

# Chitinozoa-like remains from Vindhyan Supergroup of Son Valley

P. K. Maithy & Rupendra Babu

Maithy, P. K. & Babu, Rupendra (1989). Chitinozoa-like remains from Vindhyan Supergroup of Son Valley. *Palaeobotanist* 37(1) : 77-80.

Chitinozoa-like remains have been recorded from the Arangi Formation and Markundi Quartzite of Vindhyan Supergroup exposed near Dala and Agori villages in Son Valley, Mirzapur District. These remains closely resemble *Melanocyrrillium fimbriatum* Bloeser, *M. hexodiadema* Bloeser, *M. borodyskii* Bloeser and *Melanocyrrillium* sp. A preliminary analysis of their distribution in the strata shows that they may be morphologically diversified in the younger horizons.

**Key-words**—Chitinozoa-like remains, *Melanocyrrillium*, Vindhyan Supergroup, Proterozoic, Son Valley (India).

P. K. Maithy & Rupendra Babu, Birbal Sahni Institute of Palaeobotany, 53 University Road, Lucknow 226 007, India.

## सारांश

सोन घाटी के विन्ध्य महासमूह से काइटीनीजीवी-सदृश अवशेष

प्रभात कुमार माइती एवं रूपेन्द्र बाबू

मिजापुर जनपद में सोन घाटी में डाला एवं अगोरी नामक गाँवों के समीप विगोपित विन्ध्य महासमूह के आरंगी शैल-समूह एवं मरकुन्डी स्फटिक में काइटीनीजीवी-सदृश अवशेष अभिलिखित किये गये हैं। ये अवशेष *मिलेनोसाइरिलियम् फिम्ब्रिएटम्* ब्लॉयसर, *मि० हेक्सोडियाडेमा* ब्लॉयसर, *मि० होरोडिस्क्यैड* ब्लॉयसर एवं *मिलेनोसाइरिलियम्* जाति से घनिष्ठ समानता प्रदर्शित करते हैं। इन स्तरों में इनके वितरण के प्रारम्भिक विश्लेषण में व्यक्त होता है कि अल्पायु के सस्तरो में आकारिकीय दृष्टि से ये भिन्न प्रकार के हो सकते हैं।

OCCURRENCE of chitinozoa-like or vase-shaped remains is quite common in the Precambrian rocks. Ewetz (1933) first described vase-shaped microremains in the phosphatic nodules from the Visigo beds of southern Sweden. Further populations of distinctively Chitinozoa or vase-or flask-shaped fossils were described from the shales of Chuar Group, Grand Canyon, Arizona (Bloeser *et al.*, 1977); limestone pebbles from the Jacadigo Group, south-western Brazil (Fairchild *et al.*, 1978); dolomites from the Murdama Group, Saudi Arabia (Binda & Bokhari, 1980); limestone, silicified dolomites and silicified pyritic shales of the correlative Akademikerbreen and Roaldtoppen groups of Ny Friesland and western Nordaustlandet, Svalbard (Knoll, 1982); phosphate nodules from

near shore marine shales and siltstones of the Visigo beds, Sweden (Knoll & Vidal, 1980); and Sinian System of China (Jichneg *et al.*, 1980). Recently, Bloeser (1985) put them under a new genus *Melanocyrrillium* from Chuar Group, Grand Canyon.

In India, early doubtful forms of chitinozoans or chitinozoa-like microremains have been observed in the Precambrian rocks of Vindhyan Supergroup and Himalayan areas (Salujha *et al.*, 1971a, 1971b, 1972; Salujha, 1973; Nautiyal, 1982). *Incertae sedis* Type 3, resembling ?*Desmochitina* Eisenack, was first reported by Salujha *et al.* (1971a, p. 32, pl. III, fig. 31) from the Vindhyan rocks of Son Valley. In contrary, *Incertae sedis* Type 1, resembling more or less chitinozoan genus *Hoegisphaera* Staplin was

recorded from the Upper Vindhyan rocks (Late Cambrian to Ordovician) of Rajasthan (Salujha *et al.*, 1971b, pp. 70-79, pl. 1, fig. 35). Later Salujha (1973) described this doubtful chitinozoan as *Hoegisphaera* sp. (pl. 1, fig. 18, pp. 64-67) from the Upper Vindhyan deposits of Rajasthan.

