In the fibula the length of the shaft measures 12 cm and its diameter is 3 cm. The articulating surface of the distal end has a diameter of 5.5 cm. The material is cement grey in colour and weighs 250 g which is quite heavy when compared to the corresponding fragment of modern crocodilian fibula.

The fossil bone shows a thick shaft and a terminal expanded portion showing a central shallow depression and articulating surfaces. It also shows a conical process posteriorly.

The above remains are probably the distal part of fibula of the order Crocodilia. Probably the proximal two-thirds of the bone is wanting[4].

The fibula articulates with the tarsus at its distal end. In the living crocodile, there are two proximal tarsal elements articulating with tibia and fibula. These are the astragalus and calcaneum. Fibula articulates with the astragalus at its inner articulating surface and with the calcaneum at its outer articulating surface at the region of bony projection (Figures 8–11).

From the study of the crocodilian 'fossil' vertebra and fibula, it seems that a very small area of sedimentary fossiliferous rocks is lying over the non-fossiliferous schistose rocks which cover most of the area.

This is the first report of the occurrence of crocodilian 'fossil' skeletal remains from this place which incidentally gets the name Mosale Hosahalli. The term Mosale in Kannada means a crocodile. Perhaps, because of occurrence of crocodiles in this place in the distant past in a large body of water, probably a river, the village might have obtained its current name, Mosale Hosahalli.

There are reports of similar 'fossils' being found in the late Pleistocene gravel beds of peninsular Indian rivers (Ashok Sahni, pers. commun. 1995).


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# Agnostid trilobites from the Cambrian Sequence of Zanskar and their stratigraphic significance

The Zanskar area forms a vast mountainous region between the great Himalayan range in the south-west and Indus Valley in the north-east and occupies the southern part of Zanskar region lying between lat. 30°00–33°08'N and long. 77°15' to 77°25'E (Figure 1). Srikantia *et al.*[1] have given a detailed geological map of the Zanskar region. Gaetani *et al.*[2] also discussed the significant stratigraphy and sedimentology of the Zanskar. Dungrakoti *et al.*[3] also recorded trilobites from Zanskar Valley and assigned an upper Cambrian – Orodovician age. Whittington[4] described some trilobites from Kurgiakh section of the area. Nanda and Singh[5] worked on the sedimentology[1] of the area. Since Zanskar Basin shows continuity with the Spiti Basin, the lithostratigraphic nomenclature adopted here is identical to the one adopted for Spiti Basin. A complete succession of Palaeozoic–Mesozoic rocks is exposed along the right bank of Zanskar river in the Lingti valley (Figure 1). Rocks of Cambrian to Permian age exposed in the Valley are rich in fossils. The sequence in the southwestern part of Zanskar is represented by Giambal, Haimanta and Kanawar groups. In Kurgiakh valley the rock formations found at the base belong to the Batal Formation and Kunzam La Formation of Haimanta Group, consisting of greyish or greenish micaceous schists which attain a huge thickness. The upper Kunzam La Formation according to Hayden[6] corresponds to the Parahio 'series' of Spiti from where Middle Cambrian trilobites have been recorded. The Haimanta group of the Zanskar is overlain by the Kanawar Group which is divided into three formations, namely Lipak, Po and Ganmachidam formations. Kanawar Group directly overlaps the Thango Formation in most of the Zanskar Basin.

The fossiliferous Cambrian sequence in this valley has a faulted contact with Gumbranjan Granite. A diversified trilobite fauna was collected from this sequence. The fauna signifies a Middle Cambrian age. The lowermost bed of this sequence consists of a laminated micaceous shale chiefly attaining a great thickness and is devoid of fossils. Gaetani *et al.*[2] grouped this shale under Phe Formation of Precambrian to Early Cambrian age.

The trilobite fauna obtained from this area include the following taxa.

