)
Cysteine (nmol/g)	Control	118.4 ± 20.2	93.8 ± 19.7	35.2 ± 9.5^b
	Hg-treated	85.9 ± 22.5 ($P < 0.005$)	72.5 ± 16.6 ($P < 0.025$)	37.4 ± 10.2^b ($P > 0.60$)
CoASH (nmol/g)	Control	179.3 ± 14.4	130.0 ± 15.5	38.6 ± 9.9^b
	Hg-treated	110.6 ± 17.5 ($P < 0.001$)	99.9 ± 22.9 ($P < 0.005$)	36.8 ± 9.5^b ($P > 0.70$)

^a $\mu\text{mol/g}$ Hb; ^b nmol/ml blood; all values are mean \pm S.D. of 10 observations on different rats.

estimated by the method of Beutler⁸ using 5,5'-dithiobis-(2-nitrobenzoic acid). Cysteine was determined by the method of Gaitonde⁹. CoASH and GSH in blood were similarly determined by the above methods. Cysteine was estimated in blood after deproteinization with 5% perchloric acid. Haemoglobin was measured as cyanmethaemoglobin.

The tissue levels of CoASH, GSH and cysteine after administration of a toxic dose of mercuric chloride are presented in table 1. The level of GSH was significantly decreased in liver, kidney and blood while cysteine and CoASH were significantly lowered only in kidney and liver. GSH in blood was expressed as $\mu\text{mol/g}$ haemoglobin as it is found only in red blood cells

The decrease in GSH, cysteine and CoASH may be due to their direct binding with mercury which explains the highly significant protection afforded by cysteine and CoASH against mercury toxicity⁵. The present data also support our hypothesis that mercury toxicity is partly due to its combination with CoASH which interferes in its functions⁵.

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ORTHIS AFF. RUSTICA FROM THE DEVONIAN QUARTZ-ARENITE OF THE MUTH FORMATION, KHIMOKUL LA (KINNAUR), HIMACHAL HIMALAYA

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This note records the discovery of a well-preserved *in situ* fossil referable to *Orthis* aff. *rustica* from the quartz-arenite of the Muth Formation of the Kinnaur Basin¹ (figure 1a). The fossil was recorded from the C horizon (figure 1b) exposed 1 km west of Khimokul La along the foot track.

The Muth Formation, extending from Kashmir to Kumaun, comprises a sequence of snow-white to white mottled quartz-arenite with local dolomite interbeds in its basal and upper parts. The quartz-arenite in the Spiti, except for an orthoceratid and an ill-preserved coral in a rolled boulder², has not yielded any fossil so far. The other fossils reported from the Muth Formation are from the calcareous bands^{3, 5}.

