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The hunt for *Cummingsella* (Carboniferous, Chlorophyta)

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ABSTRACT

Until recently Cummingsella *was only known by two rare and puzzling species, erected on very limited material. The genus was therefore considered as representing a very uncommon and puzzling form that played no role in carbonate sedimentation. Recent studies of Viséan carbonates in the American Midcontinent have disclosed a prolific* Cummingsella *flora that indicates the proximity of an algal bank.* Cummingsella *can therefore be considered locally abundant and cosmopolitan (Europe, Australia, North America), ranging in age from the Tournaisian to the Namurian (Serpukhovian).*

Keywords: Carboniferous, Chlorophyta, distribution

1. PREVIOUS WORK

HUTTON (1965) in his Ph.D. thesis described Namurian foraminifera and algae of the Limestone Coal Group of the Upper Limestone outcropping in southern Scotland. He also restudied some of the collections originally made by R.C. Cummings from the same levels (Top Hosie, Index, Lyoncross, Orchard, Calmy). The same year, Hutton showed his material to the senior author (Bernard Mamet) during a visit to Glasgow. One thin-section yielded a curious alga that did not fit previous diagnosis or description. Unfortunately there was only one well-oriented section of the thallus.

In 1978, Dr. I. Rolfe of the Hunterian Museum in Glasgow shipped additional material to Brussels, but it provided no additional information. The same level of the Lyoncross Limestone in the original quarry was disappointing as only fragments of the thallus could be detected.

It is obviously unwise to erect a new genus on a single good section, but the morphology was so curious that Alain Roux convinced Mamet to overcome his prejudices. We finally proposed the new genus *Cummingsella* (*Cummingsella lyoncrossi*; Pl. 1, Fig. 1) in honour of R.C. Cummings, a pioneer of foraminiferal and algal research in the Carboniferous of Great Britain (MAMET & ROUX, 1980). There was some unease as related or similar morphologies had not been recognized in the literature.

However, a few years later, we observed another unique *Cummingsella sp.*, this time in Australia. The dimensions were far more modest but the morphology quite similar to the Scottish species and we named the taxon *C. bingleburrae* (from the Late Tournaisian, Bingleburra Formation, New South Wales). Needless to say, the species was again erected on one single unique, longitudinal section and no further thin-sections brought additional information.

Figure 1: Location of Sugar Creek. KA – Kansas, IO – Iowa, ILL – Illinois, MO – Missouri.

PLATE 1

1 *Cummingsella lyoncrossi* MAMET & ROUX 1980. Reproduction of original holotype, pl.1, fig. 1, photograph Ro.29/6, sample UK209, Collection Mamet, U. of B. 8253, Lyoncross Limestone, upper Zone 17, Namurian-Serpukhovian, Whitecraigs, Renfrewshire, Scotland, x78.

2 *Cummingsella bingleburrae* MAMET & ROUX 1983. Reproduction of the holotype, pl. 4, fig. 8, sample Canberra CPC24047, Mamet Collection 9F, 526/29, Bingleburra Formation, uppermost Zone 9, Tournaisian, Bingleburra, New South Wales, Australia, x121.

3–17 *Cummingsella bingleburrae* MAMET & ROUX 1983. All material from the upper "Warsaw" Formation, Sugar Creek Quarry, Kansas City, Kansas, Zone 12, Viséan, x121.

3, 11, 13, 17 Sligthlty oblique sections with micritized and corroded central medulla; Fig. 3 – U. of B. 916/35, sample 95/2/863; Fig. 11 – U. of B. 914/5, sample 94/2/690; Fig. 13 – U. of B. 915/3, sample 94/1/625, Fig. 17 – U. of B. 913/30, sample 95/2/863b.

4, 5, 6, 15 Longitudinal sections with somewhat corroded medulla. Sample 6 broken between two segments. Fig. 4 – U. of B. 917/32, sample 94/2/691, Fig. 5 – U. of B. 917/3, sample 95/2/873; Fig. 6 – U. of B. 917/1, sample 95/2/870; Fig. 15 – U. of B. 914/6, sample 94/2/690b.

7–9 Axial sections with medulla. Fig. 7 – U. of B. 913/31, sample 95/2/863b; Fig. 8 – U. of B. 913/35, sample 95/2/864; Fig. 9 – U. of B. 917/30, sample 94/2/690c.

10 Axial section with dichotomy. U. of B. 915/6, sample 94/1/603.

12, 14, 16 Longitudinal sections; Segment 16 is broken. Fig. 12 – U. of B. 915/8, sample 94/2/693; Fig. 14 – U. of B. 916/19, sample 96/2/704, Fig. 16 – U. of B. 914/7, sample 94/2/601.