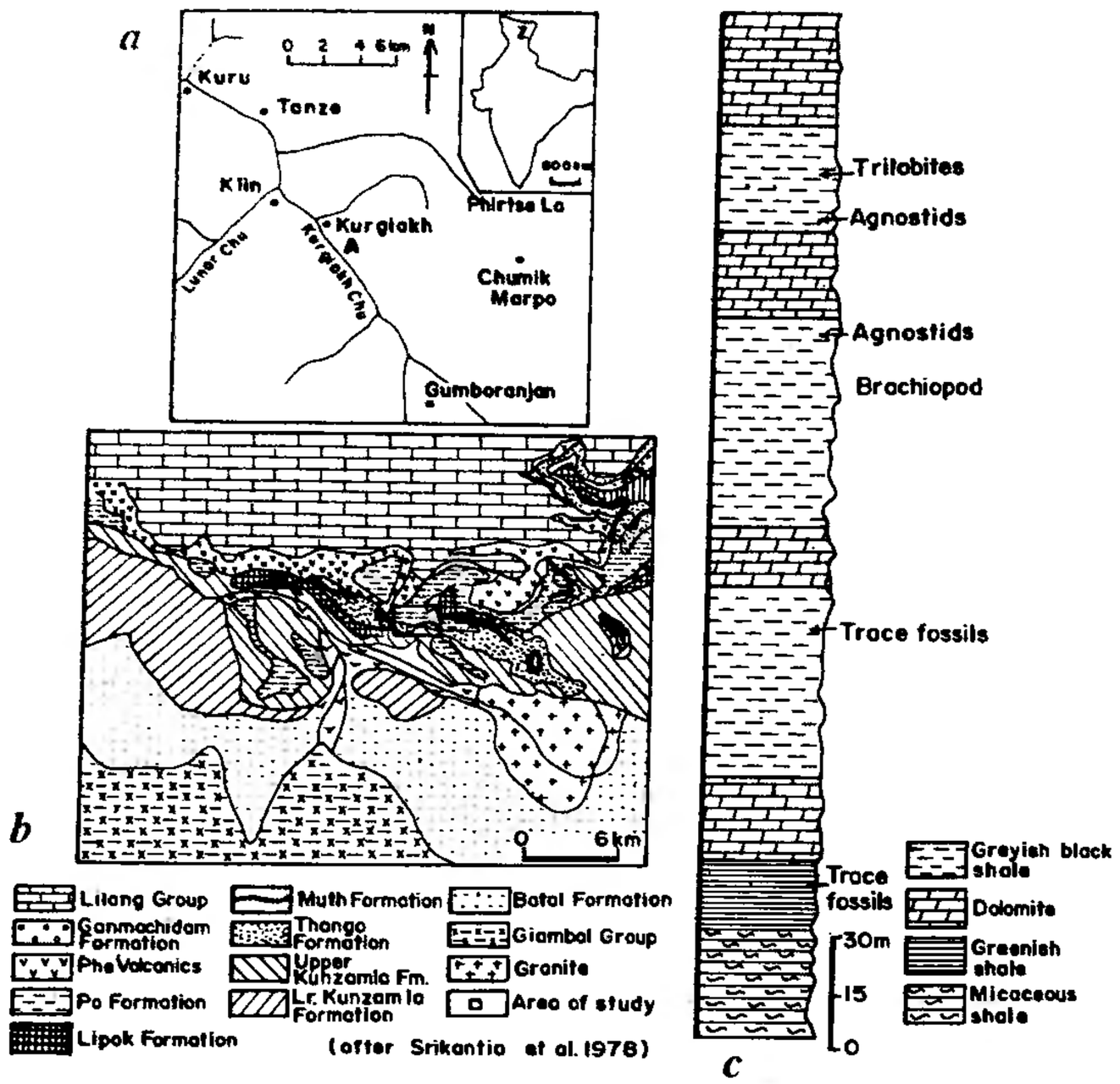


**Figure 1.** *a*, Location map of Zanskar area showing Kurgiakh section; *b*, Geological map showing the area studied (After Srikantia *et al.*[1]); *c*, Stratigraphic column.

*Repository.* The fossils have been deposited in the Palaeontology Museum, Geology Department, Jammu University. Fossil specimen numbers are indicated for each taxa after the figure number in the explanation to Figure 2.

*Acadagnostus scutalis*, Salter, 1886 (Figure 2: 1, 2, 5).

The specimens correspond with *Acadagnostus scutalis* in its evenly curved cephalon and pygidium and well preserved axial pygidial node. The specimens differ from *Hypagnostus* cf. *clipcus* in the absence of subquadrate pygidium, short axis and width being greater than length.

*Peronopsis tramitis*, Opik, 1979 (Figure 2: 8, 9, 10, 21).

The specimens resemble *Peronopsis tramitis* in a number of morphological characters such as subcircular cephalon, small and circular frontal glabellar lobe,well-preserved pygidial axial node. They differ from *Peronopsis rakuroensis* Kobayashi in the shape of the cephalon and strong median glabellar node.

*Peronopsis* cf. *longinqua* Opik, 1979 (Figure 2: 7, 11, 17).

The specimens differ from *P. prolifixa* in the shape of the posterolateral spines. They also differ from *P.* (*Itaonostus*) *elkedraensis* in the shape of the glabella and presence of small node on the anterior glabellar lobe. The form is known to have three lobes in the axial region which is not clear in the present specimens and hence they are tentatively referred to this species on the basis of subrounded cephalon, presence of prominent pygidial axial node and its placement.

