Precambrian-Cambrian sequence in Krol belt and additional Ediacaran fossils

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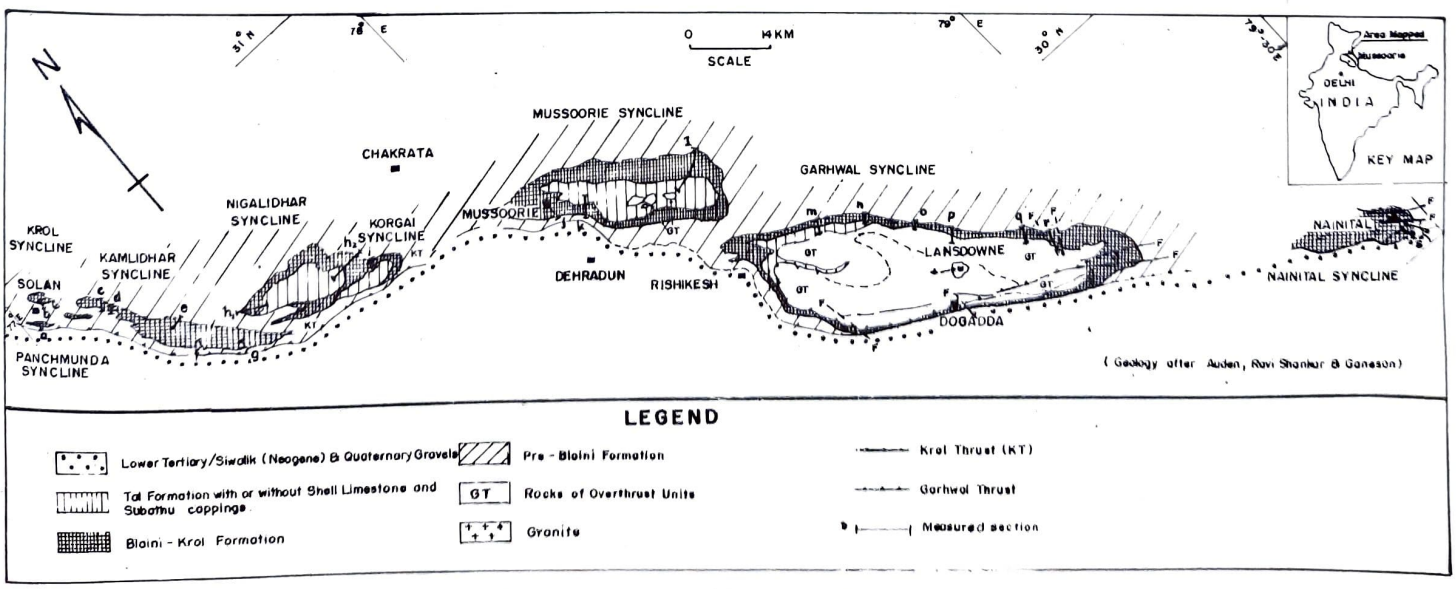
Detailed lithostratigraphic and palaeontologic studies, including the elements of Ediacaran fossils, suggest that Blaini-Krol-Tal succession of Krol belt in Lesser Himalaya represents a part of Precambrian-Cambrian sequence in the basin. The Chert Member of the Tal Formation contains fossils of Meishucunian Zone I (uppermost Precambrian) and the overlying lower part of Arenaceous Member has yielded the fossils of Meishucunian Zone III (early Cambrian). The Precambrian–Cambrian boundary, thus may lie between Chert and Arenaceous members. There is, therefore, a scope of locating fauna of Meishucunian Zone II in the intervening Argillaceous Member and delineating the boundary with precision.

Key-words—Ediacaran fossils, Krol belt, Precambrian-Cambrian.

INTRODUCTION

THE thick pile of sedimentary sequence (Blaini-Krol-Tal), exposed in several detached synclines in Lesser Himalaya between Solan and Nainital (Text-fig. 1), constitutes a part of a major Upper Proterozoic (Neo- Proterozoic, Cowie & Bassett, 1989) - Lower Cambrian sedimentary basin on the northern edge of the Indian shield. The classical work of Auden (1934, 1937) was further advanced by adding lithostratigraphic and lithofacies details by Bhargava (1979), Shanker *et al.* (1975) and Shanker (1989). This sequence was considered earlier as Upper Palaeozoic-Mesozoic in age until Singh (1976, 1979) recognised a major hiatus between Shell Limestone (Upper Cretaceous) and underlying Tal Formation and assigning Precambrian age to the sequence. Since then, significant palaeontological discoveries have been generated (Singh & Rai, 1977, 1983; Azmi, 1983; Bhatt *et al.*, 1985; Rai & Singh, 1983; Tripathi *et al.*, 1984; Kumar *et al.*, 1983 1987; Tewari, 1984; Dhaundiyal &



Text-figure 1. Geological map of Blaini-Krol-Tal Basin, Lesser Himalaya.

Moitra, 1987; Joshi *et al.*, 1988, 1989; Mathur & Joshi, 1989; Mathur & Shanker, 1989, 1990; Acharyya *et al.*, 1989; Prasad *et al.*, 1990) establishing Proterozoic to Lower Cambrian age to the sequence.

LITHOFACIES DISTRIBUTION

Lithostratigraphic map and sections measured along the Blaini- Krol-Tal sequence of the Krol belt between Solan and Nainital are given in text-figures 1 and 2 to demonstrate the evolution of the Krol Basin and lithofacies changes.

Shanker (1975) opined that phosphate bearing Chert Member of the Tal Formation, occurring in four detached synclines in Himachal Pradesh and Uttar Pradesh actually represents deposition in different parts of the same basin and later elaborated the same hypothesis for the entire Blaini-Tal sequence (Shanker *et al.*, 1975; Shanker, 1989), presented in the Text-fig. 2. The maximum thickness of the sequence is developed in the central part of the basin - in the Mussoorie Syncline. The trends of isopach lines suggest that the basin deepens in northerly/ north-northeasterly direction (Text-fig. 3). During Krol-Tal deposition, the basin appears to be shallowing both towards Solan and Nainital. The presence of sandstone in the basal part of Krol Formation; quartz arenite/ quartzitic sandstones in upper part of Krol carbonates, increase in sandy facies in shaly sequence of 'Lower Tal' and increase in the grains size and pebbly content in Upper Tal quartzite support this view. Except for Tal Formation, whose zero isopach delimiting boundary of the deposition in northwestern and southeastern directions within the Krol belt (Text-fig. 3d), all other formations were deposited in much larger areas extending beyond the present limit of the Krol belt. The Tal Formation pinches around the Gar Machher (section 'e', Kamlidhar Syncline) and Rikhinkhal (section 'r', Garhwal Syncline (Text-figs 2,3), delimited by zero isopachs (Text-figs 1,3). The above study confirms that the Tal Formation was not deposited in the Nainital area.

