

## A SPONGE SPICULE ASSEMBLAGE FROM LOWER ORDOVICIAN OF PRECORDILLERAN ARGENTINA

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**KEY-WORDS:** Sponges, Ordovician, South America.

*Abstract.* The occurrence of Sponge remains, reported for the first time in the Ordovician rocks of South America (Precordilleran Argentina) permits us to complete the picture of the life association which populated the muddy bottom during the deposition of the San Juan Limestone.

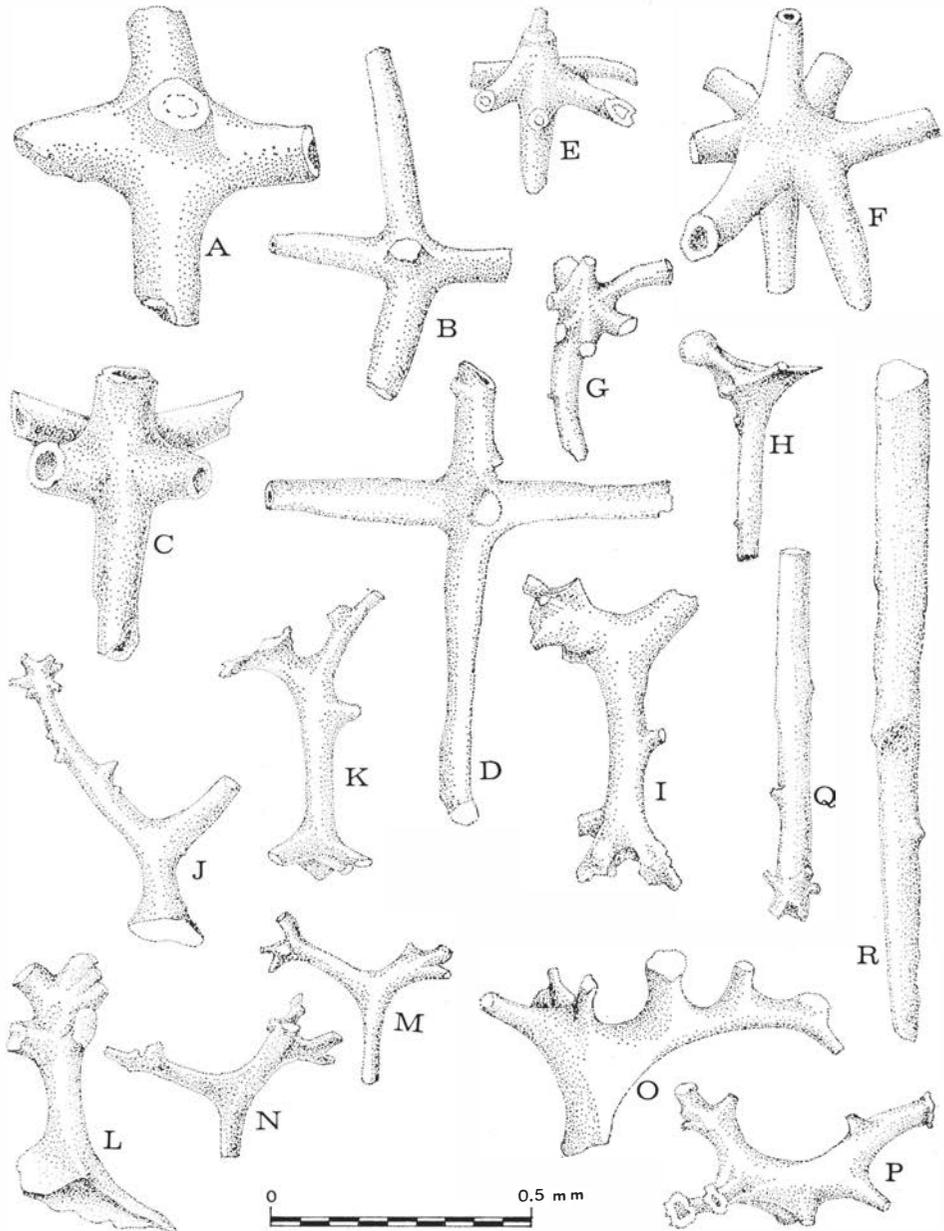
*Riassunto.* La presenza di spicole di Spugna, segnalate per la prima volta nell'Ordoviciano del Sud America (Precordillera argentina), permette di completare il quadro dell'associazione biologica che popolava il fondo durante la deposizione del « Calcare di San Juan ».

### **Introduction.**

The purpose of this paper is to illustrate and document the first occurrence of Sponges in the Ordovician of South America.

