

## A new Species of *Hyalolitha* from the Late Cambrian of Northwestern Argentina

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**Abstract:** A NEW SPECIES OF *HYALOLITHA* FROM THE LATE CAMBRIAN OF NORTHWESTERN ARGENTINA. The new species *Tajinella?iruyensis* (*Hyalolitha*) from the Upper Cambrian of the Iruya region, northwestern Argentina, is described. The material was recorded in association with olenid and agnostoid trilobites of the *Parabolina* (*Neoparabolina*) *frequens argentina* Biozone. *Tajinella* Malinky is a genus previously described from the Middle Cambrian of Morocco. Specimens studied are rather well-preserved, keeping operculum in position and fine details of their ornamentation.

**Resumen:** UNA NUEVA ESPECIE DE *HYALOLITHA* DEL CÁMBRICO TARDIO DEL NOROESTE DE ARGENTINA. Se describe *Tajinella?iruyensis* n. sp. (*Hyalolitha*) del Cámbrico Superior de la región de Iruya, noroeste de Argentina. El material se encuentra asociado a trilobites olénidos y agnóstidos de la Biozona de *Parabolina* (*Neoparabolina*) *frequens argentina*. *Tajinella* Malinky es un género previamente descrito en el Cámbrico Medio de Marruecos. Los ejemplares estudiados están bien preservados, mostrando el opérculo en posición de vida y finos detalles de su ornamentación.

**Key words:** *Tajinella*. *Hyalolitha*. Upper Cambrian. Iruya. Northwestern Argentina.

**Palabras clave:** *Tajinella*. *Hyalolitha*. Cámbrico Superior. Iruya. Noroeste argentino.

### Introduction

One of the earliest references to the discovery of uppermost Cambrian fossils of northwestern Argentina was provided by Bodenbender (1916), who collected trilobites and brachiopods (*Agnostus*, *Obolus*) from the Volcancito Formation at Río Volcancito (Famatina Range, La Rioja Province) and assigned the section to the "Upper Cambrian or Lower Ordovician" (see Tortello and Esteban, this volume). The material collected by Bodenbender (1916) belongs to the *Parabolina frequens argentina* Zone, a unit that has proved to be widely represented in La Rioja, Salta and Jujuy. Though this zone is mainly composed of trilobites, brachiopods and graptolites, it also contains subordinate faunas such as echinoderms, rostroconchs, and hyolithids.

Hyalithids (Cambrian-Permian) are most abundant and diverse in dark shales and limestones of Cambrian age. Although their biostratigraphic significance is generally regarded as rather limited, some species constitute valuable guide fossils. The systematic position of hyolithids has been an enigma for many decades. Some authors support molluscan affinities mainly based on shell shape, composition and microstructure similarities (Shimer and Shrock, 1944; Yochelson, 1961; Marek and Yochelson, 1964, 1976; Wills, 1993; Yochelson, 2000), whereas others consider they warrant placement in a separate phylum (Runnegar et al., 1975; Runnegar, 1980; Pojeta, 1987; Kouchinsky, 2000).

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Lower Paleozoic hyolithids are known from two geologic regions in Argentina: the Precordillera (San Juan and Mendoza Provinces) and the Eastern Cordillera (Jujuy and Salta Provinces). The material from Precordillera is mainly represented in outer shelf and slope limestones assignable to the Middle and Late Cambrian (Rusconi, 1945, 1950a-b, 1951, 1952a-b, 1955, 1956a-b; Poulsen, 1960; Borrello, 1971; Bordonaro and Martos, 1985), whereas specimens from the Eastern Cordillera occur in siliclastic facies of latest Cambrian-Early Ordovician age. Reports from the Eastern Cordillera are not abundant: Kayser (1876) described *Hyolithes* sp. from the uppermost Cambrian of Tincuya, and Harrington (1937, 1938) erected *Hyolithus* (*Orthotheca*) *multistriatus* Harrington and *Hyolithus* sp. indet. from the Tremadocian of Purmamarca (Jujuy) and Pueblo Viejo (Salta), respectively. Subsequently, Aceñolaza (1966, 1968) and Alonso *et al.* (1982) mentioned the presence of fragmentary material of *H. multistriatus* from the ?Upper Cambrian and the Early Arenigian of El Aguilar-Cajas region (Jujuy).

