
Jainiella—A new dinoflagellate cyst genus from the Upper Cretaceous of Cauvery Basin, India

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A new dinoflagellate cyst genus *Jainiella* is described from Trichinopoly Formation (Upper Cretaceous), Cauvery Basin, southern India. It is characterised by subspherical to oval cyst having an autophragm without apical and antapical horns, and possessing an intercalary, type 3I archaeopyle. The genus *Trivalvadinium* Islam 1983 is emended and *T. plenum* Islam 1983 is transferred to the new genus *Jainiella*.

Key-words—Palynology, Dinoflagellate cyst, Upper Cretaceous, Trichinopoly Formation, Cauvery Basin (India).

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सारांश

जैनिवेल्ला—भारत की कावेरी द्रोणी के उपरि क्रीटेशी कल्प से एक नई घूर्णीकशाभ पुटी प्रजाति

खोवाजा-अतीकुज्जमौ एवं राहुल गर्ग

दक्षिणी भारत में कावेरी द्रोणी के त्रिचनापल्ली शैल-समूह (उपरि क्रीटेशी) से एक नई घूर्णीकशाभ पुटी प्रजाति—जैनिवेल्ला का वर्णन किया गया है। यह एक अन्तर्विष्ट टाइप 3-आई आर्कियोपाइल से युक्त तथा शीर्षस्थ एवं प्रतिशीर्ष उद्वर्ध रहित एक ऑटोफ्रॉम वाला उपवृत्ताकार से अण्डाकार पुटी से अभिलक्षणित है। *ट्राइवाल्वाडीनियम* इस्लाम 1983 प्रजाति संशोधित की गई है तथा *ट्रा० प्लेनम्* इस्लाम 1983 नई प्रजाति जैनिवेल्ला में स्थानांतरित की गई है।

THE marine Cretaceous sedimentary sequences in the Indian peninsula are best developed in the Cauvery Basin, ranging in age from Hauterivian to Maastrichtian. The exposed sequence is divided into five major litho-units, in stratigraphic order, viz., the Sivaganga, the Dalmiapuram, the Uttatur, the Trichinopoly and the Ariyalur formations (Sastri *et al.*, 1974, 1981).

The Trichinopoly Formation is characterised by its persistent bluish-grey shell limestones, though its lithology is diverse consisting of sandy to gritty shales inter-bedded with highly fossiliferous gritty to conglomeratic calcareous sandstone towards the base and shell limestone bands with soft calcareous to sandy shales within the upper part.

Due to their rich micro-and mega-floral and faunal contents, the Cretaceous of Trichinopoly area has always been the centre of attraction for the palaeontologists since the last century. Dinoflagellate cysts from this basin were first reported by Jain and Subbaraman (1969) from the grey shales of the Dalmiapuram Formation. Subsequently, several important publications have appeared dealing with the morphology and taxonomy of dinoflagellate cysts and their biostratigraphic

significance, viz., Jain and Taugourdeau-Lantz (1973), Jain (1977, 1978), Mehrotra and Sarjeant (1984a, b, c; 1986), Khowaja-Ateequzzaman and Jain (1990) and Khowaja-Ateequzzaman *et al.* (1991). The present dinoflagellate cysts have been recovered from hard calcareous sandstone concretions underlying bluish grey shell limestone band within the calcareous shales, collected from a dug well situated 0.5 km west of Kunnam Village, near Ariyalur, Tamil Nadu.

A critical re-evaluation of age and taxonomic status of the dinoflagellate cyst assemblages known from Cauvery and other east coast basins is summarised by Garg *et al.* (1988) and Khowaja-Ateequzzaman (1991).

Repository—The Type and Figured slides are housed in the Museum, Birbal Sahni Institute of Palaeobotany, Lucknow. The specimen coordinates refer to the Olympus (BH-2) microscope no. 217282.

SYSTEMATIC DESCRIPTION

Jainiella gen. nov.

Type species—*Jainiella breviornata* sp. nov.

Diagnosis—Autocyst subspherical to oval; proximate to proximochorate; parasutural features absent, archaeopyle intercalary, type 3I; operculum free.

Etymology—The genus is named after Dr Krishna P. Jain who has pioneered the study of fossil dinoflagellates in India.

Remarks—The new genus *Jainiella* is characterised by its hornless autocyst with intercalary, type 3I archaeopyle. In archaeopyle architecture, *Jainiella* gen. nov. resembles *Ginginodinium* Cookson & Eisenack 1960 emend. Lentin & Williams 1976; *Trivalvadinium* Islam 1983 emended herein and *Trithyrodinium* Drugg 1967 emend. Lentin & Williams 1976, but differs from all these taxa in not being biphragmal (having only an autophragm) and in lacking apical and antapical horns (Table 1).

