Outcrops of the Quebrada Larga Formation (Scalabrini Ortiz, 1972) can be recognized on the western flank of the Punilla Hill in the Carrizalito area (San Juan province) and belong to the northern sector of the Río Blanco Basin (Argentine Precordillera). The type locality of this stratigraphical section, Quebrada Larga, is located on the left margin of the Blanco River, about 60 km north of Malimán (figure 1).

The first mentions of the marine fauna from the Quebrada Larga Formation were provided by Furque (1958, 1965), who indicated the presence of the fossils Orthoceras sp., Conularia sp., gastropods and ostracods in outcrops located on the right margin of the Blanco River. From the type locality, Antelo (1972) described and illustrated several brachiopod species with the names Orbiculoidea aff. saltensis Reed, Streptorhynchus inaequiornatus Leanza, Lisochoonetes jachalensis Amos, Heteralosia cornelliana (Derby), Buxtonia riojana (Leanza) and “Septosyringothyris” sp. However with the new collections, brachiopods and bivalves that integrate the marine fauna from the Quebrada Larga Formation, have been understood in modern terms by the present study.

The fossils documented herein come from the upper part of the Quebrada Larga Formation, fundamentally from the fossiliferous horizons studied by Antelo (1972). This sequence is characterized by a predominance of sandstones with occasional interbedded fine conglomerates and mudstones that contain remains of flora (figure 2). Towards the upper part, two fossiliferous horizons associated to grey sandstone beds have been identified in a stratigraphical interval of about 120 m in thickness, which is essentially composed of alternating sandstones and mudstones. The first horizon is dominated by Septosyringothyris sp. aff. Septosyringothyris jaguelensis Lech accompanied by Tivertonia jachalensis Amos, Orbiculoidea sp. and very scarce and fragmentary Streptorhynchus inaequiornatus Leanza (figure 3 K-O; Q-R), gastropods (probably Peruvispira sp.) and bivalves indet. In the second fossiliferous horizon, located about 100 m above horizon 1, an assemblage composed of Coronalosia sp., Svalbardia sp. (figure 3 A-J; P) and Septosyringothyris sp. aff. Septosyringothyris jaguelensis Lech, accompanied of scarce gastropods, has been also recognized.

On the left margin of the Blanco River, immediately to the north of the Quebrada Larga locality, and other fossiliferous site has been identified. Herein, the fauna appears in calcareous horizons interbedded in a predominately mudstone stratigraphical interval. These fossil accumulations (interpreted as sedimentologic in origin) appear concentrated in densely packed beds about 1 to 4 cm thick. The shells show a poor preservation (high degrees of abrasion and fragment-
tation and some of them are slightly deformed), hence the taxonomic identification is very difficult. However, a preliminary taxonomic analysis of these skeletal concentrations reveals that the bioclastic deposits are dominated by the infaunal bivalves *Schizodus* sp., *Pleurophorella* sp., *Edmondia* sp. and *Modiolus* sp., and the epibyssate subordinated *Aviculopecten* sp. and *Streblochondria* sp. (figure 4). Gastropods (*Peruvispira*? sp.) and brachiopods (*Septosyringothyris* sp. and *Productida* indet.) have been also identified in these concentrations.

From the same margin of the river, about 600 m to the north of the Quebrada Larga, other fossiliferous site has been documented by Scalabrini Ortiz (1972). This author recorded the species *Orbiculoidea saltensis* Reed, *Lissochonetes jachalensis Amos, Syringothyris keideli* Harrington, *Peruvispira* sp. and *Neilsonia* sp. but this faunal assemblage has not been recognized in this opportunity by the authors.

From the biostratigraphical viewpoints, the marine assemblage from the Quebrada Larga Formation has been considered to be included in the *Tivertonia jachalensis-Streptorhynchus inaequiornatus* Biozone (Sabatini et al., 1990), recently regarded as being of early Permian age (Cisterna and Simanauskas 2000; Cisterna et al., 2002b; Archbold, et al., 2004; Cisterna et al., 2005; Gutiérrez et al., 2005; Cisterna et al., 2006a). The brachiopod assemblage that characterizes this biozone (i.e. *Streptorhynchus inaequiornatus* Leanza, *Tivertonia jachalensis* (Amos), *Kochiproductus riojanus* (Leanza), *Kochiproductus* sp., *Costatumulus* sp., *Coronalosia argentinensis* Archbold and Simanauskas, *Tupelosia paganoensis* Archbold and Simanauskas, *Pericospira pericoensis* (Leanza) (formerly *Spirifer* (Spirifer) *pericoensis* Leanza (Leanza, 1945) and then *Trigonotrexa pericoensis* (Leanza) (Cisterna et al., 2002), *P riojanensis* (Lech), *Septosyringothyris* sp. aff. *S. jaguelensis* Lech, *Cruithyris*? sp. and *Orbiculoidae* sp.), exhibits clear Permian gondwanic affinities which have been widely discussed by Cisterna et al. (2002a) and Cisterna et al. (2006b).