Other forms of chitinozoa, vaguely resembling *Desmochitina* Eisenack (Salujha *et al.*, 1972, p. 129, pl. 1, figs 32-34), were reported as *Incertae sedis* Type 2 from the Kurnool rocks (Late Precambrian to Cambrian) of Andhra Pradesh. A few chitinozoa-like tests (Nautiyal, 1982, fig. 13, pp. 273, 274) were also recorded from the Late Precambrian medium dark grey fluted silty shale of the Lower Sanjauli Formation in Himachal Pradesh. Nautiyal (1978, figs 18-23, pp. 222-226) described definitive and distinctive forms of chitinozoans showing affinities with desmochitinids (*Desmochitina minor*, *D. ovulum*, *D. bohémica*) from the Late Precambrian Simla Slates (= Upper Simla Group) of the Satpuli area in Garhwal Himalaya. Subsequently, their stratigraphic occurrence was demonstrated in a section of Simla Slate Group (Nautiyal, 1979, pp. 29, 30; Nautiyal, 1981, p. 50).

The present paper deals with the occurrence of some non-colonial vesicle-shaped organic-walled chitinozoa-like remains from the Arangi Formation (Semri Group) and Markundi Quartzite (Kaimur Group) of the Vindhyan Supergroup in Son Valley.

### GENERAL GEOLOGY

Auden (1933) gave a generalized stratigraphic succession of the Semri and Kaimur groups around Chopan in Son Valley. Later, Ahmad (1971), Mathur (1981) and Prakash and Dalela (1982) revised the geological succession of the area as follows:

Group	Formation
Kaimur	Dhandraul Quartzite
	Bijaigarh Shale
	Markundi Quartzite
	Ghurma Shale
Semri	Ghaghar Quartzite
	Rohtas Limestone
	Basuhari Sandstone
	Bargawan Limestone
	Kheinjua Shale
	Chopan Porcellanite
	Kajrahat Limestone
	Arangi Formation

The rock samples for the present study were collected from the areas as detailed below:

Formation	Location	Lithology
A. Arangi Formation	1. 1-½ km NW of Dala (near barrier of Kajrahat Quarry)	Dirty grey to hornblende green, very fine grained shales
	2. Parsoi (exposed in Arangi Nala)	
B. Markundi Quartzite	3. 3-½ km NW of Agori Khas railway station (along the railway cutting near the contact of Markundi Quartzite with overlying Bijaigarh Shale)	Ash grey cherts

### ISOLATION OF BIOTA

To isolate chitinozoa-like microfossils, the silicified rocks were treated with hydrochloric and hydrofluoric acids, and the carbonaceous rocks with nitric acid. Subsequently, extracted organic residue was washed repeatedly in distilled water and after clearing it was mounted on the slides with Canada Balsam or D.P.X. mountant. The organic remains are dark black and opaque forms which were studied under transmitted light. All the slides have been deposited in the Birbal Sahni Institute of Palaeobotany, Museum.

### DESCRIPTION

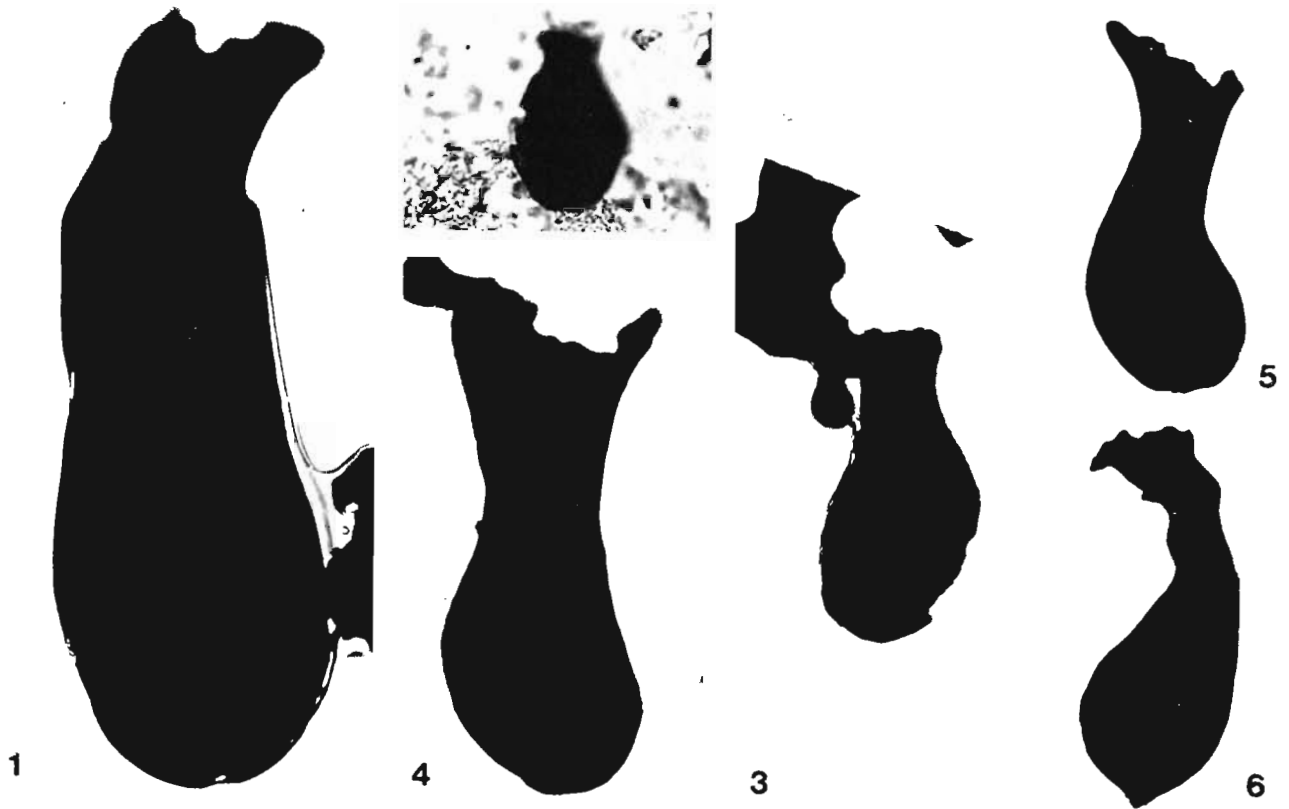
Four types of Chitinozoa-like microremains have been recorded.

