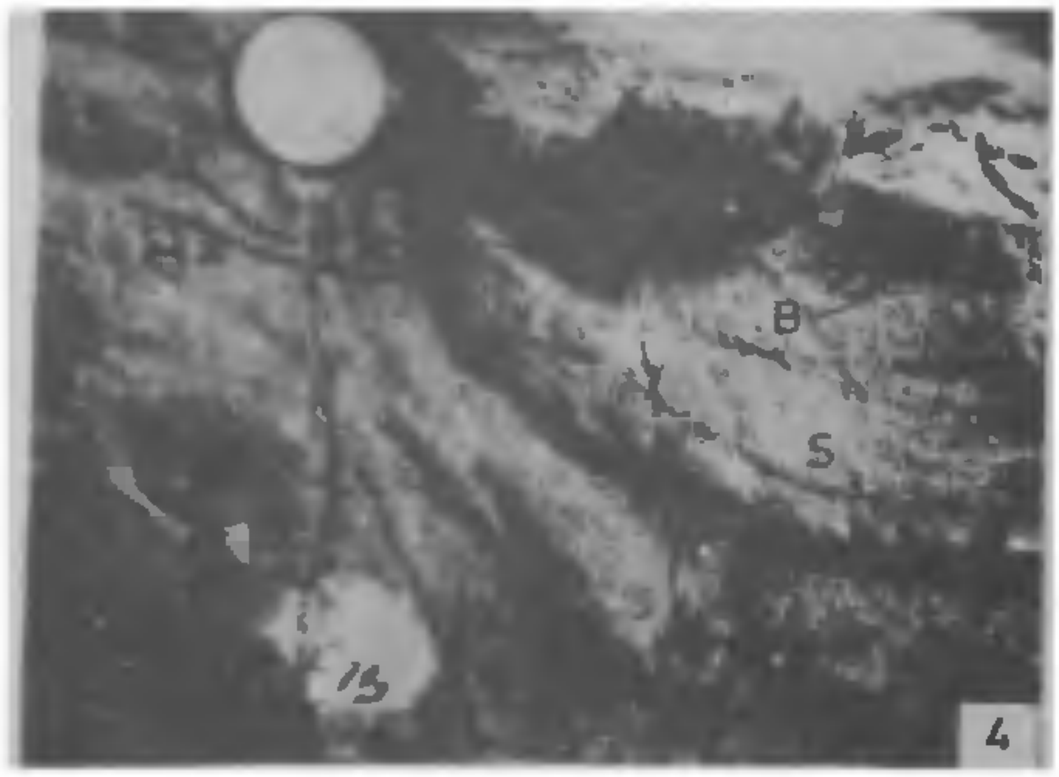

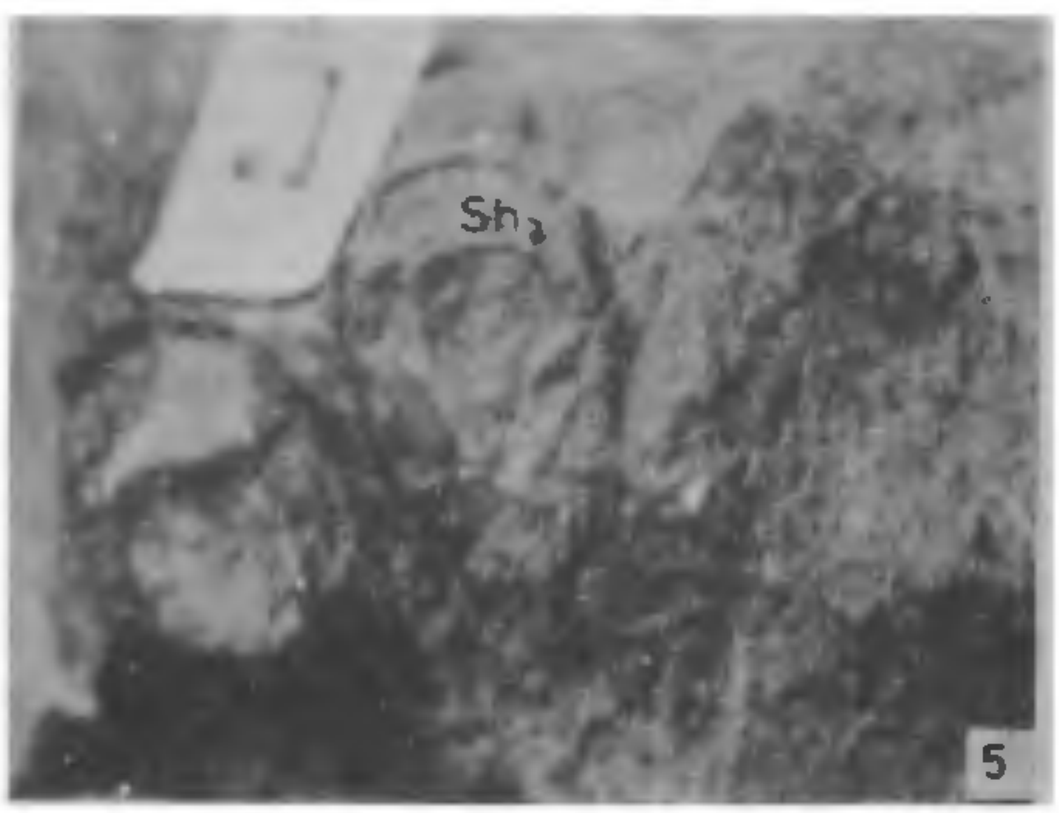

Figures 4 and 5. 4. Field photograph of *Skolithos* showing distinct relief and parallelism of burrows, and **5.** Unidentified large bivalve shells associated with sandy limestone in which *Skolithos* has been recorded.

foraminiferal moulds and echinoid spines, assigned Ordovician to Devonian date to the unit.