Additional hyolithids from Argentina occur in the upper Paleozoic of the Tepuel-Genoa and Río Blanco basins (Chubut Province), where five species assignable to the genus *Hyolithes* were reported (González and Sabattini, 1972; Pagani and Sabattini, 1999; Sabattini *et al.*, 2001; Pagani *et al.*, 2002).

The aim of this note is to describe a new species of *Hyolitha* from the Upper Cambrian of the Iruya region, northwestern Argentina. It is assigned to? *Tajinella* Malinky, a genus previously described from the Middle Cambrian of Morocco. Specimens studied are rather well-preserved, keeping operculum in position and fine details of their ornamentation. They are recorded in dark shales representing low-oxygen-water bottom conditions, in association with trilobites of the *Parabolina frequens argentina* Biozone.

## Location and stratigraphy

The Santa Rosita Formation is widely distributed in the Eastern Cordillera. It is mainly composed of shales, sandstones, and rare interspersed marl and limestone layers assignable to the uppermost Cambrian-Tremadocian. The unit represents a wide range of sedimentary environments, including estuarine, wave-dominated shallow marine and open marine conditions (Buatois and Mángano, 2003). Macrofossils are abundant and mainly composed of trilobites, brachiopods, graptolites, echinoderms, gastropods, bivalves and cephalopods. The Santa Rosita Formation overlies the Cambrian Meson Group and conformably underlies the Arenigian Acoite Formation.

Since the lower Paleozoic of Iruya region was affected by strong tectonism, the Santa Rosita Formation is represented by thin dislocated slices in a north-south direction, dipping to the west (Vilela, 1960; Turner, 1964; Turner and Mon, 1979). Paleontologic studies in this area are scarce, generally restricted to the lower part of the formation (Casa Colorada Member Harrington in Harrington and Leanza, 1957; López and Nullo, 1969). Kayser (1897), Harrington (1938) and Harrington and Leanza (1957) described trilobites of the *Parabolina frequens argentina* Biozone (latest Cambrian-Lower Tremadocian) from "Iruya", "San Isidro" and "Cerro Colorado" (Figure 1). In addition, Figueroa Caprini (1955) mentioned the presence of trilobites of the same biozone from "río Iruya".

The material studied comes from the lower San Isidro river, 3 km north-east of Iruya town (Figure 1). The outcrop is mainly composed of dark shales, interposed between the cuarzites of the Meson Group (Cambrian) and the sandstones of the Salta Group (Cretaceous-Paleogene). Hyolithids were recorded in association with olenid and agnostoid trilobites. *Parabolina* (*Neoparabolina*) *frequens argentina* (Kayser) largely dominates the assemblage, followed by *Angelina hyeronimi* (Kayser), *Plicatolina*, *Lotagnostus* (*Semagnostus*) and *Micragnostus* cf. *vilonii* Harrington and Leanza. The co-

