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IBERIAELLA, A NEW FOSSIL ALGA FROM THE MIDDLE CARBONIFEROUS OF NW SPAIN[1]

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ABSTRACT

Rácz, L. G. 1984 Iberiaella, a new fossil alga from the Middle Carboniferous of NW Spain – Geol. Mijnbouw 63: 333-336.

A colony-forming organism, constructed of single, pairs or bundles of wavy, locally constricted tubular filaments, is described here as new Middle Carboniferous algal genus *Iberiaella* of uncertain affinity. *Iberiaella* superficially resembles *Donezella*, a widespread organism observed in shallow water carbonates of the Cantabrian Mountains. However, the multi-layered tubular tissue, the non-perforated wall structure of the tubes and the encrusting habitus make *Iberiaella* easily distinguishable from *Donezella* with its dichotomously branching single layers of detached septated tubes.

It is believed that *Iberiaella* with its anastomosing branching-network and encrusting character forms the rigid skeleton of the organic mounds which occur commonly in the carbonate beds on the southern slope of the Cantabrian Mountains. *Donezella* had the function of a stabilizer in the process. The fine (micritic) internal sediment – the bulk of the material filling up the open spaces in the algal network – suggests low to moderate energy during deposition and absence of drastic diagenetic alterations.

INTRODUCTION

During a re-examination of a collection of fossil algae from northern Spain (Figs. 1, 2) an interesting colony-forming organism was noted. Originally, it was thought that the peculiarly developed algal structure was a species of the widely distributed genus *Donezella*, which it resembles superficially. Closer examination revealed, however, anatomical features which, as far as I can trace, have not until now been described in the literature. The large quantities of this organism found at various stratigraphic levels suggest an influence on the sedimentary mechanism of carbonates in Middle Carboniferous Spain.

SYSTEMATIC DESCRIPTION

Family : Uncertain
Genus : *Iberiaella* n. gen.
Type species : *Iberiaella carbonica* n. sp.
Fig. 3, a-f

Material

Thin sections of samples I-b-34, ND-I-49, ND-II-66, S-II-05, LO-52 are deposited in the Geological Museum, Leiden.

Holotype : I-b-34 (Fig. 3, a), San Emiliano Fm, south of Cármenes (loc R 34), Prov. Léon (Fig. 2).

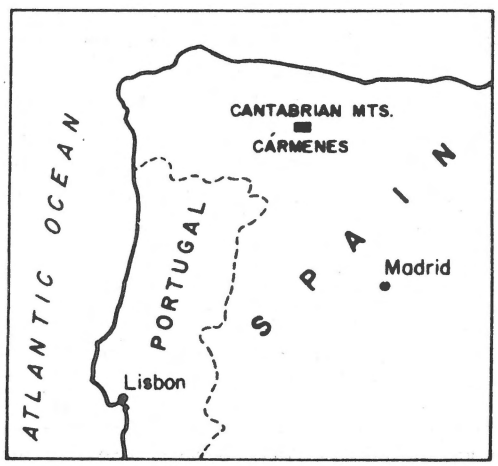

Fig. 1
Locality map

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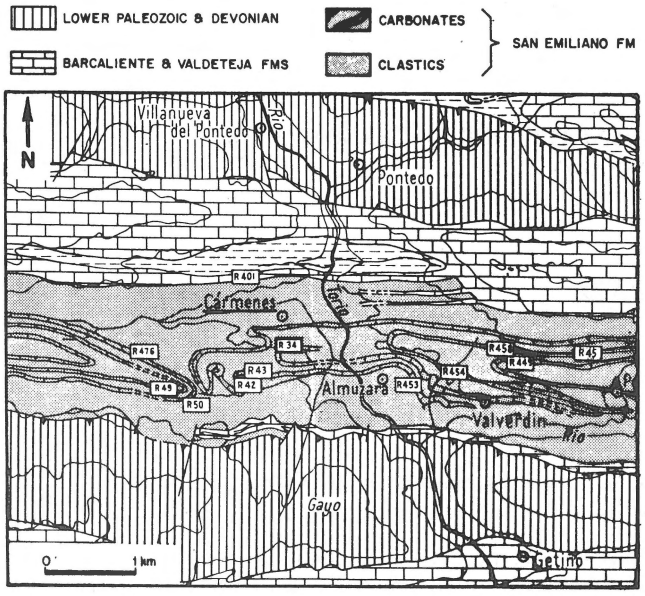


Fig. 2
Geological map of the Cármenes area

Occurrence

Specimens of *Iberiaella* occur widespread in the Middle Carboniferous carbonate deposits of the Cantabrian Mountains. This alga has been found in both the provinces Léon and Palencia, and also in samples collected in Asturias. Carbonate beds of Bashkirian and Moskovian age (calcareous algal zones II-V, RÁCZ, 1965) contain *Iberiaella* in moderate to large quantities.