Sponge remains have been found in the San Juan Limestone outcrops of the Precordillera region (Cordillera frontal of San Juan, Province of San Juan). This thick formation, already described by Harrington and Leanza (1957) is restricted exclusively to the eastern half of the Precordillera and is considered to be mainly of the Lower Ordovician age.

The studied section was sampled from the right side of the San Juan River Valley, halfway between the towns of Calingasta and San Juan and on the basis of Conodonts (Serpagli, 1974 a) has been dated Arenigian in age. However the Sponge remains only occur in the middle part of the section.



On the basis of previous research (Harrington & Leanza, 1957; Serpagli, 1974 a, b, c; Gnoli & Serpagli, 1980; Gnoli, 1980), it is possible to state that, beside Sponges, large quantities of shell-bearing organisms such as Molluscs, Echinoderms, Brachiopods, Trilobites, Ostracods, Bryozoans, Conodonts and calcareous Algae were populating the substratum.

#### Sponge spicules assemblage.

A large variety of Sponge spicules were recovered from acetic acid residue prepared for the recovery of Conodonts. The five basic types of spicules found are 1) relatively undistorted hexactines and their minor modifications, 2) dendroclones, 3) rhizoclones, 4) octactines, 5) monaxones.

*Hexactines* display four tangential rays, one proximal ray and one distal ray. Hexactines include some of the largest spicules with rays of 0.55 mm in length. However the largest spicules are usually broken and incomplete, they are smooth rayed, gently tapering forms in which the rays often meet at approximately 90 degrees, although quite a few have rays meeting at other angles. In the hexactines most rays are equally developed, some having one or two rays shorter. Some are in such good condition that the tiny axial canal is well preserved, it varies in diameter but it is usually smaller than 0.03 mm.

*Dendroclones* are quite common spicules and range from those consisting of long subcylindrical smooth shafts to those with considerable sculpture. All have complex arborescent ray tips, with one end commonly larger and more distinctly branched than the other. They range from 0.62 to 0.33 mm long and have shaft diameters of approximately 0.07 to 0.04 mm. Shafts expand towards the tips their maximum diameters being adjacent to the point where the rhabdome and cladome branch. Dendroclones seem to grade into characteristic rhizoclones.

*Rhizoclones* are gently curved and can be up to approximately 0.71 mm long and 0.1 to 0.04 mm in diameter. A characteristic of these rhizo-

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Text-fig. 1 - Spicules recovered from acid-etched residues of the San Juan Limestone, Precordilleran Argentina.

A-D, relatively unmodified hexactines; E-G, octactine-based spicules showing range of size; H-N, dendroclones showing the characteristic branching tips that expand from the relatively long and smooth shaft of each spicule; O-P, rhizoclones of peculiar shape grading into characteristic dendroclones; Q-R, monaxones. One of the specimen (R) shows thinning towards one tip whereas the other (Q) is only tentatively assigned to this group.

clones is their peculiar shape they are almost invariably obtuse, some having knobby articulating expansions on opposite sides.

*Octactine forms.* Octactine spicules are usually robust and are characterized by six tangential rays on a plane, they occur at approximately 60° intervals. The other two rays are set perpendicular to these and join the tangential rays at a common junction. The individual rays are smooth and almost uniformly tapered. The proximal part of most rays is sub-cylindrical, but they seem to taper more sharply in the distal part. Proximal and distal rays are nearly circular but are usually broken.

Octactine-based spicules, such as these, are known from several genera of Cambrian to Devonian Sponges (Rigby & Nitecki, 1975). In addition, spicules of approximately this form and size also occur in great variety of genera at any other age. Consequently, these spicules are only of interest as they document the occurrence of astraeospongid or cancellorid heteractinid Sponges in South America.

*Monaxon forms.* The present monaxons appear to be smooth varieties of the common type, often showing a fairly visible axial canal. Some of them are nearly straight but others are gently curved. The few monaxon forms occurring in the collection are approximately 1.35 mm long, with maximum diameters of 0.11 mm, however the ray tips are never preserved.

#### Discussion.

All spicules recovered were mineralized by pyrite therefore the octactine-based spicules were probably calcareous (Rietschel, 1968; Rigby & Nitecki, 1975), whereas hexactines and desmas (dendroclones and rhizoclones) were originally siliceous.

On the basis of spicules it is possible to assume that at least two kinds of Sponges may have populated that bottom during the Lower Ordovician age. Finally, it is interesting to point out that whereas Sponges or Sponge-remains are common in several continents (mainly North America, Europe, Asia), there are no reports of such fossils from the Paleozoic of South America.

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