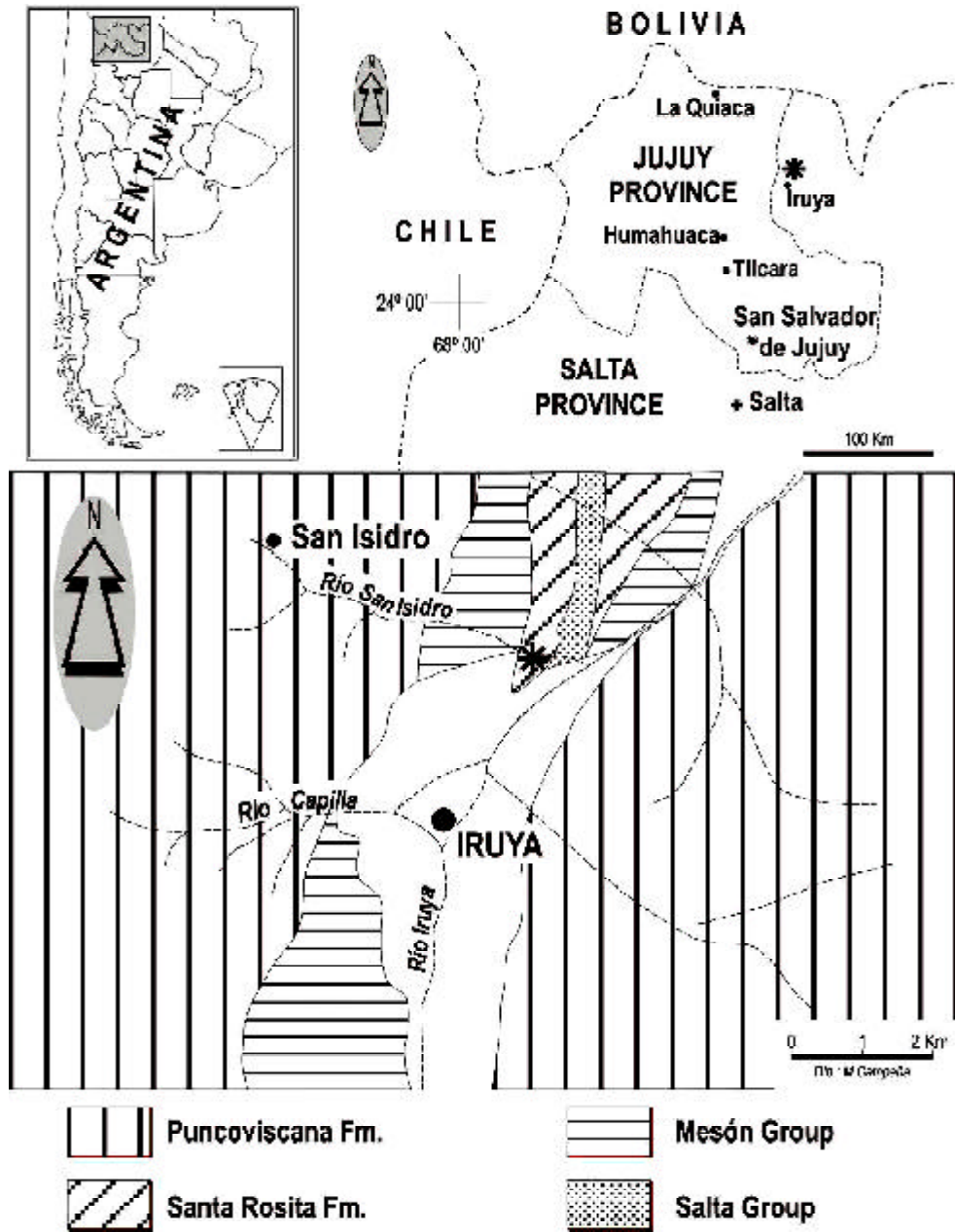


Fig. 1. Location map (based on Vilela, 1960)./ **Figura 1.** Mapa de ubicación (basado en Vilela, 1960).

occurrence of *P. frequens argentina* and *Lotagnostus* characterizes the lower part of the *P. frequens argentina* Biozone, indicating a late Cambrian age (e.g. Benedetto, 1977; Aceñolaza, 1983; Tortello, 2003; Tortello and Esteban, 1999, 2003). Material was deposited under low-oxygen-water bottom conditions ("olenid biofacies" Fortey, 1975), a fact well documented in other localities of northwestern Argentina (Tortello and Esteban, 2003).

## Systematic paleontology

Class Hyolitha Marek, 1963 (= Calyptomatida Fisher, 1962)

Order Hyolithida Matthew, 1889

Family uncertain

Genus *Tajinella* Marek, Malinky and Geyer, 1997

**Type species.** *Tajinella mosei* (Marek, Malinky and Geyer) by original designation.

**Occurrence.** Middle Cambrian. Central High Atlas, Morocco.

**Diagnosis.** "Hyolithid with conch having highly inflated dorsum with pronounced central dorsal ridge; slight concavity in flanks adjacent to ridge, with flanks gradually curving away from central ridge to become convex near lateral edge; height of conch increasing more rapidly than width toward apertural end; central ridge on dorsum more angular and keel-like at apical end, but becoming slightly more rounded at apertural end" (Marek *et al.*, 1997, pp. 650).

**Remarks.** *Tajinella*, *Similotheca* Malinky (1988), *Grantithea* Malinky (1989) and *Solenotheca* Malinky (1990) are closely allied genera. Dorsal keel of *Grantithea* is similar to that of *Tajinella*, but the dorsal flanks of the former are straight. *Similotheca* differs from *Tajinella* mainly by possessing a more distinct longitudinal ornament, whereas *Solenotheca* lacks a distinct median ridge.

### *TAJINELLA IRUYENSIS* NEW SPECIES (FIGURE 2 A-H)

**Diagnosis.** Cross section subtriangular. Venter with longitudinal and transverse sculpture; transverse lirae arched, subparallel to the margin of ligula. Dorsum having transverse ornamentation and a dorsal ridge, which varies from angular to rounded during ontogeny. Slopes adjacent to axis concave.