*Peronopsis* (*Itagnostus*) cf. *elkedraensis* (Etheridge Jr.) Opik, 1979 (Figure 2: 14, 16, 19).

The specimens are comparable with *P.* (*Itagnostus*) *elkedraensis* because of the angularity at the anterolateral cephalic margins, absence of preglabellar furrow, position of the pygidial node and subrounded shape of the pygidial marginal furrow. The specimens differ from *P. montis* Mathew in the presence of the glabellar node and absence of posterolateral angularity of the pygidial rim.

*Peronopsis* sp. (Figure 2: 22, 24, 25).

The specimens contain a number of pygidial and cephalic characters of that of the genus *Peronopsis*, such as nearly circular cephalon with parallel acrolobes, glabella divided by a transglabellar furrow, in the ratio of 2 : 3, pygidium semicircular to rectangular shaped, pygidial axis gently narrowing posteriorly, etc. Because of their poor preservation they have been identified only up to genetic level.

*Peronopsis amplaxa* Robison, 1982 (Figure 2: 3, 4, 6, 13).

The specimens correspond to *P. amplaxa* in the cephalic and pygidial characters especially in their smaller average size, wide axial lobes, weak, segmentation in the pygidial axis and in the absence of marginal spines. Robison[7] has discussed in detail the comparative morphology of *P. amplexa.*

*Diplagnostus floralis* Opik, 1979 (Figure 2: 18, 23).

The specimens compare with *Diplagnostus floralis* on the basis of wide pygidial axis at the anterior side and abruptly pointed rear side, rapid widening of the marginal furrow and two faintly-preserved furrows dividing the pygidium into three lobes.

*Doryagnostus magister* Whitehouse, 1936 (Figure 2: 12, 15, 20).

The specimens resemble *Doryagnostus magister* in a number of physical characters such as dimensions of cephalon nearly equal to the pygidium, width of the pygidium which is more than its length, curved nature of pygidial spines, etc. The specimens also show resemblance with *Doryagnostus incertus* but can be differentiated on the basis of the curved nature of marginal spines. The specimens can also be differentiated from *D. natalibrae* in the absence of scrabicules over the surface of the acrolobes and bow-shaped transglabellar furrow.