Islam (1983a, pp. 344-346) established *Trivalvadinium* with the following diagnosis "Cyst peridinioid and roundly pentagonal to subspherical; horns, if present, vestigial; laterally to dorsoventrally compressed; proximochorate; acavate to narrowly circumcavate when possessing two mildly ornamented phragma; numerous or relatively fewer nontabular processes, solid, tubular or thinly tubular; archaeopyle intercalary type 3I/3I or 3I when an autocyst, operculum free, opercular pieces not found." He designated *Trivalvadinium formosum* as its type species. In a subsequent publication (1983b, p. 90) he described another species *Trivalvadinium plenum* which is characterised by having autocyst with intercalary archaeopyle type 3I. He further remarked, "Generic

assignment of the species been based on overall morphology and 3I archaeopyle, but this is an autocyst as against biphragmal *T. formosum*, the type of the genus. Generic reallocation of *T. plenum* n. sp. may therefore be necessary when appropriate."

In view of the above opinion (Islam, 1983b, p. 90) it is apparent that cysts with two different types of wall structures (autocyst and biphragmal cyst) should be accommodated in two different genera. A new genus *Jainiella* is therefore erected to receive the single walled cysts (autocyst). Accordingly the genus *Trivalvadinium* is emended herein excluding the autocyst. *Trivalvadinium plenum* Islam 1983b (p. 90; pl. 4, figs 4-6) having autocyst is thus transferred to the new genus.

Jainiella plena (Islam) comb. nov. = *Trivalvadinium plenum* Islam 1983b, p. 90; pl. 4, figs 4-6; *Palynology* 7 : 71-92.

Jainiella breviornata sp. nov.

P1. 1, figs 1-6

Holotype—P1. 1, figs 1-2; Slide no. 10264; coordinates : 7.6 × 167; Trichinopoly Formation, Cauvery Basin, Upper Cretaceous.

Locality—0.5 km west of Kunnam Village, near Ariyalur, Tamil Nadu.

Diagnosis—Cyst small, proximate; subspherical to oval; apex broadly obtuse; antapex with two unequally developed lobes separated by a concavity; no parasutural features; surface ornamentation mixed type with closely

Table 1—Comparative morphological features of *Jainiella* gen. nov. and related taxa

Taxa Characters	<i>Jainiella</i> gen. nov.	<i>Trivalvadinium</i> Islam 1983 emend. herein	<i>Ginginodinium</i> Cookson & Eisenack 1960 emend. Lentin & Williams 1976	<i>Trithyrodinium</i> Drugg 1967 emend. Lentin & Williams 1976
Shape	Subspherical to oval, without horns	Compressed, peridinioid to roundly pentagonal or subspherical with short apical and two antapical horns present or absent	Compressed, peridinioid to subcircular with one short apical and two short antapical horns	Subspherical to ellipsoidal usually with one apical and two poorly developed antapical horns
Wall Relationship	Autophragm only	Biphragmal, cornucavate to narrowly circumcavate	Biphragmal, cornucavate	Biphragmal, cornucavate possibly circumcavate
Wall Features	No parasutural features	Periphragm bears sparse to numerous solid or hollow, non-tubular processes; processes occasionally joined in pairs	Pandasutural bands smooth or granular, intratubular areas finely to coarsely granular	No parasutural features; endophragm variously ornamented with features of low to moderate relief; periphragm smooth or faintly ornamented
Paratabulation	Indicated by archaeopyle alone	Indicated by archaeopyle alone	4', 3a, 7" × c. 5", 2"	Indicated by archaeopyle and faint paracingulum
Archaeopyle	Intercalary type 3I	Intercalary type 3I/3I	Intercalary type 3I/3I	Intercalary type 3I/3I