EDIACARAN FOSSILS

Diversified biota was recovered from the lithounit nos 1, 2, 6, 11, 12, 13, 15, 17, 18, 20, 21, 23 and 25 Text-fig. 2) in the Krol belt (Text-fig. 4).

Ediacaran fossils were recorded earlier from the upper part of the Krol Formation in the Nainital Syncline (Mathur & Shanker, 1989, 1990). Recently some additional elements have been identified which include *Charniodiscus* sp. (Pl. 1, figs 1-4), *Sekwia* sp. cf. *S. excentrica*, *Irridinitus* sp. and *Kimberella* sp. cf. *K. quadrata* (Pl. 2, figs 2, 3, 5, 6) from the same horizon exposed about 750 m south-southeast of Narayan Nagar village (29° 23'15" : 79° 26'05") on Nainital-Khurpatal road and about 200 m northwest of Gairkhet village (29° 23'25" : 79° 25' 00") near water tap on the mule track, passing through Gairkhet village complex going down the spur to Malla Khan-Adhura village in Nainital District, Uttar Pradesh (Text-figs 5 a,b). Fossils are preserved as impressions on the thinly bedded greyish black shale interbedded with ferruginous siltstone. The sequence is marked by rhythmites and lenticular beddings and shows evidences of well developed tidal flat (intertidal to subtidal) environment. Super-imposed on sedimentary features are signatures of post depositional deformation. These incorporate records of additional Ediacaran fossils which are being studied in detail. The fossil specimens are kept in the Curatorial Unit, Palaeontology and Stratigraphy Division, Geological Survey of India, Calcutta, bearing GSI type nos 20,392 to 20,399.