Description

Thallus is sphaerical, nodular or irregular, composed of colony-forming thread-like, wavy tubular elements. The tubes vary in diameter between 20 to 50 μm. Occasionally poorly preserved dark coloured walls of 3-7 μm separate two consecutive tubes. Usually the tubes are partly or wholly recrystallized exhibiting a thread-like appearance. The "threads" often show a thin dark central canal of a few μm. In weathered matrix the tubes are constructed by a thin outer calcareous wall of 10-15 μm and a dark central area. In such instances it can be observed that the tubes are undulating, constricted at irregular intervals and rounded at their distal end.

At a short distance from the distal end the tubes contract, then expand again at their extreme end. Rarely, incomplete septation is visible. The tubes or threads occur single, in pairs or multi-layered. They branch at random but often turn 90° or nearly so, leading to an anastomosing pattern. The twisted bundles contain swollen "knobs" at branching points. No reproductive organs were observed with certainty. The swollen knobs at branching points and the expanded extreme end of the tubes might have accommodated reproductory organs.

COMPARISON

The branching tubes and/or threads of *Iberiaella carbonica* resemble *Donezella* closely. While in *Donezella* the wall structure of the tubes is subdivided into a darker, apparently perforated inner, and a thinner outer calcite layer, no such separation was noted in *Iberiaella*.

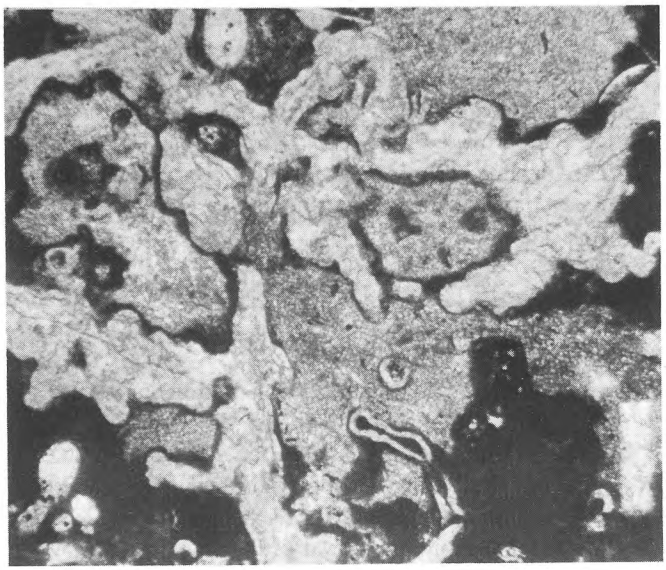
The dichotomously branching tubes of *Donezella* appear as a single septated layer, while those in *Iberiaella* form parallel or twisted bundles of layers. Additionally, the strong encrusting growth habit of *Iberiaella* was not observed in *Donezella*. Certain species of *Cuneiphycus* also show similarities to *Iberiaella* by exhibiting a branching crustose thallus forming a chain-like three-dimensional network (WRAY, 1977). However, the rectangular or wedge-shaped cellular tissue of *Cuneiphycus* must not be confused with *Iberiaella*.

SYSTEMATIC POSITION

Iberiaella, together with *Donezella*, systematically belong to a much disputed group of fossil organisms. Available data show that *Donezella* has been considered, in the past, as a red alga (MASOV, 1929), a green alga (JOHNSON, 1963; RÁCZ, 1965; EMBERGER, 1976; MAMET & ROUX, 1978), a foramanifer (RIDING, 1977; BOWMAN, 1979), a sponge (TERMIER ET AL., 1977), and a microproblematicum (RICH, 1967; RIDING, 1979).

I find the algal nature of both *Iberiaella* and *Donezella* the most acceptable. Their general appearance, size, growth form, internal structure and fossil assemblages seem to furnish adequate evidence to consider them calcareous algae. In the absence of direct analogues with recent counterparts, their systematic position within the algal kingdom remains, however, uncertain.