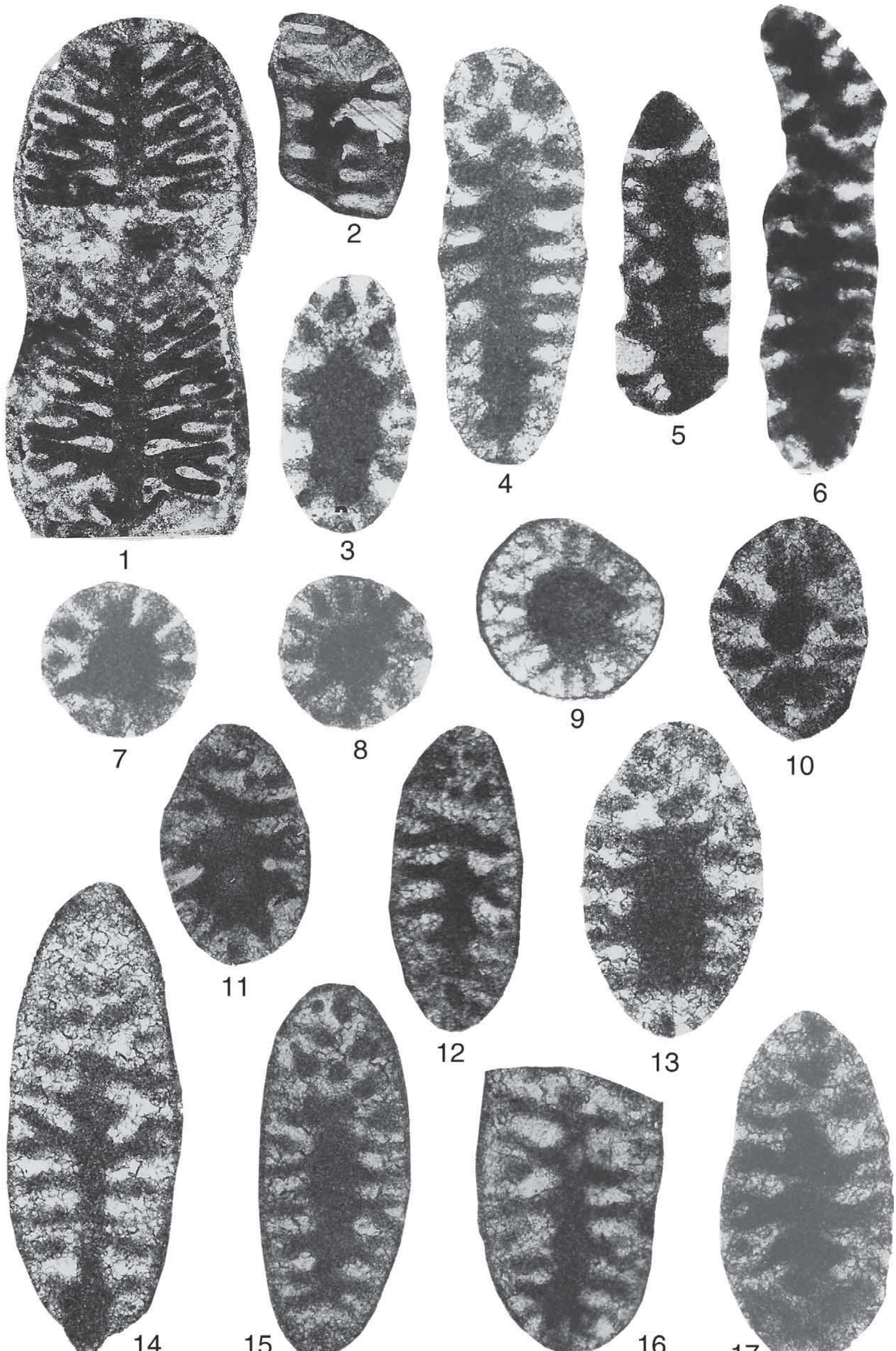
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PLATE 2