SYSTEMATIC DESCRIPTION

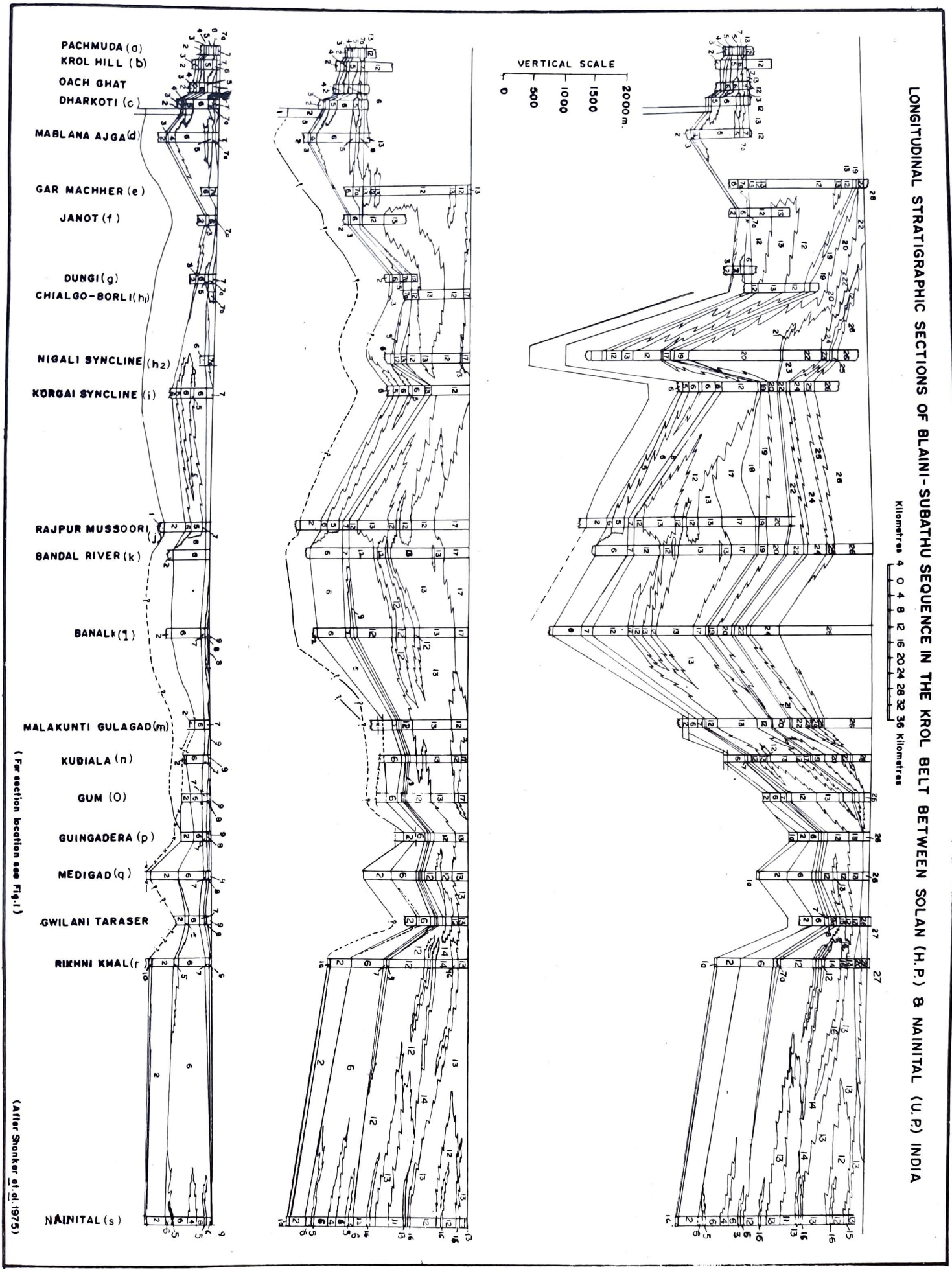
Genus –*Charniodiscus* Ford

Charniodiscus sp. cf. *C. arboreus* Glaessner
Pl. I, figs 1-4

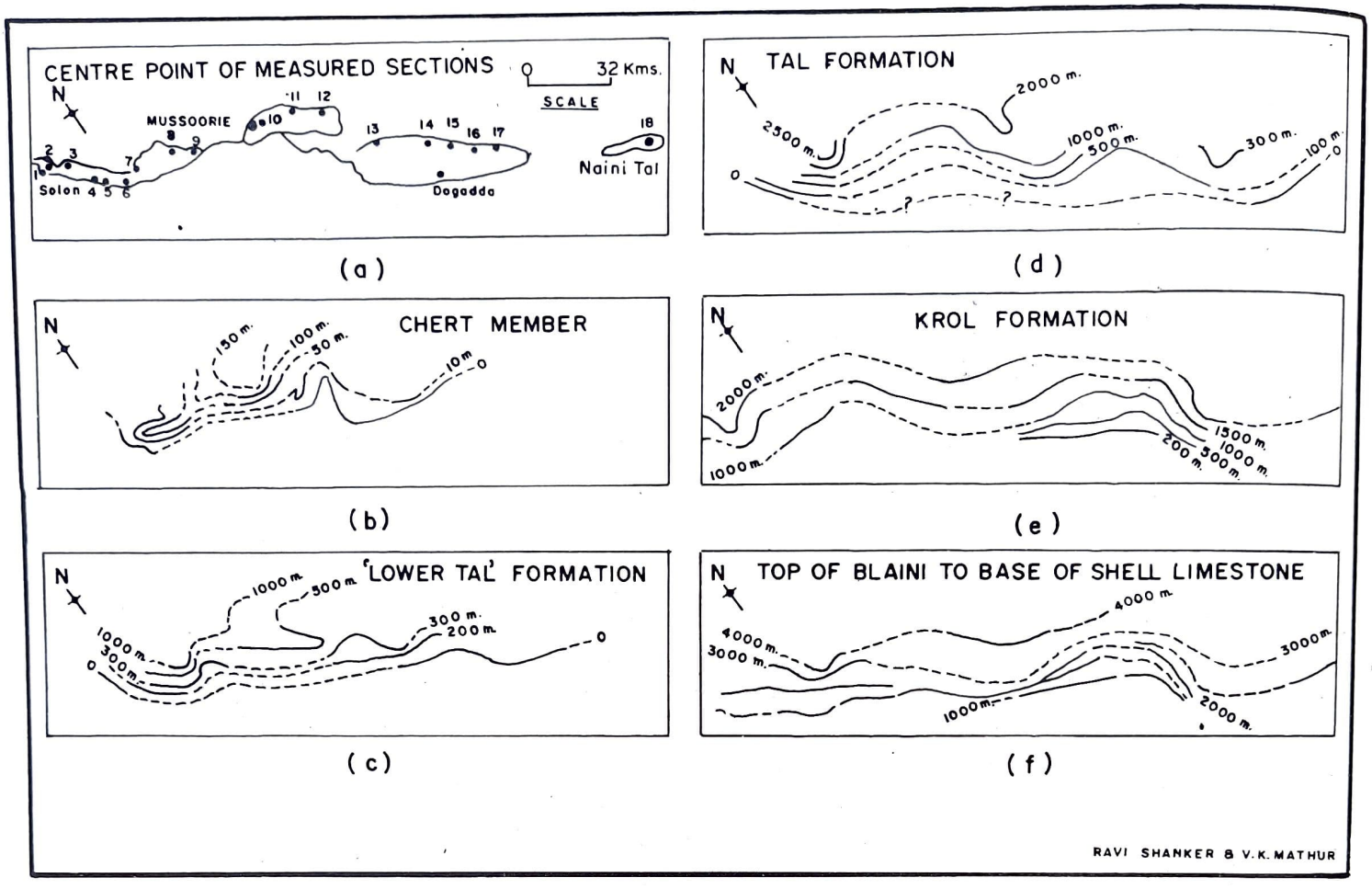
1966 *Arborea arborea* (Glaessner) Glaessner & Wade, p. 619, figs 1 & 2.

1979 *Charniodiscus arboreus* (Glaessner) Glaessner, p. A99, figs 12, 2a-c

Text-figure 2. Vertical stratigraphic sections of Blaini-Subathu sequence in the Krol Belt between Solan and Naini Tal, India. 1-1a. Blaini Formation : 1. Boulder bed interbedded with shale and arenite, 1a Pink limestone; 2. Infra Krol Formation; 3. Sandstone Member - well bedded sandstone with thin phosphatic streaks; 4-6- Lower Member (Krol A); 4. Black slaty shale and siltstone; 5. Interlayered green calcareous shale with predominent limestone; 6. Interlayered green calcareous shale and thin limestone; 7-10. Middle Member (Krol B). 7a. Red/green shale with limestone, 7b. Red shale with occasional limestone, 8. Bluish limestone/dolomitic limestone, 9. Interlayered shale and siltstone with limestone showing flow structures and ripple marks, 10. Red shale and siltstone. 11-17: Upper Member 11-12. (Krol C); 11. Thickly bedded to massive dolomitic limestone/ limestone, siliceous and often crystalline, 12. Thickly bedded to massive dolomitic limestone/limestone. 13-16- (Krol D): 13. Interlayered dolomitic limestone and shale, 14. Interlayered dolomitic limestone and shale with arenite bands, 15. Interlayered arenite, siltstone with dolomitic limestone/ limestone, 16. Bedded arenite. 17. (Krol E): Argillaceous limestone/dolomitic and calc shale. 18-26. Tal Group: 18. Chert Member : Bedded Chert, sandy shale interbedded with phosphate rock. 19. Argillaceous Member: Grey and black shale often silty. 20. Arenaceous Member : Banded siltstone, and shale. 21. Calcareous Member : Calc arenite. 22-26. Quartzite Member: 22. Micaceous quartzite with gritty and pebble beds, 23. Shale, siltstone with interbeds of quartzite, 24. Arkosic quartzite/ quartizite, 25. Algal limestone interbedded with quartzite, 26. White to light grey quartzite with ferruginous weathering tints. 27. Shell Limestone Formation: Shell limestone. 28. Subathu Formation: Olive, shale, marl, nummulitic limestone.



Text-figure 2



Text-figure 3. Isopach maps in Krol-Tal Basin.

Material—Several broken specimens preserved as impressions along the bedding plane.

Description—Bilaterally symmetrical frond like body with a narrow median axis (rhachis) giving rise to primary branches (polyp-leaves) extending laterally. Primary branches are better preserved on one side and alternately arranged on either side of median axis. Length and width of body varies from 25-80 mm and 12-20 mm respectively. The distance between primary branches varies from 2 mm to 8 mm. The angle between primary branches and the median axis varies between 40°-75°. The primary branches are faintly divided into secondary branches (anthosteles) in Pl. I, Fig. 2.

Remarks—The present specimens are morphologically similar to the forms *Arborea arborea* described by Glaessner and Wade (1966, p. 619, figs 1&2) from Ediacara, South Australia, later included under *Charniodiscus arboreus* (Glaessner, 1979, p. A99, figs 12, 2a-c). However, secondary branches in the above specimens are ill-preserved.

Locality—About 750 m south southeast of Narayan Nagar village and about 200 m northwest of Gairkhet village in Nainital District, Uttar Pradesh.

Specimen—GSI type nos 20392 to 20394.