#### *Melanocyrrillium fimbriatum* Bloeser Pl. 1, fig. 1

Ovoid chamber (or body), 160-200  $\mu$ m long (overall size), aboral end rounded; chamber gradually reducing in size towards oral end. Oral end and collar not preserved; margin entire, surface laevigate. In general morphology, the specimen closely resembles *Melanocyrrillium fimbriatum* Bloeser 1985.

#### *Melanocyrrillium hexodiadema* Bloeser Pl. 1, figs 2, 3

Ellipsoidal to ovoid chamber or body, 25-50  $\mu$ m long (overall size); aboral end rounded, chamber gradually reducing towards oral end into narrow neck; margin entire, surface laevigate. Morphologically the specimens, although fairly small-sized,



## PLATE 1

1. *Melanocyrrillium fimbriatum* Bloeser; Slide no. BSIP 8018 at X 61/1.  $\times 500$ .
2. *Melanocyrrillium hexodiadema* Bloeser; Slide no. BSIP 8017 at E 48/2.  $\times 1000$ .
3. *Melanocyrrillium hexodiadema* Bloeser; Slide no. BSIP 8018 at X 47/3.  $\times 500$ .
4. *Melanocyrrillium borodyskii* Bloeser; Slide no. BSIP 8018 at X 38/3.  $\times 500$ .
5. *Melanocyrrillium borodyskii* Bloeser; Slide no. BSIP 8018 at T 31/1.  $\times 500$ .
6. *Melanocyrrillium* sp.; Slide no. BSIP 8019 at V 28/4.  $\times 500$ .

show close resemblance with *Melanocyrrillium hexodiadema* Bloeser 1985.

*Melanocyrrillium borodyskii* Bloeser  
Pl. 1, figs 4, 5

Ovoid chamber or body, 35-70  $\mu\text{m}$  long (overall size); aboral end rounded, abruptly reducing to a narrow neck and subsequently expanding towards oral end into a wide collar; margin entire, surface laevigate. The specimens, although small-sized, closely resemble *Melanocyrrillium borodyskii* Bloeser 1985.

*Melanocyrrillium* sp.  
Pl. 1, fig. 6

Pear-shaped chamber or body, 40-60  $\mu\text{m}$  long (overall size); aboral margin rounded with a conical projection; neck narrow, curved, becomes broad at

oral end; margin entire, exine laevigate. This specimen also shows affinity to some forms of *Melanocyrrillium* Bloeser 1985. The collars are not preserved in the specimens due to which their detailed comparison is not possible. Thus they have been referred to *Melanocyrrillium* sp.

## CONCLUSIONS

Chitinozoans, in recent years, are being considered to be remains of animals rather than of plant origin. They are also considered to be marine and predominantly planktonic in habit. Fairchild *et al.* (1978) considered these Precambrian vase-like fossils comparable to ciliate protistan tintinids. This opinion also received the support from Knoll and Vidal (1980). However, recently Bloeser (1985) interpreted them as encystment of unidentified alga.

