

Silurian acanthomorphitae acritarch from the Shiala Formation, Tethys Garhwal Himalaya, India

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The Tethyan-Tibetan sedimentary belt extends from Nanga Parbat in the west to Namcha Barwa in the east and divisible into five sub basins, which are resting over the Central Crystalline basement in the south. These continuous sedimentary sequences vary in thickness from 5000 to 16000 m and range in age from Precambrian to Eocene (?). In north they are terminated by the Indus-Tsangpo Suture Zone. The five subdivisions are developed in the Kashmir, Zaskar, Spiti-Kinnur and Garhwal-Kumaon Basin. The present study is confined to the Lower Palaeozoic sequences of Garhwal-Kumaon basin, which is best known for biostratigraphy and sedimentological studies (Shah and Sinha 1974, Sinha 1989, Sinha et al. 1998, Sinha et al. 2005, Sinha and Mishra 2006, Bagati et al. 1991, among others) in the Tethyan-Tibetan belt.

The Ordovician-Silurian strata known as Shiala Formation in the Garhwal-Kumaon basin vary from 400-500 m thickness and are not easily accessible for field work. The Shiala Formation conformably overlies the Garbyang Formation, which is characterised by green shales at the bottom and arenaceous component increases gradually reflecting coarsening upward sequence.

The Shiala Formation has been assigned a mid to late Ordovician age based on index forms of brachiopod taxa (Sinha 1989). Goel et al (1987) assigned a mid Ordovician age on the basis of conodont species, whereas Sinha et al (1998) demarcated Ordovician-Silurian boundary within Shiala Formation itself based on stratigraphically acritarch forms.

The present study reveals the recovery of two acanthomorph acritarch species from the siltyshale discrete horizons. These forms have not been described earlier (Sinha et al. 1998). The recovered forms are *Multiplicisphaeridium eltonense* Dornning 1981 and *Micrhystridium stellatum* Deflandre 1945.

The systematic paleontology is as follow of the recovered forms:

Group: ACRITARCHA Evitt, 1963

Subgroup: Acanthomorphitae Downie et al. 1963

Gegus: Micrhystridium Deflandre 1937

Type species: *Micrhystridium inconspicuum* Deflandre 1937

Micrhystridium stellatum Deflandre 1945

Range: *M. stellatum* has cosmopolitan in distribution and long ranging (Silurian-Mesozoic).

Occurrence: It is rare from the siltyshale lithounit of the Shiala Formation, Garhwal Tethys Himalaya.

Genus: *Multiplicisphaeridium* (Staplin) Lister, 1970

Type species: *Multiplicisphaeridium ramispinosum* Staplin 1961

Multiplicisphaeridium eltonense Dornning 1981

Range: Ludlow type area (Dornning, 1981); Elton group, Ludlow Series (Mullins, 2001).

Occurrence: It is rare from the siltyshale lithounit of the Shiala Formation, Tethys Garhwal Himalaya, India.

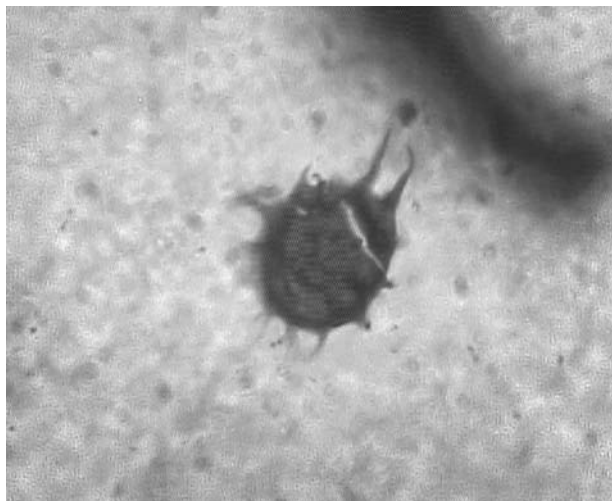


FIGURE 1. Cyst circular to subcircular in outline, originally spherical; wall thin, surface laevigate; 10-14 hollow, homomorphic, slightly flexible, spine like, laevigate processes drawn out from and freely communicating with vesicle interior; processes 4-7 m long, 1-2 m wide at sub circular base; processes tips sharply acute, excystment by simple splitting of vesicle wall. Diameter of cyst 14 m.

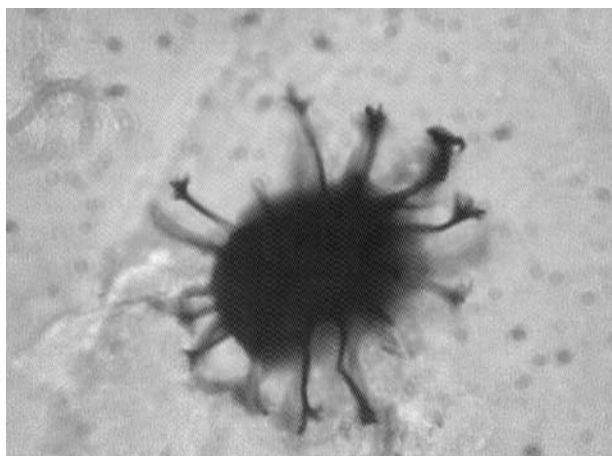


FIGURE 2. Cyst sub spherical, 25 m in diameter, laevigate; 10-18 laevigate, long processes which taper to simple and branched tips; process cavities open to the vesicle interior. Branching generally occurs at 2/3rds the way along the processes; branches ramified up to 3rd order. Pylome not distinct possibly due to over maturation.

Age and Palaeoenvironment

The yield of *Micrhystridium stellatum* and *Multiplicisphaeridium eltonense* from the study section reveals the Silurian age for the Shiala Formation, which is consistent with earlier age (Sinha et al. 1998) assigned.

Several studies have been carried out on the relationship between microplankton species and paleoenvironment. Vecoli (2000) used the distribution of microplankton to interpret the palaeoenvironment of the Cambrian-Ordovician sequence of the Sahara Platform. He found the near shore environment is dominated by thin walled sphaeromorphs, whereas outerself settings were typified by increased acritarch assemblage, high diversity and greater morphological complexity. The recovered forms from the Shiala Formation reveal the outer shelf to open marine environment. These forms are dark indicating high thermal maturation as well as the forms is oxidized prior to final burial in shallow outer shelf settings.

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