Genus- *Sekwia* Hofmann

Sekwia sp. cf. *S. excentrica* Hofmann
Pl. 2, figs 3,5

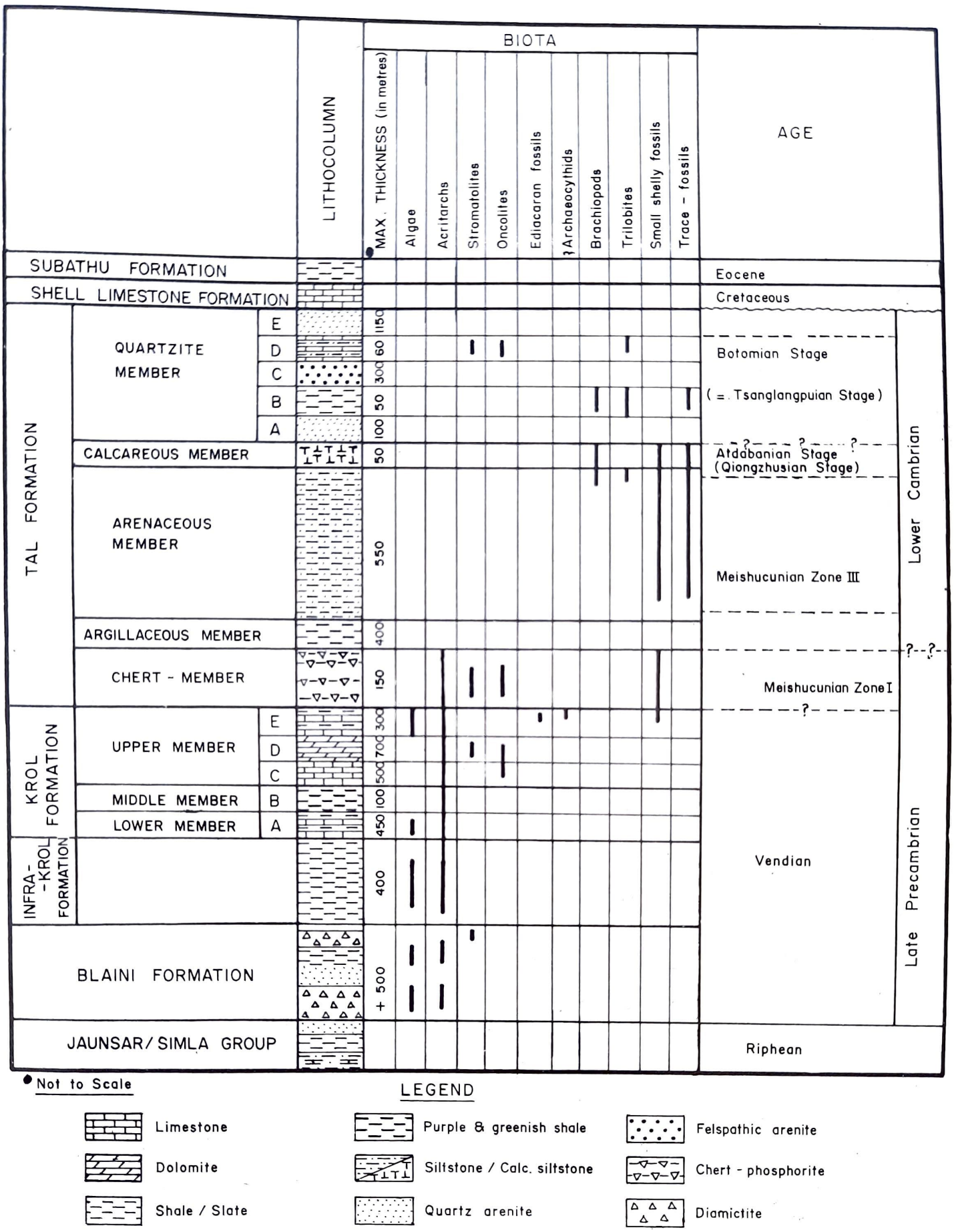
1981 *Sekwia excentrica* Hofmann, p. 303-310, figs 4A-C, H?.
1986 *Sekwia excentrica* Acenolozea & Durrand, figs 3-C,D.

Material—Eight specimens preserved as impressions along the bedding plane.

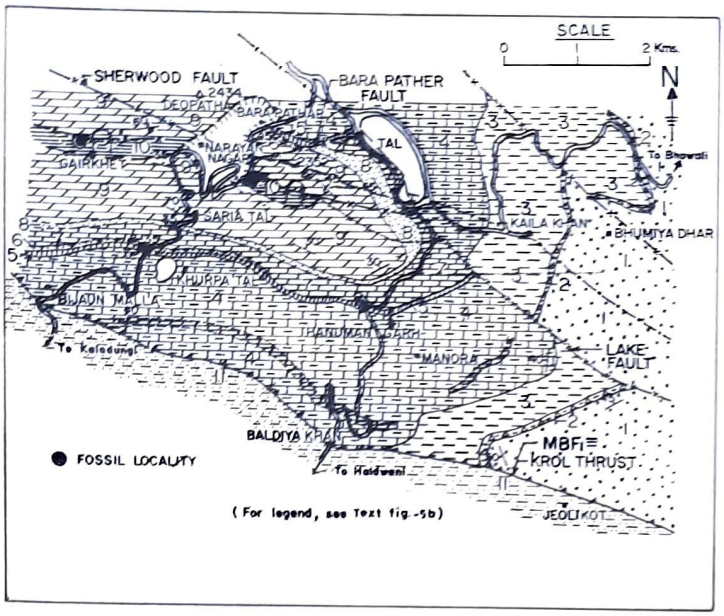
Description—Circular to slightly subcircular structures on bedding plane, with marginal groove and several excentric coarse wrinkles, diameter 2.5 to 3.5 mm, relief less than 1 mm.

Remarks—Specimens closely resemble the forms described by Hofmann (1981, figs 4A-C, H?) and Acenolozoa and Durrand (1986, figs 3C-D), except being smaller in size. The phylogenetic position of forms from Sekwia Brook section of NW Canada was compared with the coelenterates by Hofmann (1981).

Locality—About 200 m northwest of Gairkhet village, Nainital, U.P. Specimen No. GSI type no. 20, 398.



Text-figure 4. Generalised stratigraphic column of Late Precambrian - Early Cambrian of the Blaini - Krol-Tal succession, Krol belt, showing distribution of fossils.



Text-figure 5a. Geological map of a part of Nainital Synclinc (modified after Shanker *et al.*, 1972; Kumar *et al.*, 1985).

Genus –*Irridinitus* Fedonkin

Irridinitus sp.
Pl.2, figs 2,3

1983 *Irridinitus* Fedonkin, p. 128-129.

1985 *Irridinitus* sp. Hofmann *et al.*, p. 820, fig. 2C.

Material—Five specimens preserved as impression along the bedding plane.