In the present study, chitinozoa-like remains have been recorded from the dirty green to hornblende green shales of Arangi Formation and ash-grey chert of Markundi Quartzite belonging to Semri and Kaimur groups respectively of Son Valley. Knoll and Vidal (1980) also recorded similar microremains from the Proterozoic rocks of contrasting lithofacies, i.e., ripple-marked argillites, off-shore shale deposit, marine carbonates and organic chert beds interbedded with carbonaceous, pyritic shales. Thus their occurrences in varying lithofacies are suggestive of their planktonic habitat. Nevertheless, the presence of chitinozoa-like microfossils or vase-shaped microremains in the Precambrian Son Valley sediments may prove stratigraphically significant and obviously their further detailed study is needed to reach at a definitive conclusion.

#### REFERENCES

- Ahmad, F. 1971. Geology of the Vindhyan System in eastern part of the Son Valley in Mirzapur District, U.P. *Rec. geol. Surv. India* **96** : 1-41.
- Auden, J. B. 1933. Vindhyan sedimentation in the Son Valley, Mirzapur District. *Mem. geol. Surv. India* **62** : 141-250.
- Binda, P. L. & Bokhari, M. M. 1980. Chitinozoan-like microfossils in a Late Precambrian dolostone from Saudi Arabia. *Geology* **8** : 70-71.
- Bloesser, B. 1985. *Melanocyrrillum*, a new genus of structurally complex Late Proterozoic microfossils from the Kwagunt Formation (Chuar Group), Grand Canyon, Arizona. *J. Paleont.* **59**(3) : 741-765.
- Bloeser, B., Schopf, J. W., Horodyski, R. & Breed, W. J. 1977. Chitinozoans from the Late Precambrian Chuar Group of the Grand Canyon, Arizona. *Science* **195** : 676-679.
- Ewetz, C. E. (1933). Einige neue Fossilfunde, in der Visingso-formation. *Geol. För. Stockh. Förh.* **55** : 506-518.
- Fairchild, T. R., Barbour, A. P. & Haralyi, N. L. E. 1978. Microfossils in the 'Eopalaeozoic' Jacadigo Group at Urucum, Mato Grosso, south-west Brazil. *Boletim do Instituto de Geologia, Instituto de Geociencias*, **9** : 74-79.
- Jichneg, Y., Lienfang, D., Tinggui, He., Shilin, Li & Lijuan, S. 1980. The palaeontology and sedimentary environment of the Sinian System in Emri-Ganluo Area, Sichnan. *Monograph*, China.
- Knoll, A. H. 1982. Microfossil based biostratigraphy of Precambrian Hecla Hock Sequence, Nordaustlandet, Svalbard. *Geol. Mag.* **119**(3) : 269-279.
- Knoll, A. H. & Vidal, G. 1980. Late Proterozoic vase-shaped microfossils from the Visingso beds, Sweden. *Geol. För. Stockh. Förh.* **102**(3) : 207-211.
- Mathur, S. M. 1981. A revision of the stratigraphy of the Vindhyan Supergroup in the Son Valley, Mirzapur District, Uttar Pradesh. *G.S.I. Misc. Publ.* **50** : 7-20.
- Nautiyal, A. C. 1978. Discovery of Cyanophycean algal remains and Chitinozoans from the Late Precambrian argillaceous sequence of Satpuli, Garhwal Himalaya. *Curr. Sci.* **47**(7) : 222-226.
- Nautiyal, A. C. 1979. The organic remains of the Garhwal Himalayan argillaceous sequence (Late Precambrian). *Indian J. Ear. Sci.* **6** : 24-31.
- Nautiyal, A. C. 1981. Algonkian microorganisms of the Kumaun and Himachal Himalaya and their sedimentary facies relationship (Abst.). *XIII Him. Geol. Sem.* : 1-129. Wadia Institute of Himalayan Geology, Dehradun, India.
- Nautiyal, A. C. 1982. Microplanktons from the Late Precambrian Simla Group, Himachal Pradesh. *Curr. Sci.* **51** : 273-276.
- Prakash, R. & Dalela, I. K. 1982. Stratigraphy of the Vindhyan in Uttar Pradesh : A brief review, pp. 55-79 in: Valdiya, K. S. et al. (eds)—*Geology of Vindhyachal*. Delhi.
- Salujha, S. K. 1973. Palynological evidence on the age of the Vindhyan sediments. *Proc. Indian natn. Sci. Acad.* **39** : 62-68.
- Salujha, S. K., Rehman, K. & Arora, C. M. 1971a. Plant microfossils from the Vindhyan of Son Valley, India. *J. geol. Soc. India* **12** : 24-33.
- Salujha, S. K., Rehman, K. & Rawat, M. S. 1971b. Fossil palynomorphs from the Vindhyan of Rajasthan (India). *Rev. Palaeobot. Palynol.* **11** : 65-83.
- Salujha, S. K., Rehman, K. & Arora, C. M. 1972. Early Palaeozoic microplankton from the Kurnools, Andhra Pradesh. *J. Palynol.* **8** : 123-131.