Fig. 3 (facing page)
a. *Iberiaella carbonica* n.gen. n.sp.
Holotype. San Emiliano Fm, Cármenes, NW Spain.
Photograph shows multi-layered tubular tissue, characteristic branching, development of tubes and partly neomorphosed matrix. I-b-34 50x
b. Bundled and locally twisted tubular tissue of *Iberiaella carbonica*. ND-II-66. 50x
c. Multi-layered branching tubes of *Iberiaella carbonica* localize internal sediment. LO-52. 50x
d. *Donezella lutuginii* MASLOV Characteristic, loosely arranged, detached, septated, singular branching tubes. ND-I-49. 24x
e. Multi-layered branching tubes of *Iberiaella carbonica* forming a rigid network and stabilize internal sediment. ND-II-66. 24x
f. Multi-layered wavy tubes of *Iberiaella carbonica* encrusting a bioclast. S-II-05. 24x



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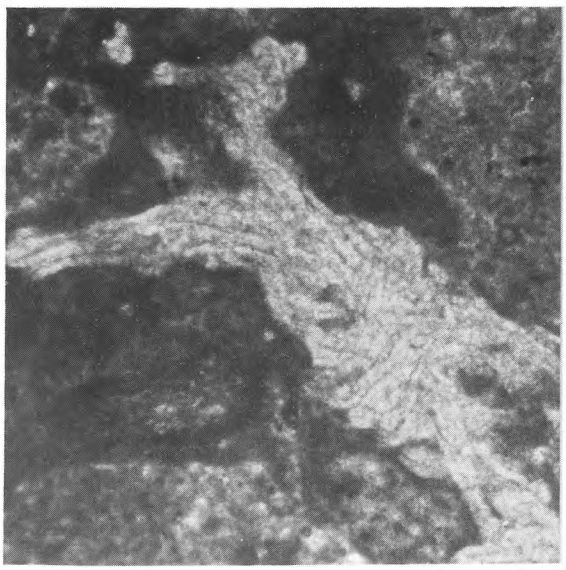

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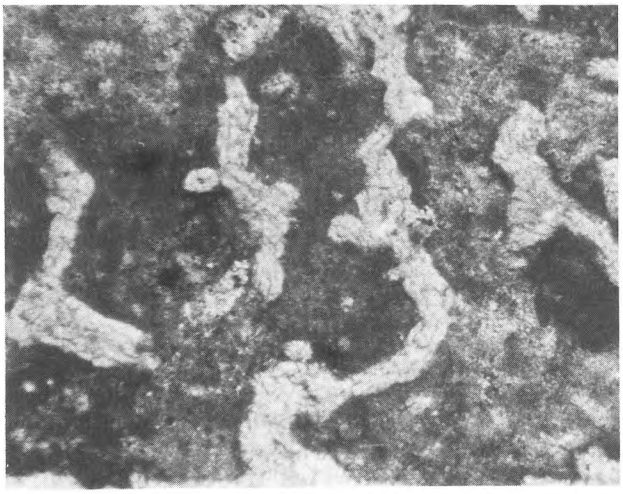

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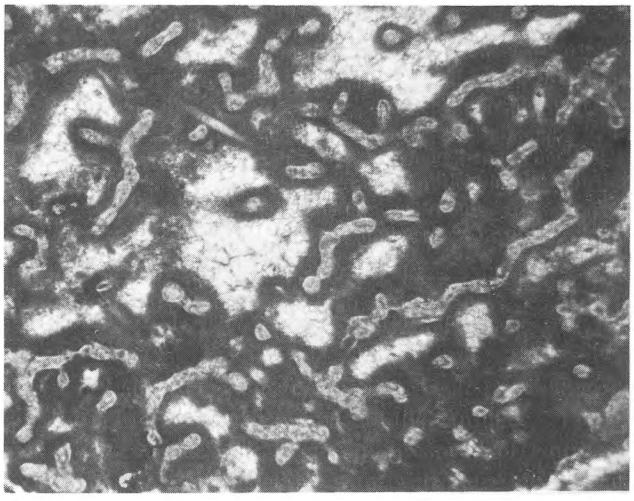