Description—Subcircular to slightly elliptical concave epirelief (? Oral surface - subumbrellar surface). These structures vary in size from 1.5 mm x 2.5 mm to 2.5 mm x 2 mm, unbranched radial markings (canals) emanate from the small concentric groove in the centre (mouth) and pass to the outer margin which is marked by a narrow annular ridge.

Remarks—The specimens are morphologically similar to the form described by Hofmann *et al.* (1985, p. 820, fig. 2C) from the Upper part of Miette Group, Rocky Mountains, British Columbia, Canada, except that these are much smaller in size. They have attributed the medusoid affinity to similar forms.

Locality—About 200 m northwest of Gairkhet village, Nainital District, Uttar Pradesh.

Specimen—GSI type no. 20, 396.

Genus– *Kimberella* Wade

Kimberella sp. cf. *K. quadrata Glaessner & Wade*
Pl.2, fig. 6

1966 *Kimberia quadrata* Glaessner & Wade, pl. 97, figs 6,7.

1972 *Kimberella wade*, p. 215.

Material—Two specimens (one broken) preserved as impressions along the bedding plane.

Description—Elongate slender bell shaped forms which tapers a little more towards one truncate and presumably open end than at the opposite rounded end, with four pouched gonads attached to radial canals projecting into cavity of bell. The form is flattened and distorted, the truncate end of the bell being noticeably less resistant to compression than the rounded end. It has frilled zone displayed centrally with transversly segmented zones on either side. These zones may be explained as representing contracted subumbrellar muscle bands. Complete form is 27 mm long and 15 mm wide whereas broken form is 17 mm long and 12 mm wide.

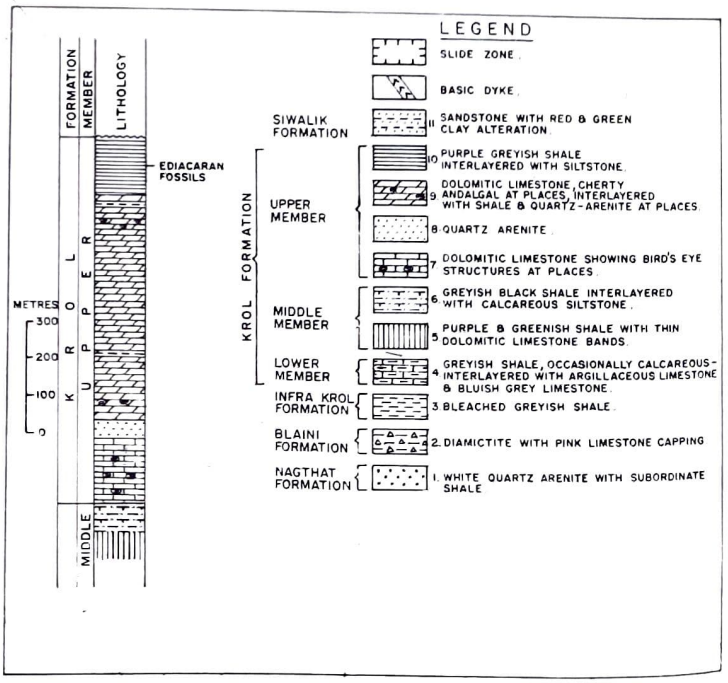
Remarks—The specimen is similar to the form described by Glaessner and Wade (1966, p. 611-612, pl. 97, figs 6,7), except being quite smaller in size. Such forms from Ediacara have been attributed to medusoid affinity (Glaessner & Wade, 1966).

Locality—About 200 m northwest of Gairkhet village, Nainital District, Uttar Pradesh.

Specimen—GSI type no. 20, 399.

DISCUSSION

Blaini-Krol-Tal sequence is one of the classical sequences for Upper Proterozoic-Cambrian succession. The assemblage consisting of brachiopods, trilobites, small shelly fossils (ssf) and trace fossils of Lower Cambrian age is well known from the Arenaceous and Calcareous members and the overlying Quartzite Member



Text-figure 5b. Lithocolumn of Upper Member of Krol Formation in Narayan Nagar - Khurpatal section.