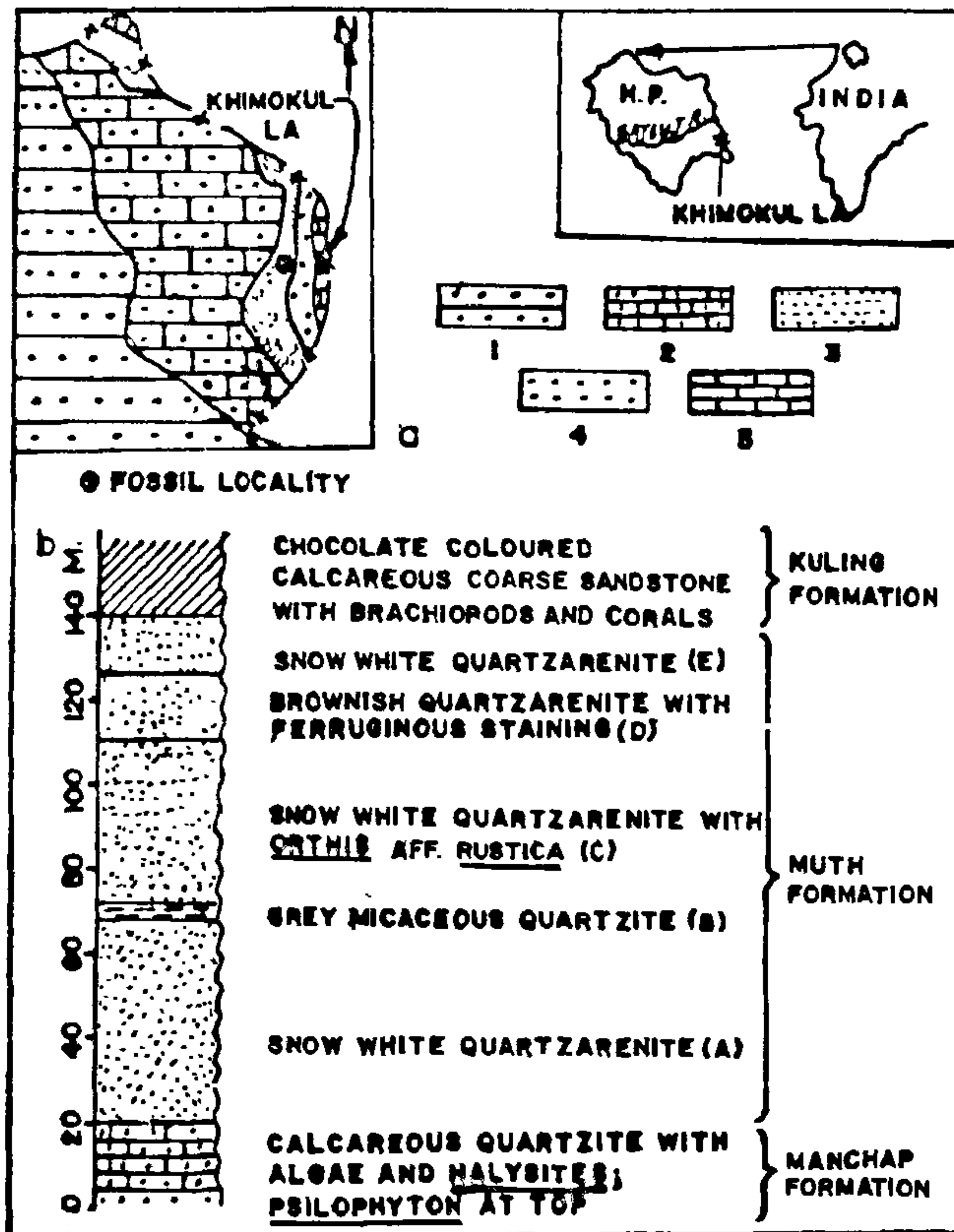


Figure 1a,b. a. Geological map of Khimokul La area, Kinnaur, Himachal Himalaya with a location map. Legend: 1. Thango Formation, 2. Manchap Formation, 3. Muth Formation, 4. Kuling Formation, 5. Lilang Group; b. Lithocolumn of the Muth Formation in Khimokul La Section.

Systematic description

Family: Orthidae Woodward 1952; Genus: *Orthis* Dalman 1827; *Orthis* aff. *rustica* Sowerby (figure 2).

Preserved brachial valve, quadrate, convex, radially ribbed surface, gently sulcate. Hinge line 20 mm long and straight but shorter than the width.

It was found in a horizon 70 m above the *Psilophyton* bearing beds and hence represents a definite Devonian age. It compares well with *O. rustica* Sowerby in shape, ornamentation and length-breadth ratio. This species is also known from the Silurian rocks of the Parahio section of Spiti⁶.