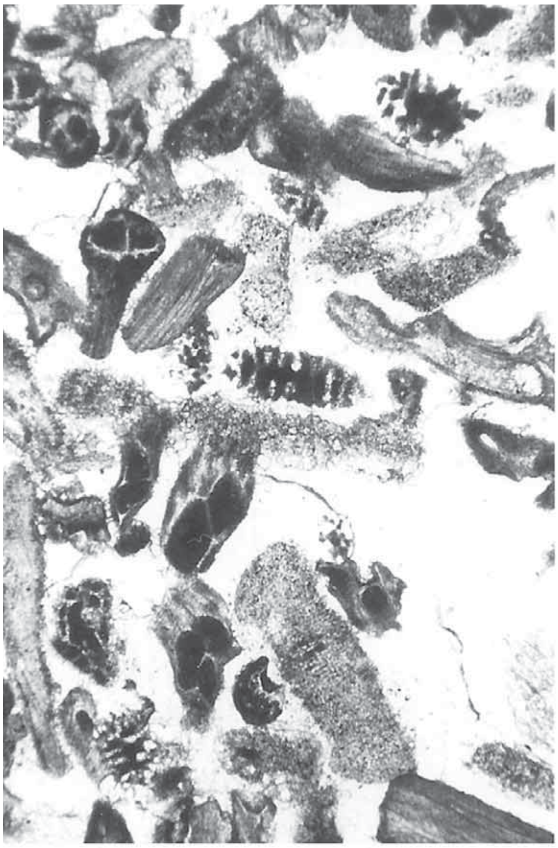
All samples are from the Middle Viséan Zone 12, "Warsaw" Formation, Sugar Creek Quarry, Kansas City. Kansas.

1 Well-sorted fossil grainstone. Three reworked mud-filled *Cummingsella* thalli (lower left, upper right) associated with pitted echinoderms, mud-filled broken fenestellid fronds and brachiopod shells. High energy, upper ramp. Sample 95/2/870, U. of B. 917/5, x31.

2 Medium-sorted fossil grainstone. Longitudinal section of *Cummingsella* (centre). Pitted echinoderms, numerous brachiopod shells, mud-filled gastropod, fenestellids, *Asphaltina* sp. and *Earlandia* sp. High energy, upper ramp. Sample 94/1/693, U. of B. 918/30, x31.

3 Recrystallized, poorly-sorted fossil packstone. Some pressure solution. Axial and longitudinal sections of *Asphaltina cordillerensis* MAMET in PETRYK & MAMET, 1972. This common and cosmopolitan Carboniferous species is characteristic of medium to high energy carbonates. Echinoderms and bryozoans. Middle part of ramp. Sample 96/2/689, U. of B. 916/12, x31.

4 *Asphaltina cordillerensis* MAMET in PETRYK & MAMET, 1972 in an echinoderm-bryozoan grainstone. Sample 95/2/872, U. of B. 917/9, x78.



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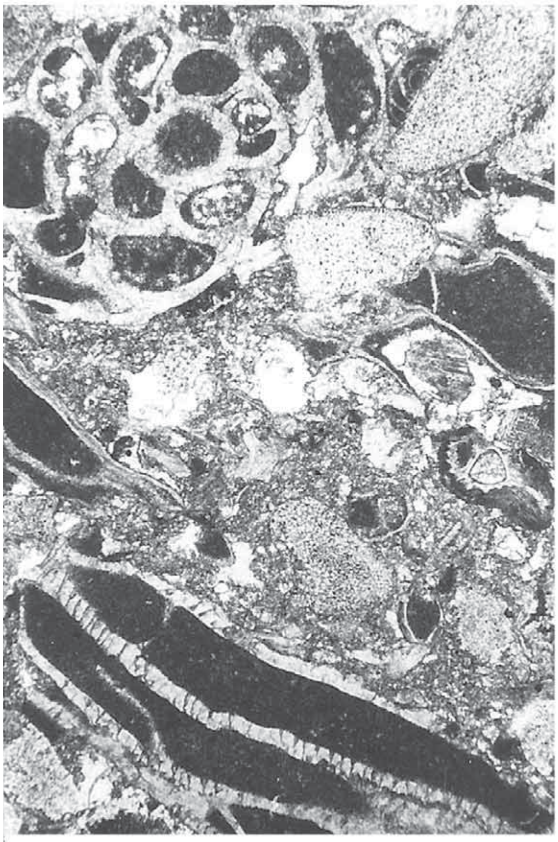

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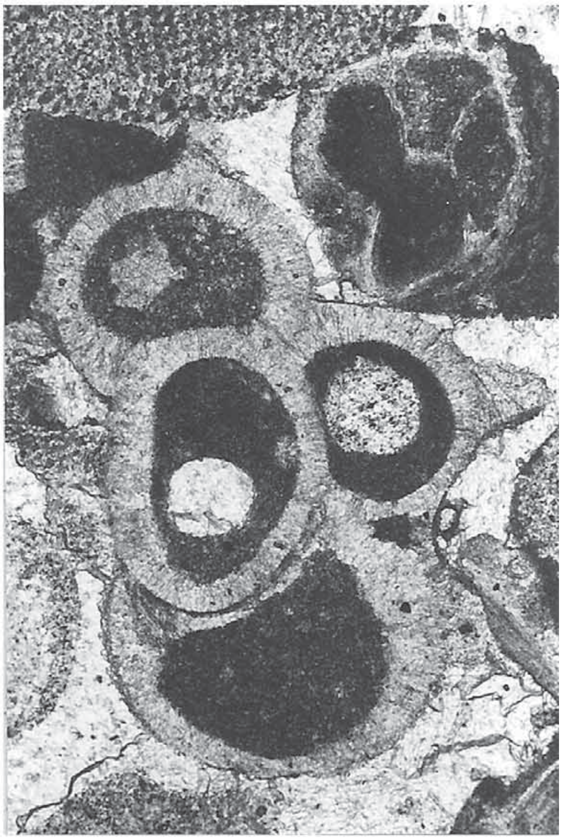