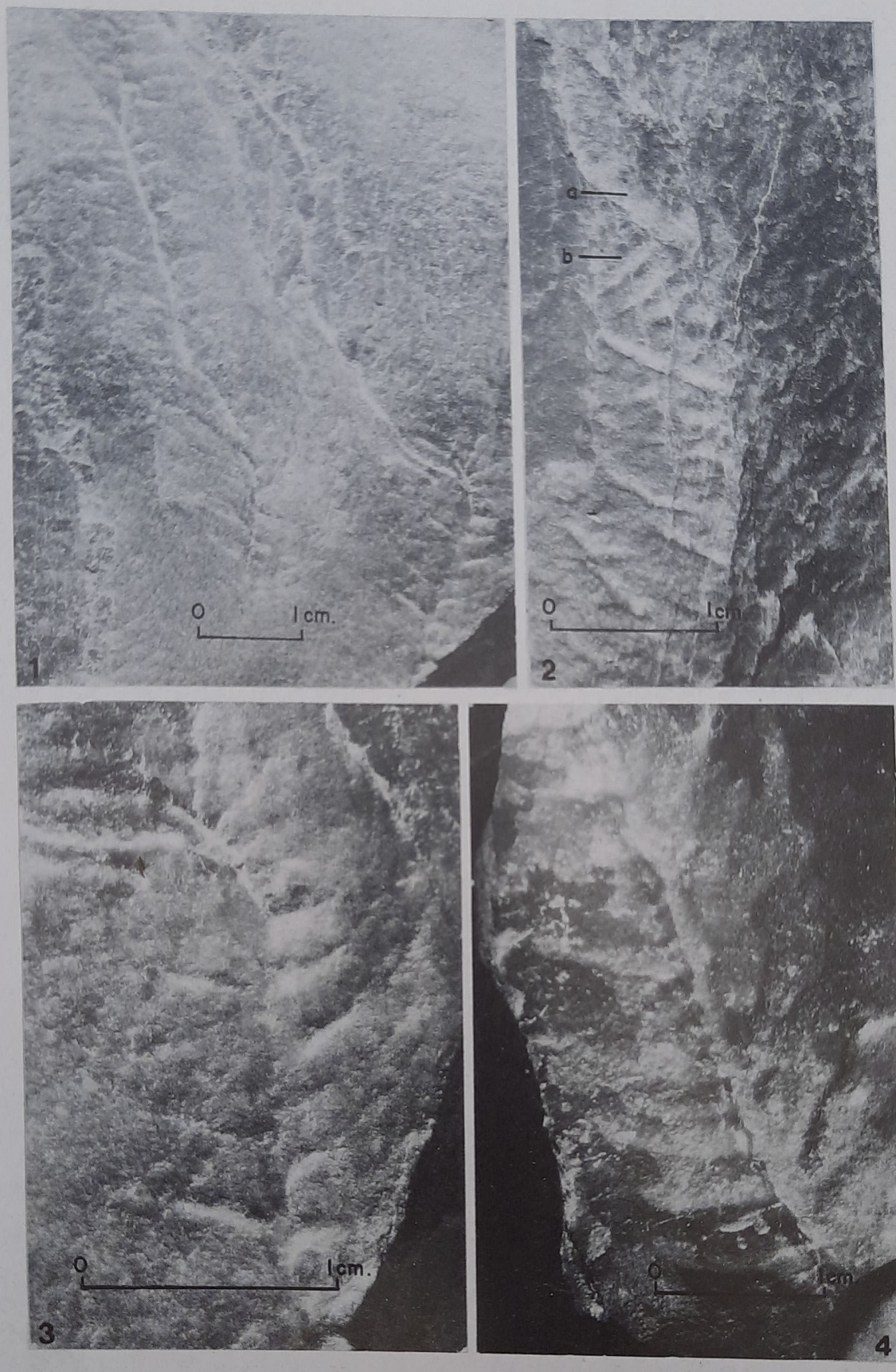


Plate 1

1. General view of slab surface containing *Charniodiscus* sp. cf. *C. arboreus*; (Glaessner) GSI type nos 20. 392.
2. *Charniodiscus* sp. cf. *C. arboreus* (Glaessner) showing primary (a) and secondary furrows (b); GSI type no. 20. 393.
3. *Charniodiscus* sp. cf. *C. arboreus* (Glaessner) enlarged southeastern specimen of fig. 1; GSI type no. 20. 392.
4. *Charniodiscus* sp. cf. *C. arboreus*; (Glaessner) GSI type no. 20. 394.

of the Tal Formation. The Chert Member in Mussoorie and Garhwal synclines yielded diagnostic small shelly fossils, acritarchs, stromatolites of Meishucumian Zone-I. The underlying carbonate sequence of Krol Formation also yielded algae, acritarchs, stromatolites and oncolites, typical of late-Precambrian (Vendian) age (Text-fig. 4). It is, therefore, clear that transition between Krol and Tal, in general, and between Chert and Argillaceous Members of the Tal Formation in particular are of interest in fixing the Precambrian-Cambrian boundary.

The Ediacaran elements from the uppermost beds in the core of Nainital Syncline (Text-fig. 5a), therefore, assume great importance to analyse biotic changes, palaeontology and paleogeography during the terminal part of Precambrian Era. The report of Ediacaran fossils, their stratigraphic position and biogenecity in the Lesser Himalaya has been a matter of debate. The authors, therefore, discuss below their own assessment.

Stratigraphic level of the horizon yielding Ediacara fossils—Lithostratigraphic correlation chart of Blaini-Krol-Tal sequence between Solan and Nainital clearly demonstrates that the Tal Formation pinches southeast to Rikhnikhal (Text-figs 1/17, 2/r Text-fig. 3) and does not continue in Nainital area. The arenaceous beds in the form of rhythmite as well as thin quartz arenite bands start appearing even in the 'Upper Krol Formation' in this part of the basin. These are very well exposed even in the Nainital town (Text-fig. 5a). Thus, the rhythmite horizon yielding the Ediacaran fossils belongs to the uppermost Krol Formation and not to the Tal Formation as claimed by Valdiya (1988), Bhatt and Mathur (1990 a,b) and Azmi *et al.* (1990). In the present author's opinion, this was the reason why Bhatt and Mathur (1990 b) could not get the small shelly fauna so typical of Chert Member in Mussoorie and Garhwal synclines with characteristic fossil assemblage of Meishucunian Zone-I (*Anabarites- Circotheca- Protohertzina* assemblage, Bhatt *et al.*, 1985; Kumar *et al.*, 1987). Further the form recorded as *Coleoloides typicalis* (Bhatt & Mathur, 1990b) does not show any diagnostic characters. It appears to be tubular form reported in Upper Vendian or Sinian sequences (Cloud & Glaessner, 1982; Luo Huilin, 1989). However, small shelly fossils (*Anabarites, Cloudina* & sabelliditids) do appear in Upper Proterozoic times and co-exist with Ediacaran soft bodied metazoans (Cloud & Glaessner, 1982; Sokolov & Fedonkin, 1984, Germs, 1972).

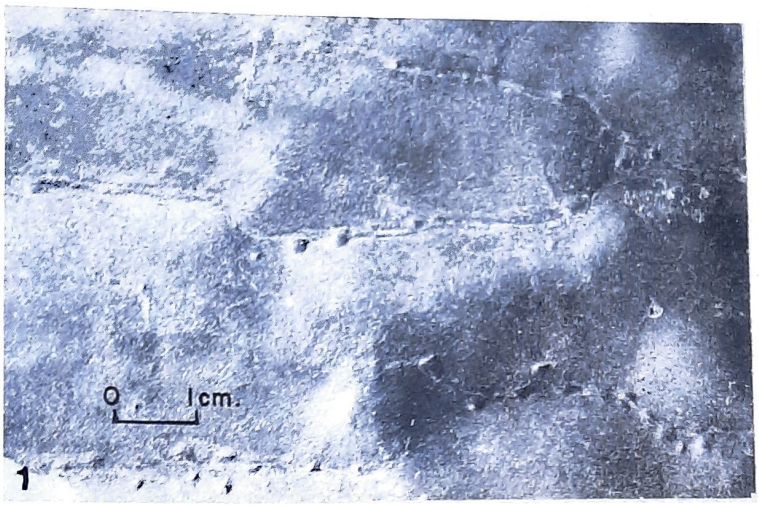
Significantly, the horizon claimed to be Tal Formation by Bhatt and Mathur (1990 b) was interlayered within the Carbonate beds and, therefore, could not be assigned to the Tal Formation. Azmi *et al.* (1990) collected small shelly fossils from black shales and slates in Hanumangarhi area underlying the Krol Formation in fact belong to Infra-Krol Formation but not to Tal Formation.