**Holotype.** MLP 31235.

**Paratypes.** MLP 31236 – MLP 31238.

**Derivation of name.** From Iruya region, Salta Province, northwestern Argentina.

**Occurrence.** Iruya region, Salta Province, Argentina. Santa Rosita Formation (Casa Colorada Member), *Parabolina frequens argentina* Biozone (late Cambrian).

**Description.** Conch of relatively small size, orthoconic; cross section apparently subtriangular. Venter appears flat. Dorsal side with flat flanks; central ridge on dorsum more angular and keel-like at apical end. Shell covered with transverse ornament on both surfaces; sculpture represented by fine, straight, irregularly spaced ribs, closer at the apertural end (6-20/mm), apparently continuous through the dorsal ridge. Venter with irregularly spaced longitudinal lirae superimposed upon transverse ribs (12/mm). Apical end rounded. Apertural rim unknown. Operculum with conical shield having rounded, semicircular edge; interior with one pair of broad clavicles, dome-like in cross section; exterior covered with distinct concentric growth lines. Angle of divergence ( $\alpha$ ) pequeño.

**Measurements (in mm).** Table I

Specimen No.	Side	Height	Width	CR/mm	TR/mm	$\alpha$
MLP 31236	ventral	9,2	2,5	20 (a) 14 (m)	12	15°
MLP 31235	dorsal	9,9	2,7	20 (Ab)	--	15°
MLP 31237	dorsal	+14,8	5,4	6-8 (m)	--	20°
MLP 31238a	dorsal	+10,4	3,5	--	--	
MLP 31238b	dorsal	+10	3,6	12 (m)	--	21°

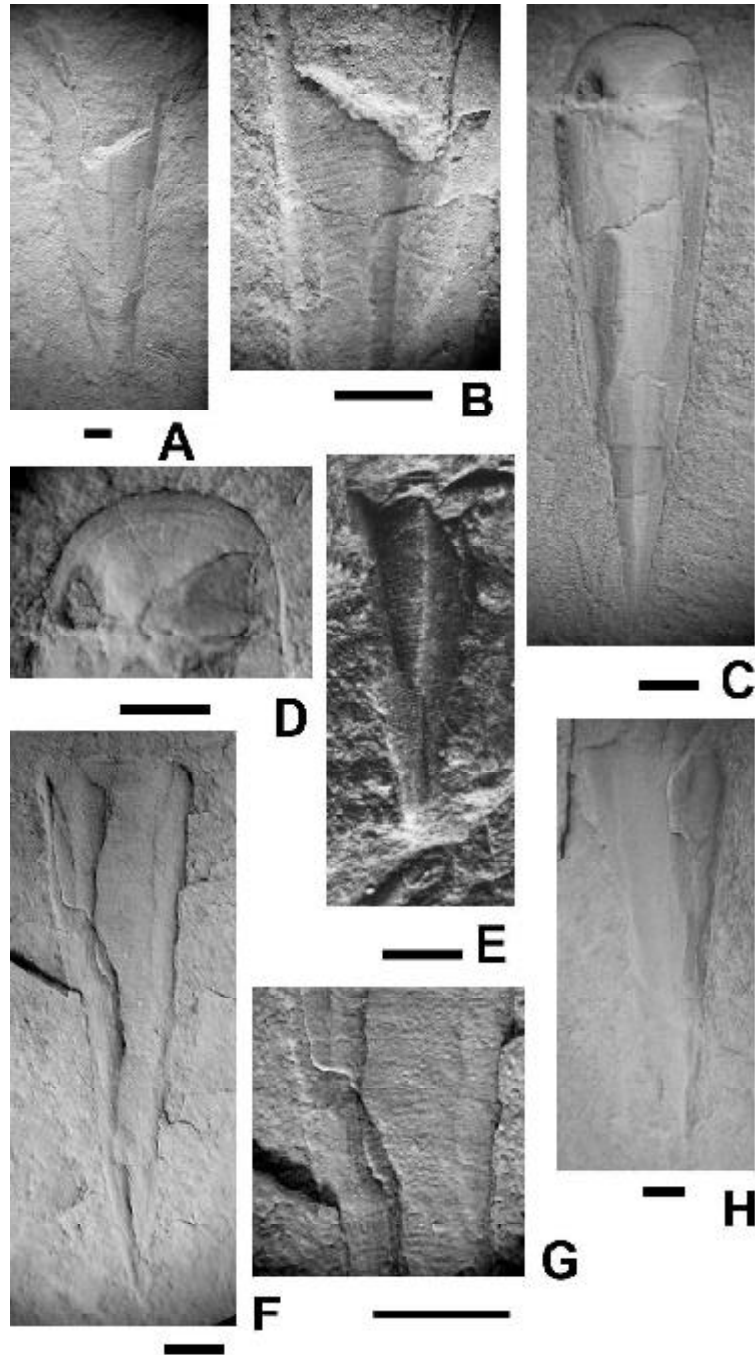
**Table 1.** Measurements of *Tajinella? iruyensis* n. sp. **Referencias.** CR/mm, concentric ribs per mm; TR/mm, transverse ribs per mm;  $\alpha$  angle of divergence; **a**, apertural region; **m**, medium region; **Ab**, abapical region./ **Tabla 1.** Medidas de *Tajinella? iruyensis* n. sp. **Referencias.** CR/mm, costillas concéntricas por mm; TR/mm, costillas longitudinales por mm;  $\alpha$  ángulo de divergencia; **a**, región apertural; **m**, región media; **Ab**, región abapical.