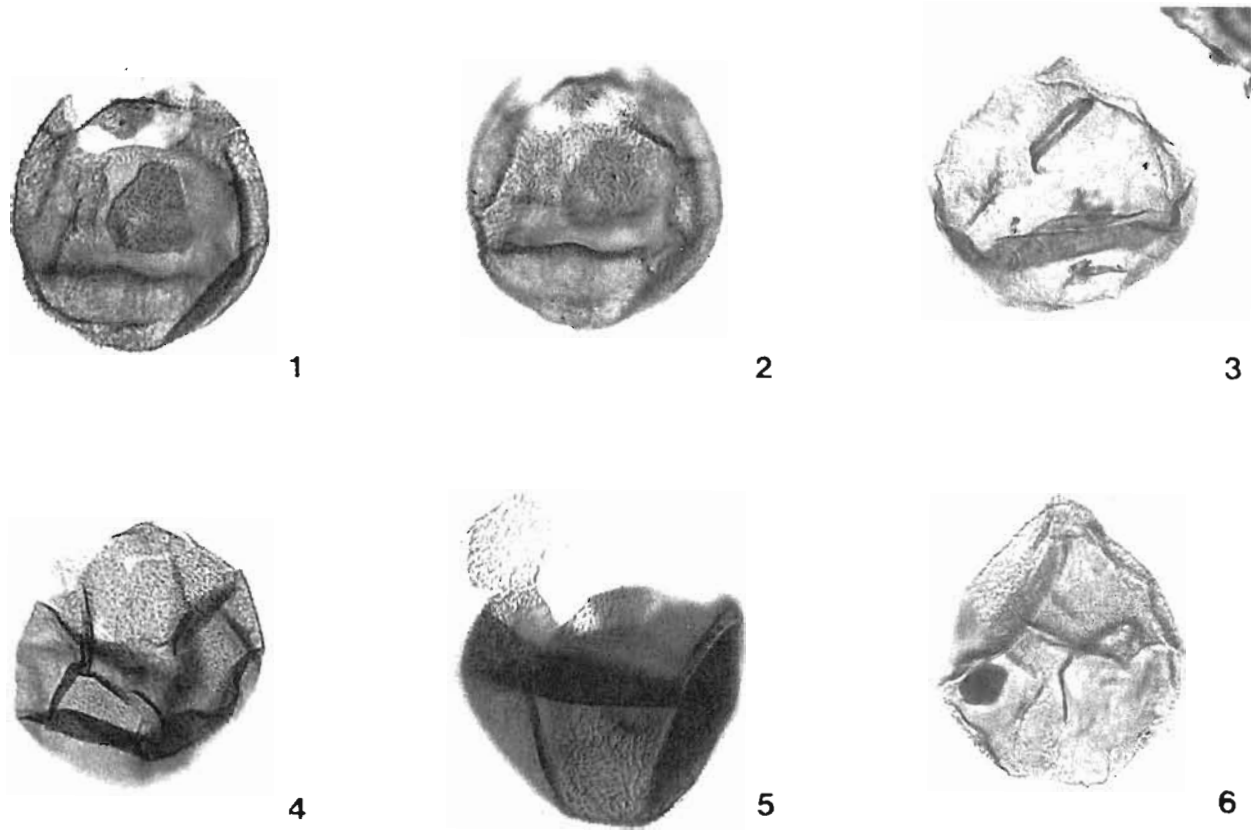


PLATE 1

(All specimens magnified $\times 750$).

1-6. *Jainiella breviornata* sp. nov.

- 1-2. Holotype specimen in dorsal high and dorsal low views respectively showing surface ornamentation and 3I intercalary archaeopyle with independently released attenuated hexa type 2a paraplate; Slide no. BSIP 10264; coordinates : 7.6 \times 167.
- 3. Paratype specimen in dorsal high view showing archaeopyle suture; Slide no. BSIP 10264; coordinates : 12 \times 122.

- 4. Paratype specimen in dorsal high view showing 3I intercalary archaeopyle with opercular pieces (1a-3a) released independently; Slide no. BSIP 10264; coordinates : 17.5 \times 129.8.
- 5. Paratype specimen showing five sided intercalary paraplate 1a; Slide no. BSIP 10264; coordinates : 16 \times 145.3.
- 6. Paratype specimen showing broadly obtuse apex and antapex with two unequal lobes separated by a concavity; Slide no. BSIP 10264; coordinates : 23 \times 126.9.

placed coarse grana and very small processes (1-2 μm in height); archaeopyle intercalary, type 3I; operculum free.

Derivation of name—Latin term *brevis* meaning short with reference to the short ornamentation.

Description :

Shape : Subspherical to oval; apex broadly obtuse; antapex with two unequal lobes separated by a concavity.

Wall relationship : Autophragm only.

Wall features : No parasutural features; surface ornamentation mixed type with features of low relief including coarse grana and very small (1-2 μm high) processes.

Paratabulation : Indicated by archaeopyle alone

Archaeopyle : Intercalary, type 3I; operculum free; opercular pieces (1a-3a) released independently 1a and 3a are five sided whereas 2a is attenuated hexa type.

Paracingulum : Not discernible.

Parasulcus : Not discernible.

Dimensions :

	<i>Holotype</i>	<i>Range</i>
Size of the cyst	50 \times 44 μm	45-55 \times 40-52 μm

Comparison—*Jainiella breviornata* sp. nov. differs from *J. plenica* (Islam) comb. nov. in being a proximate cyst having low relief ornamentation, that includes coarse grana and very small processes (1-2 μm high). *J. plenica* is a proximochorate cyst possessing numerous non-tabular, thin, slender, solid, 3-10 μm high processes only

Genus—*Trivalvadinium* Islam 1983 emended herein

Emended diagnosis—Cyst peridinioid and broadly pentagonal to subspherical; proximochorate, biphragmal, narrowly circumcavate. horns, if present, vestigial; periphragm ornamented with numerous or relatively

fewer non-tabular processes; processes solid, tubular or thinly tubular; archaeopyle intercalary, type 3I/3I; operculum free.

Type species—*Trivalvadinium formosum* Islam 1983, p. 346; pl. 4, fig. 9.

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