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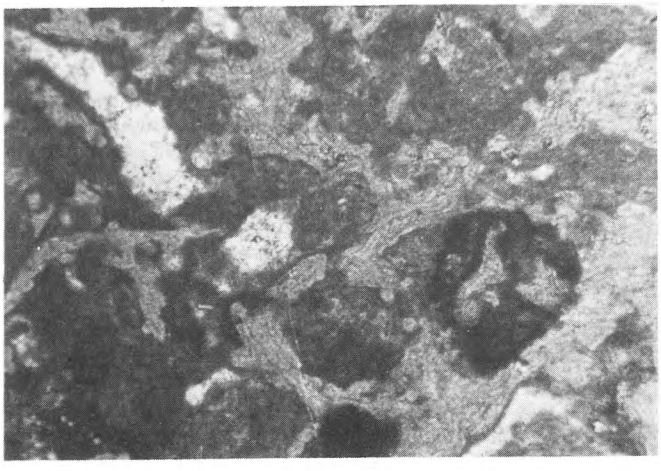

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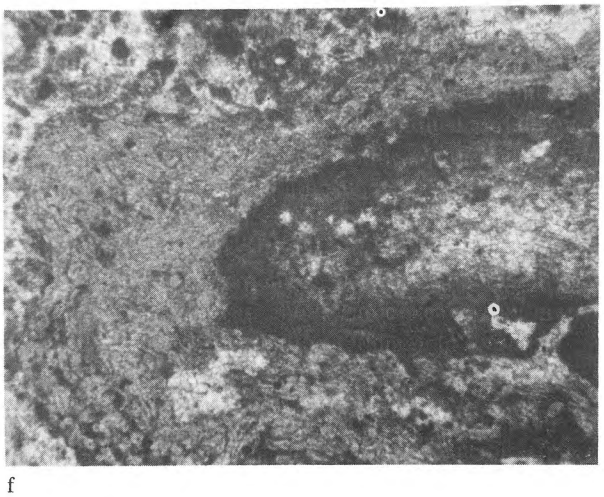

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SEDIMENTOLOGICAL ASPECTS

Skeletons of colony-forming *Iberiaella* have been found in both oolite-bearing high-energy sediments and in deposits containing a low-energy muddy (micritic) matrix. Sediments deposited under low-energy conditions contain by far the largest number of *Iberiaella* occurrences.

Iberiaella seems to appear in three ecomorphs:

a – as an anastomosing network of tubes of single or double layers;

b – as an anastomosing network of multi-layered tubes;

c – as an encrusting multi-layered organism.

The networks are composed of a continuous or discontinuous layer or bundles of layers with localized and stabilized fine sediment within open spaces. These inter-network sediments contain both autochthonous and neomorphosed micrite, sparry calcite cement and few bioclasts. Locally dark, amorphous "algal dust" is present.

The bundled layers in the network system show twisting of the layers at branching points, indicating a three-dimensional skeleton of the organism. Associated with *Iberiaella*, oncoids and fragmentary tubes of *Donezella* were observed. The ratios between the two organisms vary considerably but as a rule, *Iberiaella* is quantitatively dominant. *Iberiaella* occurs regularly as an encrusting organism. Bioclasts, such as brachiopod shells, foraminifer tests, other calcified algal fragments were found covered by threads of *Iberiaella*. Generally, the encrusting tubular threads do not construct laminated oncoids but grow in an irregular fashion around various objects.

It seems that *Iberiaella* anastomosing networks or encrustations provided the rigid framework of the organic mounds at several localities on the southern slope of the Cantabrian Mountains. The densely growing, dichotomously branched but detached tiny tubes of *Donezella* functioned as stabilizers. Because of their peculiar construction and size both *Donezella* and *Iberiaella* trapped fine sediments and bioclasts to accumulate in so-called "mud-mounds", common in Paleozoic carbonate deposits.

The presence of "Donezella bioherms" and "Donezella mounds" in the Early and Middle Carboniferous carbonates in the Cantabrian Mountains was already noticed by RIDING (1979) and BOWMAN (1979). Unaware of the presence of the widely distributed *Iberiaella* in the area, RIDING rightly wondered about the sedimentology of the micritic sediment forming the mounds. He suggested that the characteristics of the mounds can be explained either by the localization capabilities of soft organisms "which have left no recognizable traces", or which "were hydrodynamically accumulated". The recognition of *Iberiaella* and its way of occurrence in the mounds makes such complicated theories unnecessary.

BOWMAN (1979) studied the sedimentological and palaeontological aspects of the sequence and came to the conclusion that "*Donezella* formed small upstanding mounds by acting as a baffle for carbonate mud. The closely spaced intertwined "hair like" morphology of this small organism would be ideally suited for this purpose" (p. 33). I agree with BOWMAN's statement provided *Iberiaella* is read for *Donezella*, and frame-building capabilities of *Iberiaella* supported by *Donezella* instead of the "hair like morphology" of *Donezella*.

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