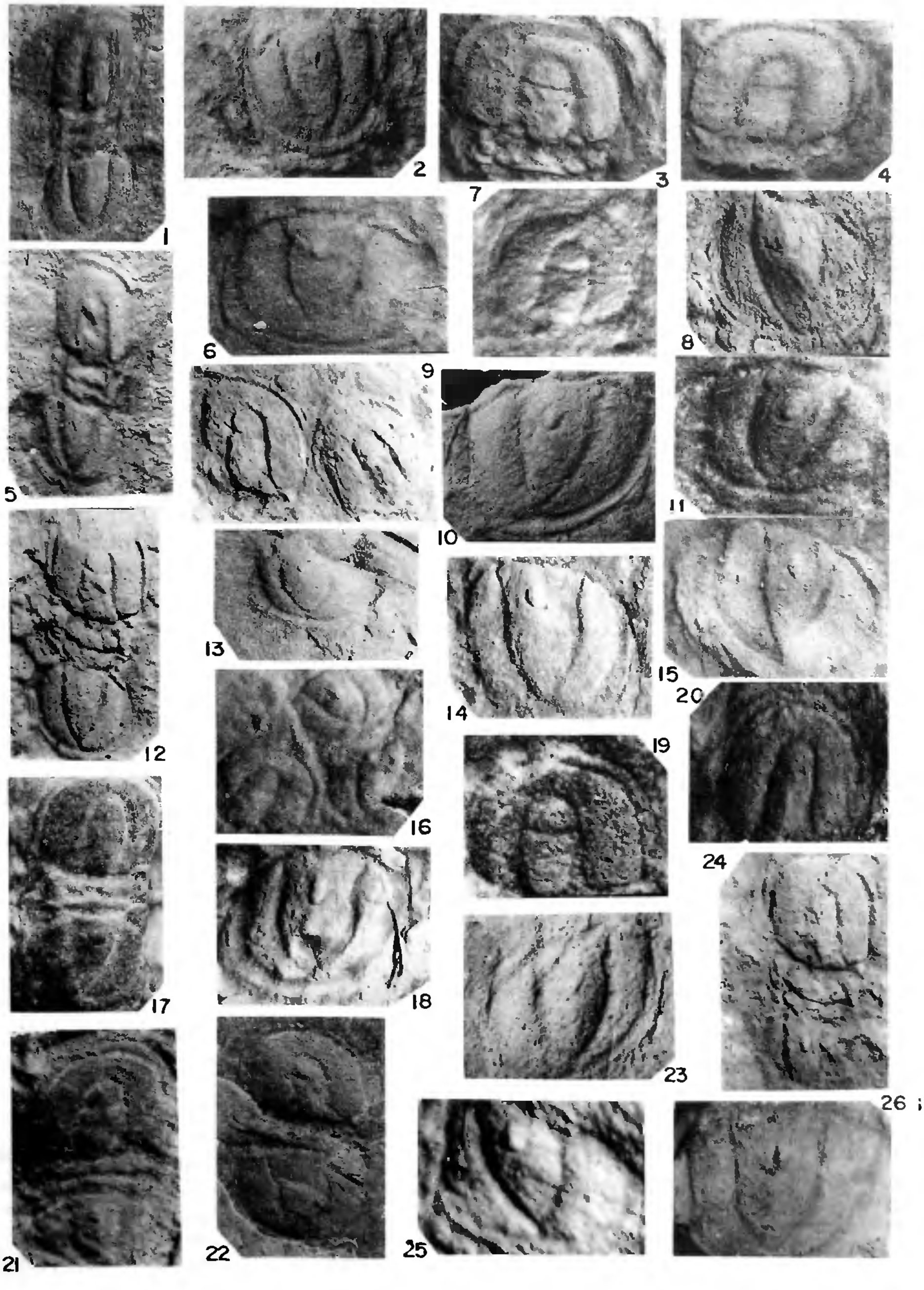


**Figure 2.** *Acadagnostus scutalis:* 1 × 8.4 (KUF-706), 2 × 9.7 (KUF-704), 5 × 9.7 (KUF-720). *Peronopsis tramitis:* 8 × 10.1 (KUF-702), 9 × 8.1 (KUF-714), 10 × 8.3 (KUF-721), 21 × 12.8 (KUF-706). *Peronopsis cf. longinqua:* 7 × 5.5 (KUF-705), 11 × 13.6 (KUF-723), 17 × 10.5 (KUF-469). *P. (Itagnostus) cf. elkedraensis:* 14 × 7.4 (KUF-707), 16 × 11.2 (KUF-699), 19 × 15.0 (KUF-716), 26 × 10.8 (KUF-728). *Peronopsis* sp: 22 × 11.1 (KUF-714), 24 × 12.1 (KUF-705), 25 × 14.5 (KUF-718). *P. amplaxa:* 3 × 11.7 (KUF-724), 4 × 9.3 (KUF-705), 6 × 11.7 (KUF-703), 13 × 8.4 (KUF-728). *Diplagnostus floralis:* 18 × 23.5 (KUF-723), 23 × 10.3 (KUF-728). *Doryagnostus magister:* 12 × 18.2 (KUF-710), 15 × 13.8 (KUF-716), 20 × 10.4 (KUF-708). The specimen numbers are given in parenthesis.

The agnostid fauna from the Middle Cambrian of Zanskar is closely comparable with that of the adjoining basins of Kashmir and Spiti. In Kashmir the agnostids consisting of different species have been described from *Solenopleura–Tonkinella* zone of Middle Cambrian[8]. Agnostids from Zanskar are also comparable with the assemblage recorded from *Prychognostus gibbus* zone of Middle Cambrian in Australia[9] and with the same zone in North America[10]. The Agnostid fauna presently described and other polymerid fauna indicate a shallow marine condition of deposition.

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# Gas emanations and subterranean sounds/microearthquakes in Marathwada, Maharashtra, India

After the great devastating earthquake of Killari on 30 September 1993, the Marathwada region is again experiencing microearthquake activity. This microearthquake activity is also accompanied by subterranean sounds and gas emanations. Earthquakes are many times accompanied by gas eruptions at high pressure. When this gas at high pressure comes out from small pores or fractures, it makes sharp sound which includes rushing sound[1]. The Killari region of Latur district has received two tremors on 29 August 1996, at 12.10 am and 12.30 am and two tremors on 2 September 1996, at 1.30 am and 1.52 am. These tremors were of magnitude 4 (*Lokmat* newspaper dated 29 September, 1996). These tremors were followed by gas emanations at Poharegaon 29 km NW of Latur and at Gunj 35 km NW of Nanded (Figure 1). Subterranean sounds were also heard in Poharegaon.