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It has to be admitted that the "erection" of a new taxon on one single section is not to be recommended and is equivalent to "skating on thin ice". To make things worse, no new material to substantiate this claim was discovered for 25 years. Moreover the attribution of the genus to higher levels was unclear but could suggest the Dasycladales or the "Udoteaceae" (Halimedaceans). BUCUR (1999) attributed the two species to the Halimedaceans. But no new discoveries of the genus could be found.

Thus the recent observations of abundant *Cummingsella* in the Viséan of North America, which are the subject of this note, are welcomed.

2. LOCATION, STRATIGRAPHY AND MICROFACIES

Due to the expansion of the Lafarge Cement Sugar Creek Quarry in the vicinity of Kansas City, Kansas (Fig. 1), a number of drill-holes were made to test the quality of the Mississippian carbonates. They provided a detailed stratigraphic succession from the Viséan (= Meramecian) "Warsaw" and St. Louis formations.

The level that contains numerous *Cummingsella* is located at the top of the "Warsaw" Formation, just below the contact with the overlying St Louis Limestone. It can be traced over a square kilometre and is 10–12 metres in thickness. A few hundred thin-sections yielded the following observations.

Microfacies are composed of high-energy, reworked fossil grainstones and packstones (Pl. 2). There is extensive pressure-solution among the packstones. The macrofauna is composed of pitted echinoderms, brachiopods, mud-filled gastropods and fenestellid fronds (Pl. 2, Figs. 1, 4). Foraminifera are plentiful: including primitive "*Archaediscus"* sp., *Earlandia* sp*., Endothyra* sp., *Eoendothyranopsis* sp., *Eoendothyranopsis hinduensis* (SKIPP, 1969), *Eoendothyranopsis spiroides* (ZELLER, 1957), *Eoforschia* sp*., Globoendothyra* sp., *Pseudotaxis* sp., *Skippella* sp. and *Tetraxis* sp.

Reworked algal thalli, Calcispheres and microproblematica are represented by: *Asphaltina cordillerensis* MAMET in PETRYK & MAMET, 1972 (pl. 2, figs. 3–4), *Calcisphaera laevis* WILLIAMSON 1881, *Calcisphaera pachysphaerica* (PRONINA 1963), *Cummingsella bingleburrae* MAMET & ROUX 1983, *Girvanella* sp. and *Pseudostacheoides loomisi* (PETRYK & MAMET 1972).

Each thin-section contains from 5 to 20 *Cummingsella* and the total observed flora amounts to 400 thalli.

The paleoenvironment is within the fair-weather wave base, at the base of the euphotic zone. The age is Zone 12, in the upper part of the Zone, Middle Viséan. The age is different from Australian material (Late Tournaisian) but the overall microfacies is quite similar. The abundance of reworked, heavily micritized thalli suggests the proximity of an algal bank.

3. PALAEONTOLOGICAL DESCRIPTION

Cummingsella bingleburrae MAMET & ROUX 1983
(Pl. 1, Figs. 2–17)

Description: Small species of *Cummingsella* has diameter of segments around 200–250 μm. The thallus is perforated by a central cylindrical medula (60 to 110 μm). Ramifications are regular, 10 to 12 at the same level, equidistant, bifurcated as single or double tufts. Diameter is 25–30 μm.

Comparison: The periphery of the thallus is less segmented than the original material. However, the central medulla is often enlarged by micritization and corrosion, and thus appears artificially segmented. This indicates extensive diagenesis (the thallus was probably aragonitic) and has caused confusion in the past between the attribution to Dasycladales and "Udoteaceans". Prof. Bucur suggests the possibility of intusannulations, suggesting junctions of lateral filaments.

4. CONCLUSION

The hunt for *Cummingsella* is a good illustration of the fluctuating state of knowledge of the Palaeozoic algae. Many genera, often recognized on insufficient data, seem endemic to a region, appear to be scarce, and of dubious sedimentological consequence. They may suddenly appear, and by chance have very different connotations. Hence palaeogeographic reconstructions and migration patterns based on microflora have to be taken "*cum grano salis"*.

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