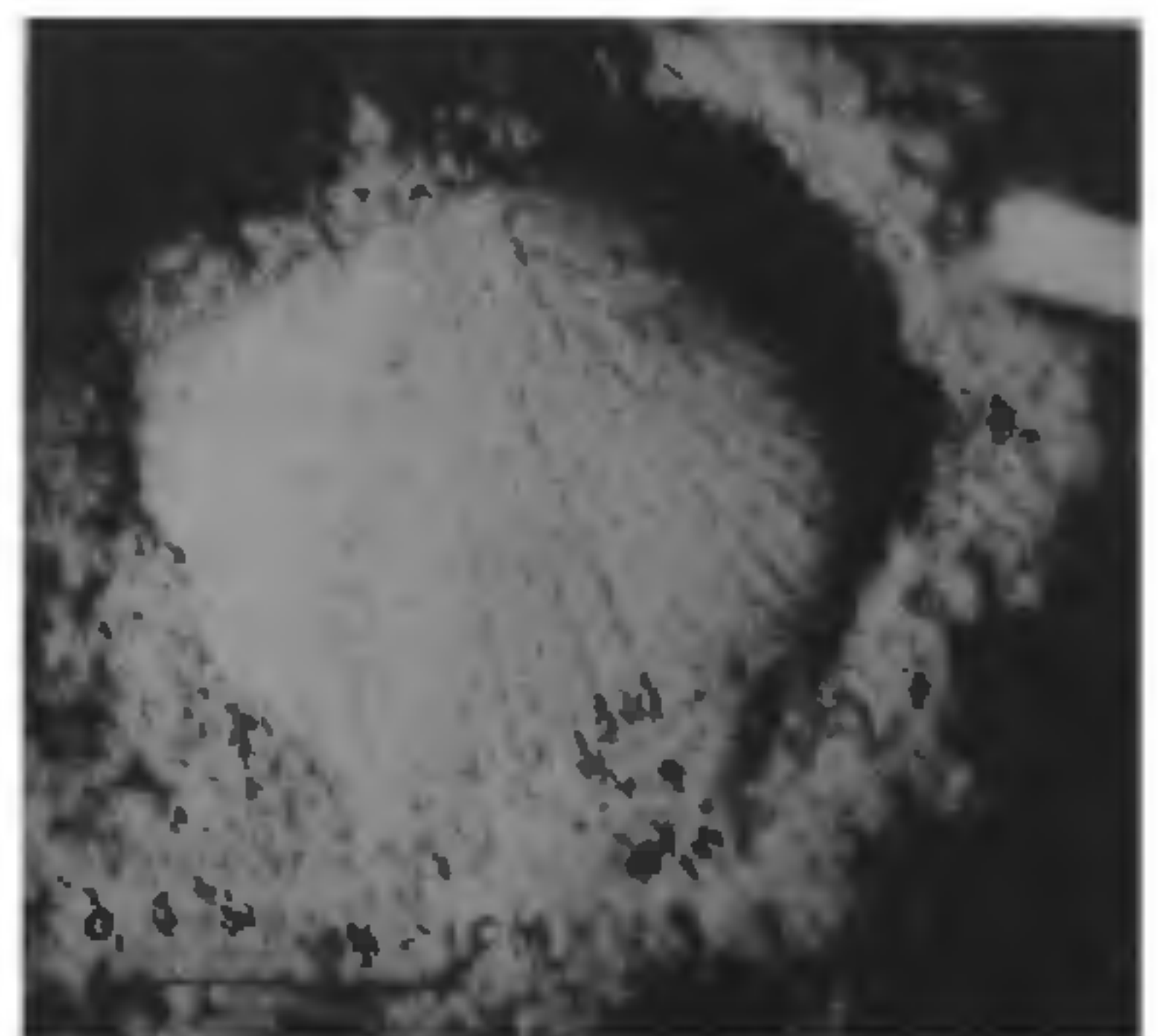


Figure 2. *Orthis* att. *rustica* Sowerby.

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OCCURRENCE OF STONE IMPLEMENTS AND VERTEBRATE FOSSILS AT BARBHANTA (21°56'45":82°47'50", 64K/13) AND LAKHALI (21°54'30":82°46'45", 64K/13) IN BAMNIDIHI AREA, CHAMPA TAHSIL, BILASPUR DISTRICT, MADHYA PRADESH

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DURING the course of systematic mapping in the Bamnidihi area (Bamnidihi, 21°54'18":82°42'20", 64K/9), SSE of Champa in the Bilaspur District of Madhya Pradesh, the authors have found stone implements, and vertebrate fossils in the Quaternary gravel and calcareous concretionary (Kankar) horizons below the alluvium at several places intermittently all along the southern and western banks of Son *nadi*, a tributary to the Mahanadi river, in the western part of Toposheet No. 64K/13. Stone implements has been found 2 km SSE of Lakhali village (21°54'30":82°46'45", 64K/13), and vertebrate fossils along with the stone implements, 400 m SE of Barbhanta (21°56'45":82°47'50", 64K/13). Vertebrate fossils in the form of partially petrified parts of bones and teeth, and stone implements have also been noticed at Parsapali (21°51'40":82°45'55") on the bank of Son *nadi*. N. K. Dutta, R. Choubey and C. Thanavelu of G.S.I. have found similar occurrences in the adjoining area near Harethi (22°01':82°56'30", 64J/16), Suvadera (22°01'15":82°53'45", 64J/16), and

Putekela (22°05':82°52', 64J/16). These occurrences have been observed for the first time in this area (figure 1).

The gravel, and the calcareous concretionary horizon form part of the Quaternary alluvial zone (terrace), and directly overlie the red-brown calcareous shale with green argillaceous bands and calcareous bands. The shale shows effects of warping and minor shearing or faulting. The calcareous concretionary horizon is about 1 m thick, and is exposed for about 100–200 m intermittently all along the Son *nadi* in this area. The gravel zone is partially consolidated to unconsolidated, and consists of pebbles and gravels of chert, cryptocrystalline (chalcedony) and crystalline quartz, shale, and laterite and bauxite set in a sandy or gritty matrix. The stone implements occur within this gravel.

The stone implements are of various shapes and sizes. They vary from small flakes, chips or blades to bigger chisel, chopper, borer and hammer-like forms. They are characterized by conchoidal facets and sharp edges artificially carved from mainly cherty rock. At Lakhali, some crude forms and seemingly unused cherty rock pieces and boulders are also found. The implements are mainly made up to chert, and less predominantly of agate, chalcedony, flint, and ortho-quartzite. The shape and size of the implements suggest a Pre- to Palaeolithic age¹.

The vertebrate fossils are in the form of partially petrified and preserved bones of different parts of different animals, which include jaws with teeth, hind limbs, horn, etc. These and their fragmentary finds have been found on the upper exposed part of the gravel zone, and the calcareous concretionary horizon of the alluvium e.g. SE of Barbhanta and north of Putekela.

Preliminary palaeontological study of 9 specimens of parts of the bone fossils and horn cores, and 15 specimens of stone implements has been done by Shri A. Sonakia, Geologist (Sr.), Geological Survey of India, Palaeontological Division, Nagpur (figure 2A, B). It is concluded that the fossils collected greatly resemble the one collected from the base of yellow clay in Narmada Quaternary sediments, and might represent the upper-Pleistocene period. None of the fossils resemble human form, but the possibility of an upper pleistocene man yet to be recorded from the sub-continent increases. The palaeolithic industry, here, has a varied combination of Acheulian industry with chopper type tools.