## Discussion

Since the material described is somewhat deformed, it is questionably assigned to *Tajinella*. *Tajinella? iruyensis* n. sp. resembles *Tajinella mosei* Marek *et al.* (1997), from the Middle Cambrian of Morocco, by having a dorsal longitudinal keel and similar cross section and angle of divergence. However, the former differs in having flat slopes adjacent to axis; fine, straight, irregularly spaced ribs; and a venter with irregularly spaced longitudinal lirae.

"*Hyolithus (Orthotheca) multistriatus*" Harrington (1937: p. 109, pl. 5, fig. 1; 1938: p. 139, pl. 3, figs. 2, 3, 9), from the ?Upper Cambrian-Lower Ordovician of Eastern Cordillera, resembles *Tajinella? iruyensis* n. sp. by having a longitudinal sculpture, but the ribs of the latter are restricted to the ventral surface. Unfortunately the type material of *H. multistriatus* is not available in the repository indicated by the author, a fact that prevents closer comparison.

Many species from the Middle Cambrian of Precordillera deserve systematic revision because original descriptions were not accompanied by adequate illustrations (Rusconi, 1945, 1950a-b, 1951, 1952a-b, 1955, 1956a-b). According to Rusconi's sketches, they differ from *Tajinella? iruyensis* n. sp. in several details. *Hyolithes (Orthotheca) longisulcatus* Rusconi (1951, p. 11, fig. 15) is slightly smaller and its venter (=dorsum of Rusconi) has a shallow median concavity, which is bounded by a pair of low ridges. *Hyolithes sinclairi* Rusconi (1951, p. 10-11, fig. 14; 1952a) is similar in size and outline, but differs by showing six transverse wrinkles. *Hyolithes andinensis* Rusconi (1951, p. 11-12, fig. 16) differs from the new species mainly by having longitudinal furrows. *Hyolithes huentotensis* Rusconi (1951, p. 12, fig. 17) is characterized by its bigger size and its curved growth lines on ventral surface (=dorsum of Rusconi). *Hyolithellus mendozanus* Rusconi (1951, p. 13, fig. 19) has a very different relation W/H and its venter (=dorsum of Rusconi) is strongly convex. In addition, *Hyolithes peladensis* Rusconi (1951, p. 5, fig. 4), from the Upper Cambrian of Cerro Pelado (Mendoza), clearly differs from *Tajinella? iruyensis* n. sp. by having a smaller, smooth shell.



**Fig. 2.A-H. *Tajinella? iruyensis* n.sp.** A-B, MLP 31237 external mould dorsal view/molde externo vista dorsal. C-D, MLP 21235, C, external mould dorsal view/molde externo vista dorsal; D, detail of operculum/detalle del opérculo. E, MLP 21238b, external mould dorsal view/molde externo vista dorsal. F-G, MLP 21236, external mould ventral view/molde externo vista ventral; G, detail of ornamentation/detalle de la ornamentación. H, MLP21238a, external mould dorsal view/molde externo vista dorsal. Scale bar equal 1 mm/Escala gráfica igual a 1 mm.

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