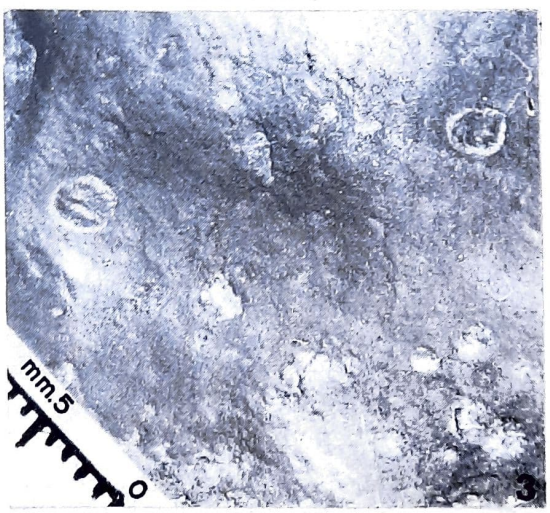
Biogenecity of reported Ediacaran fossil elements—This aspect is to be considered along with the primary sedimentary characters of the enclosing beds as well as the superimposed post-depositional deformational features. The reported fossils were recovered from a sequence of shale siltstone intercalations where rhythmites and lenticular beddings were present and show evidence of well developed tidal flat environments. In addition, micro and mesoscale ripple marks, wrinkle marks, foam marks, load structures, gas pits, were also observed in the sequence but not necessarily on the surface over which fossil impressions were found. Significantly, mud cracks and rain drops (Misra, 1984) were not observed by us on the planar surfaces having impressions of reported Ediacaran fossils.

Superimposed over these primary sedimentary features are remnants of reported Ediacaran fossil elements (Mathur & Shanker, 1989, 1990; Shanker *et al.*, in press) in the form of fronds, discoidal impressions, spheroids and some other problematic forms which show consistent morphology and some form of symmetry and organisation - all pointing towards biological affinity.

Doubts have been expressed (Bhatt & Mathur, 1990b; Bhatt, 1990; Misra, 1990) about the biogenic origin and suggested alternating explanations mostly assigning the origin of these impressions to either sedimentary structures or deformation features. The fossils dealt with and described by us can easily be distinguished from the sedimentary and structural features in most of the cases, if carefully scrutinised and discriminated. Given below are some of the characteristic features which distinguish the forms ascribed by us to the biogenic origin from the others.

A. *Frond-like forms*—*Pteridinium* and *Charniodiscus*, described by us are those frond–like forms which are non-penetrative in nature and their median axes are not always aligned with the hinges of folds and are at times also seen on nonfolded flat surfaces. These fronds resemble much to the present day pennatulid coelenterates (sea pens). They have foliate structure—the median rhachis, the stalk and attachment disc (Glaessner, 1984, p. 56). The nonavailability of well preserved complete form so far could be due to the intense deformation of the area. Consistent morphology and bilateral symmetry are observed in these forms where primary and secondary branches can be seen (Pl. 1, figs 1-4). All these features are not at all typical of wrinkle marks/dendritic structures. Because of non-penetrative nature of frond-like forms, the contention of those advocating deformational origin of these forms is self contradictory. As contended, if they were due to axial plane cleavages and conjugate system of shears, intersecting system of rhomboid features would be produced and they should be





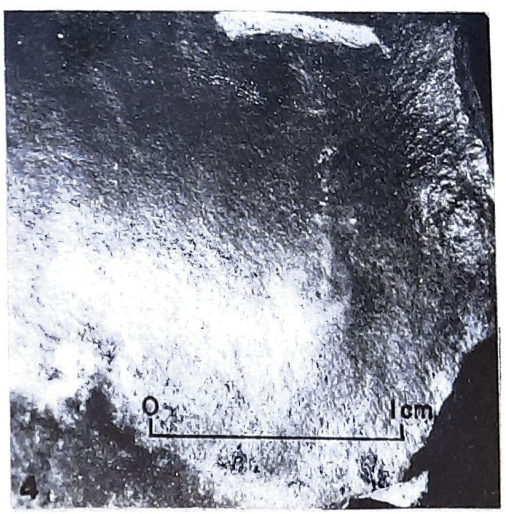


Plate 2

1. Juvenile *Beltanelliformis* sp./spheroids, arranged in linear fashion; GSI type no. 20, 395.
2. *Irridinitus* sp., enlarged southeastern specimens of Fig. 3; GSI type no. 20, 396.
3. General view of slab surface containing medusoid colonies consisting of *Sekwia* sp. cf. *S. excentrica* Hofmann & *Irridinitus* sp.; GSI type nos. 20, 398 and 20,396 respectively.
4. Attachment disc of *Charniodiscus* sp., GSI type no. 20, 397.
5. *Sekwia* sp. cf. *S. excentrica* Hofmann enlarged northwestern specimen of fig. 3; GSI type no. 20,398.
6. *Kimberella* sp. cf. *K. quadrata* Glaessner & Wade; GSI type no. 20,399.

seen in the lithounits with similar physical characteristics in the sequence. The subparallel alignments of fronds is attributable to drifting from the place of growth during tidal recession. The similar explanation has already been suggested by Sprigg (*in* Jenkins *et al.*, 1983, p. 101) and Jenkins, (1985, p. 337, fig. 1E). We may mention that many frond-like features which do not show morphological consistency and bilateral symmetry mentioned above cannot be grouped conclusively with the forms described by us.

B. *Beltanelliformis* —Smaller circular to subcircular structures referred to as *Beltanelliformis* (Mathur & Shanker, 1989) exhibit both concave and convex hypo-reliefs ranging from less than 1 mm to 6 mm, can be grouped in three maxima; and are at times aligned (Pl. 2, fig. 1). These features distinguish them from rain drop impressions, which will have only convex hypo-relief and only one maxima. These features (spheroids) are also common in other Ediacaran localities elsewhere (Bland, 1984).

C. *Medusoids*—The discoidal features described by Mathur and Shanker (1990) as medusoids have characteristics annulus, marginal flange and outer ring, besides faintly preserved radial marks in some specimens. All these features easily distinguish them from the load structures. The absence of vertical tubes do not support them to be water or gas escape structure. Based on these distinct morphological features, they have been grouped in three different genera, viz., *Medusinites*, *Tirasiana* and *Beltanella*. Nainital medusoids are relatively smaller in size than those found in Canada and Australia; but smaller forms, in milimetric to centimetric sizes, have been reported from North America (Hofmann, 1981) and U.K. (Cope in Spectrum, quoted in the Pioneer, Lucknow, dated 27.3.91).

The additional forms of medusoids, namely, *Sekwia*, *Irridinitus, Kimberella* and *Conomedusites* were also recorded in this paper are remarkably similar to Australian and Canadian forms.

D. *Precambrian-Cambrian boundary*—As per recommendations of IGCP Project-29 Working Group (1991), the Fortune Head section at Burin Peninsula southeast Newfoundland, and Canada is to be considered as the Global stratotype section and point (GSSP) for the demarcation of the Precambrian-Cambrain boundary which is based on trace fossils. In this section, the boundary has been placed 2.4 m above the base of the Chapal Island Formation between *Harlaniella podolica* Zone and *Phycodes pedum* Zone (Narbonne *et al.*, 1987) which corresponds to ichnozones I and II of Crimes (1987) respectively.