The detailed mapping reveal that the Gethia unit unconformably overlies the Nagthat quartzite and its upper limit is marked by greyish green slates with thin marly interbeds (Lower Krol) or purple and green slates (Blaini) with a tectonic contact (figures 2 and 3).

The Gethia unit is made of thinly laminated, highly splintery, greyish, greyish-green, drab, iron-stained slates with interbeds of sandy, coarse-grained limestone showing extensive facies variation.

The present note describes animal burrows from the Gethia unit for the first time.

The ichnogenera occur in the lower part of the Gethia unit (figure 2). The burrows, about 9.5 cm in length, are simple, unbranched and about 1.2 cm in diameter. In the upper level the burrows are developed almost at right angles to the bedding plane, becoming sub-horizontal in the lower part. They exhibit distinct relief and are inclined to the bedding. Locally the burrows occur parallel to each other (figure 4). In transverse section they are semi-circular to elliptical. The form is similar to ichnogenus *Skolithos*[7–9]. These are probably the dwelling burrows of suspension feeding organisms as also evidenced by associated invertebrates (figures 5).

The ichnogenera are helpful in deciphering the animal behaviour during the sedimentation. Besides the burrows, a large number of large shelly fossils are also associated with the burrowed sandy limestone. The overall lithological and petrographic character reveals that the sedimentation took place in a shallow, warm and coastal marine environment. This is further corroborated by the presence of the recorded ichnogenera.

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OCCURRENCE OF AN AUTOCLASTIC VOLCANIC BRECCIA

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THE present note records the occurrence of an autoclastic volcanic (intrusion) breccia from the Deccan Volcanic Province, for the first time.

The Deccan Basaltic Flood eruption is widely related to the northward drifting of the Indian Plate during the late mesozoic causing attenuation, warping and fracturing of the crust[1]. The main channel ways of eruption were located along the arms (Konkan arm with its northward extension — the Sabarmati graben, the Saurashtra arm and the Narmada arm) of the Cambay triple (and possibly a four-armed) junction and the lines of tension developed parallel to them[2].

The southern edge of the Malwa Plateau, south of Indore (22°43′ N: 75°50′ E) is rugged owing to the development of a number of narrow, vertically walled structural valleys roughly between Kannod and Gujri (22°25′ N to 22°75′ N: 75°25′ E to 76°75′ E). This has resulted in waterfalls of low height in the upper streams/nallahs.

These narrow, steep valleys are bounded on either side by vertical to steeply dipping faults, the individual valley varying in width from 15 to 20 m and visibly opening up to 40 to 110 m depth. Further, these valleys are characterized by the occurrence of peculiar breccias composed of heterogeneous fragments of various dimensions of vesicular, amygdaloidal and massive basalt set within an altogether different dark-coloured, fine-grained basaltic matrix. The confinement of these breccias only to the valley floor, heterogeneity of the enclosing basaltic fragments different from the ones exposed on the walls of valleys and their cross-cutting relationship are indicative of their being formed under confinement within the lithosphere principally by the process of quiet (auto) brecciation within a rising magma and due to commingling with the basaltic flows, it intruded. These breccias are referred to as "autoclastic volcanic (intrusion) breccias" in line with the classification of volcanic breccias advocated by Fisher[3].

Occurrence of these autoclastic volcanic breccias was noted in all the three valleys investigated, viz., Tincha (22°34′ N: 75°59′ E), Kajligarh (22°31′ N: 75°57′ E) and Khudel. The area is mainly drained by Kaner nallah which on its southward journey joins the Choral river, a tributory of the Narmada.

Subramanyan[4], while describing the geomorphology of the Deccan Volcanic Province, remarks: "The small hanging valleys with short waterfalls of some of the southerly tributaries to the Choral river in the central part and the many waterfalls further to the north are suggestive of progressive east-west step-faulting with southerly down-throws parallel to the Narmada". However, the present investigation revealed that these structural valleys originated owing to a combination of "volcano-tectonic processes" (tectonically controlled subsidence valleys resulting from the outpouring of magma from its chamber followed by caving in of overlying crust) and perhaps mark the subsidiary channelways of Deccan eruptions as lines of tension developed north of "ENE–WSW trending Narmada graben".

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ON THE AGE OF THE LOWER COARSE MEMBER OF THE UPPER BHIMA FORMATION

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THE Upper Bhima Formation (UBF) is the most ubiquitous alluvial formation in the Upland region of the Deccan Volcanic Province[1]. Although more than a dozen radio-carbon (^{14}C) dates are available from the upper fine member of UBF, the basal coarse member of the formation is beyond the range of ^{14}C dating and therefore could not be dated in absolute terms. Earlier workers have tentatively assigned a late-middle Pleistocene date on the basis of archaeological, geomorphological and palaeontological evidence[2].

Therefore, the uranium series disequilibrium dating method was applied to a fossilized tusk of an *Elephus* sp.[3] from Yedurwadi, Karnataka (figure 1). Analysis of the bone shows that the percentage of fluorine and phosphate (F & P_2O_5) are, respectively, 0.636 and 14.31 (Kshirsagar, personal commun.). An activity ratio of 0.543 between ^{230}Th