A week following the earthquake tremors received on 29 August 1996, there is report of gas emanations and it continued for a few days. At Poharegaon, gas emanations started on 6 September 1996 and continued till 12 September 1996 while at Gunj emanations started on 7 September 1996, and continued till 9 September 1996. The description of the sites is as follows:

Site 1 Poharegaon (Taluka Renapur, District Latur): The site of gas emanation is about 2 km NW of Poharegaon. Gas emanations were first felt by animals and they turned their way because of the hissing sound. Then villagers reported an odourless emission coming out up to 1 ft height from small pores of 0.5 cm diameter in an area of about 0.5 m diameter. The pores were observed only on the upper 4 inches of soil cover (Figure 2 *a*). The hissing sound could be heard up to the distance of 125 feet. After closing one hole, a

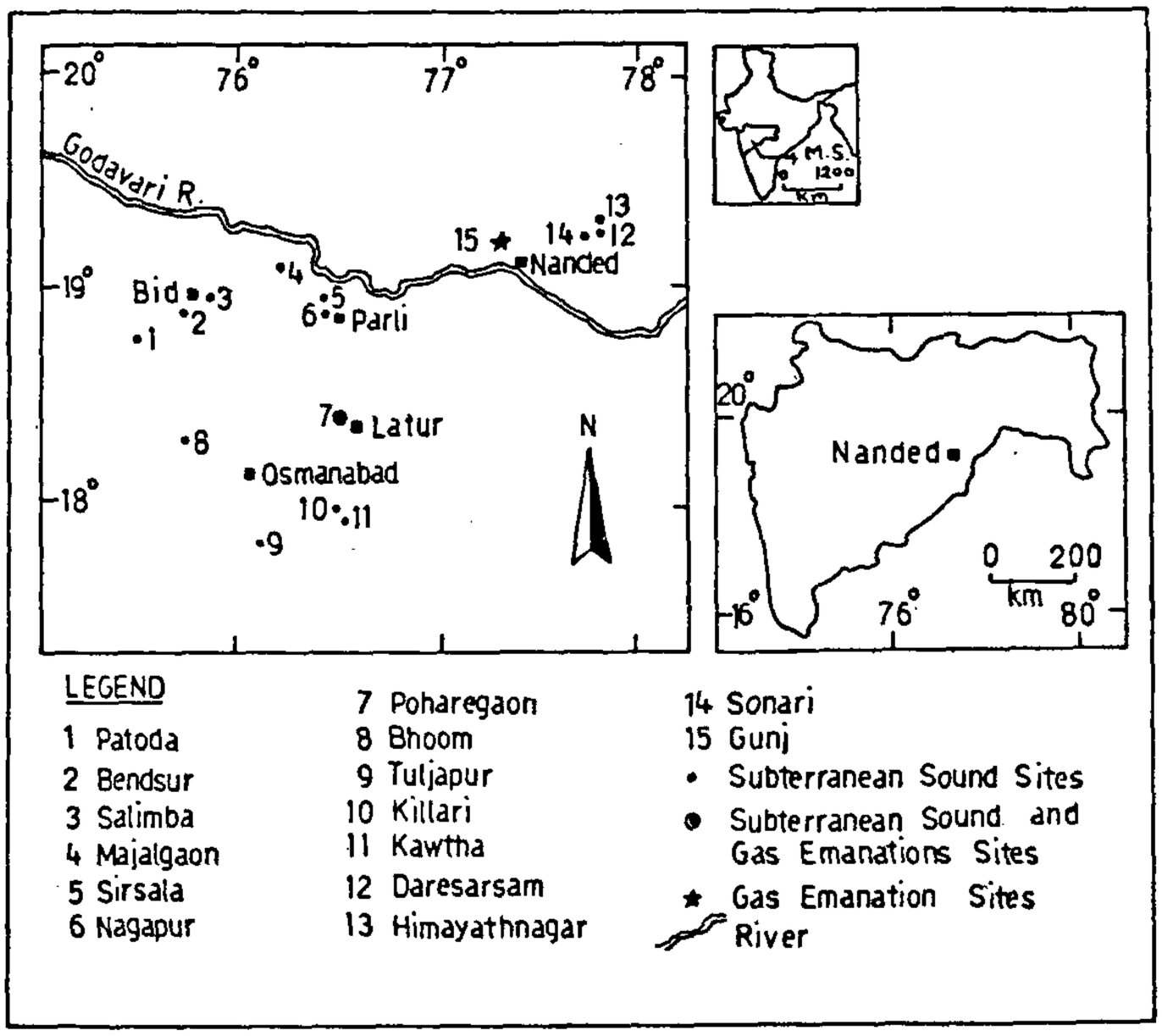


**Figure 1.** Location map of the sites.