In Krol belt, the ichnofossils of ichnozone I and II have not yet been recorded. However, a rich assemblage of trace fossils corresponding to ichnozone III (Crimes, 1987) has been recorded from the Arenaceous Member of Tal Formation. It includes characteristic fossils such as *Astropoichnus (Astropolithon), Skolithos, Cruziana, Diplichnites, Rusophycus, Plagiogmus, Taphrhelminthopsis circularis* (Singh & Rai, 1983; Kumar *et al.*, 1983; Mathur *et al.*, 1988). *Phycodes cf. P. pedum* (Singh & Rai, 1983), a characteristic diagnostic ichnofossil of Zone II has also been recorded in association with this assemblage. According to Crimes (1987), this assemblage ranges in age from Upper Tommotian to Lower Atdabanian. It also contains small shelly fossils of Chinese Meishucunian Zone III (Kumar *et al.*, 1987).

Ediacaran fossil elements recorded from the upper part of the Krol Formation and the Chert Member of Tal Formation include small shelly fossils of Meishucunian Zone I which as per earlier recommendations of IGCP-29 Working Group are to be considered to be within Terminal Precambrian. The Precambrian- Cambrian boundary, therefore, would lie between Chert and Arenaceous members of Tal Formation. It is significant that Crimes (1987) has considered the three ichnozones broadly equivalent to small shelly fossil assemblages (Mieshucunian Zone I—III).

POSTSCRIPT

Subsequent to the submission of this paper, additional fossil bearing areas were discovered and collection of fossils was made from the upper part of the Krol Formation (+145 m to 840 m below the Tal Formation) jointly with Shri M..C. Srivastava in the Garhwal, Mussoorie and Nigalidhar synclines, in the vicinity of sections r, k and h_2 respectively (Text-figure 2).

The forms present include coelenterates: *Cyclomedusa davidi* Sprigg 1947 (Pl.3, fig.1), *Cyclomedusa* sp. (Pl.3, fig.2.) *Conomedusites lobatus* Glaessner & Wade 1966 (Pl.3, figs3,4), Holdfast of *Charniodiscus* sp. (Pl.3, fig.6), *Zolotytsia biserialis* Fedonkin 1981 (Pl.3, fig.9), Ichnogenus A. (Pl.3, fig.5), Ichnogenus B (Pl.3, fig.7) and ? algae (Pl.3, fig.8.). Detailed study of these fossils is in progress.

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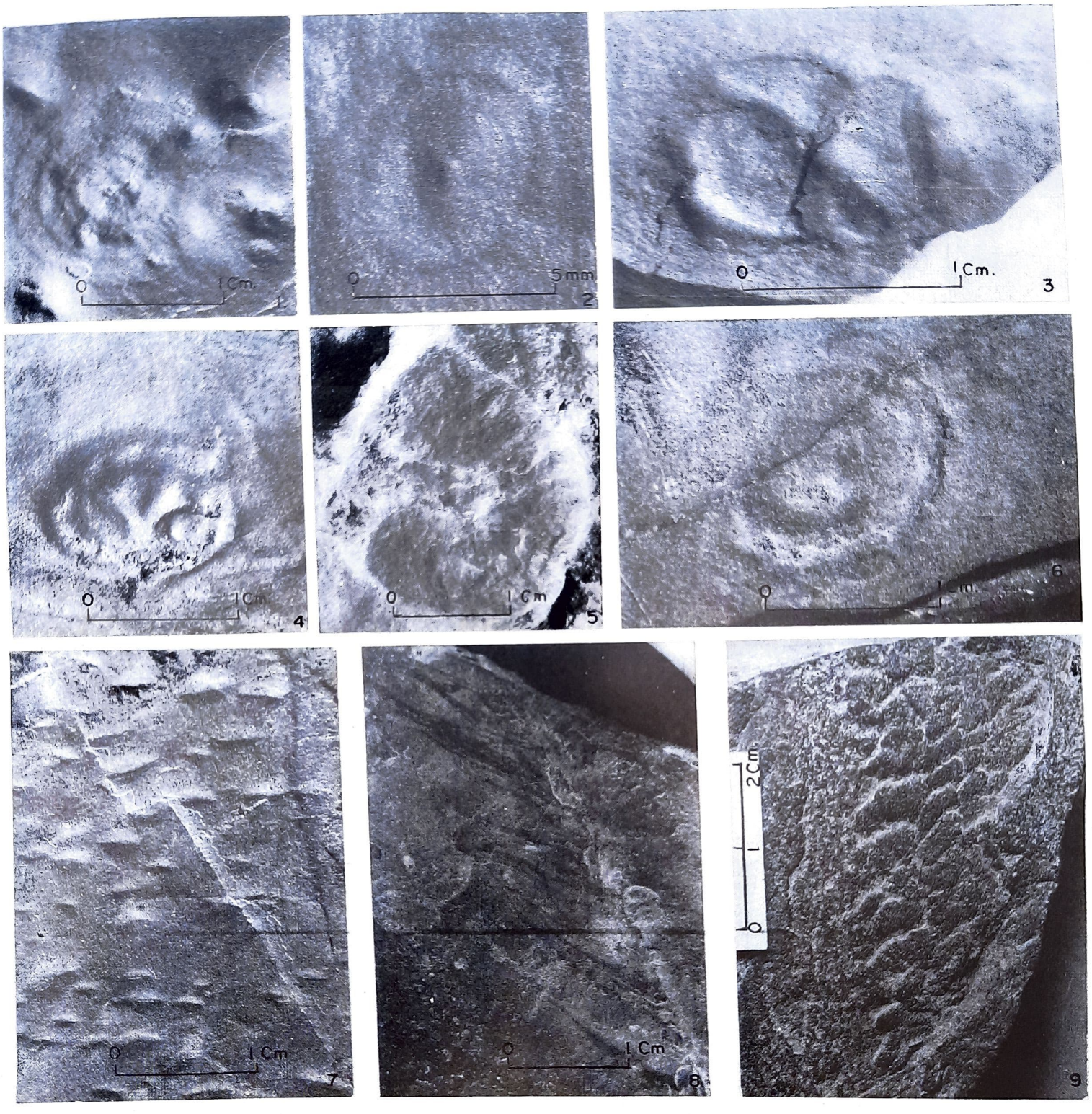

Plate 3

1. *Cyclomedusa davidi* Sprigg
2. *Cyclomedusa* sp.
3. *Conomedusites lobatus* Glaessner & Wade
4. *Conomedusites lobatus* Glaessner & Wade
5. Ichnogenus A
6. Holdfast of *Charniodiscus* sp.
7. Ichnogenus B
8. ? Algae
9. *Zolotytsia biserialis* Fedonkin

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