Although the bivalves herein identified belong to cosmopolitan genera, these taxa usually appear associated to the brachiopods of the *Tivertonia jachalensis-Streptorhynchus inaequiornatus* Biozone in the Río del Peñón and Tupe formations (González, 1997; Sterren, 2000; 2004).

The *Tivertonia jachalensis-Streptorhynchus inaequiornatus* Biozone, originally named the *Lissochonetes jachalensis-Strepto-
rhynchus inaequiornatus Biozone, was referred to the Late Carboniferous by Sabatti
ini et al. (1990). Because of the inclusion of the species Lissochonetes jachalensis Amos in the Permian genus Tivertonia Arch-
bold and Gaetani, Archangelsky et al. (1996) suggested that this biozone would be ex-
tended to the Permian. The Tupe Formation at La Herradura Creek in the Paganzo Basin was proposed as the stratotype of this biozone and the stratigraphical sections of the Tupe Formation at La Delfina Creek (Paganzo Basin) and the Río del Peñón Formation at Rincón Blanco locality (Río Blanco Basin), were also considered as the para-
stratotypes (Sabattini et al., 1990).

The Tivertonia jachalensis-Streptorhyn-
chus inaequiornatus fauna was later re-
viewed in the Río del Peñón Formation (Cisterna and Sabattini, 1998; Cisterna and Simanuskas, 2000), as well as in the differ-
ent localities of the Tupe Formation (La Herradura Creek, La Delfina Creek, La Ciénaga and Paslean), where it appears as-
associated to the Latest Carboniferous-Earliest Permian Paleo-Pacific transgression into the western Paganzo basin (Cisterna et al., 2002b; Cisterna et al., 2005; Gutiérrez et al., 2005; Cisterna et al., 2006a).

Although diagnostic species that distin-
guish the Tivertonia jachalensis-Streptorhyn-
chus inaequiornatus Biozone have been rec-
ognized in the type locality of the Quebrada Larga Formation, compositional variations can be noted, i.e. the occurrence of Coro-
nalosia sp. and Svalbardia sp., probably two new species. Coralosalosia Waterhouse and Gupta is a Gondwanan Permian genus described from the Early Permian (Sakmari-
ian) of India and Western Australia. The species Coralosalosia sp. herein identified was previously referred to Heteralosia cor-
nelliana (Derby) by Antelo (1972). However, the material described by this author shows the widely spaced ventral spines that char-
acterizes Coralosalosia and it is closely allied to Coralosalosia argentinensis Archbold and Simanuskas from the Tupe Formation at La Herradura Creek (Archbold and Simanuskas, 2001; Cisterna et al., 2002b). Svalbardia Barkhatova, described from the Permi-

nadian Artic and Australia, as well as other Permian conetids, has a disjunct or bipolar distribution (Archbold, 1981). Svalbardia appears to be closely related to Tivertonia and probably evolved from this genus (Si-
amauskas, pers. comm.). However distinct characters of the Svalbardia, such as a markedly planoconvex shell, coarsely pseudopunctate ventral valve, dorsal interior with anteriorly prominent median sep-
tum and anderidia posteriorly fusing an-
terior to cardinal process pit, have been rec-
ognized in the specimens from Quebrada Larga.

The review of the brachiopods and bi-
valves from the Quebrada Larga Formation allows to confirm the presence of the Tiver-
tonia jachalensis-Streptorhynchus inaequiornatus fauna in this locality as well as to en-
large the knowledge about its compositional variation. The occurrence of this fauna is also related to the definition of the Carbonif-
erous-Permian boundary in Precordillera. In

![Figure 2. Stratigraphical section of the Quebrada Larga Formation at the type locality.](image-url)
Figure 3. A-C, E. *Coronalosia* sp. A, ventral valve CEGH-UNC 22847, x 2.5; B, dorsal interior CEGH-UNC 22848, x2; C, external mould of dorsal valve CEGH-UNC 22849, x1.5; E, external mould of dorsal valve CEGH-UNC 22850, x2; D, F-J, P. *Svalbardia* sp. D, internal mould of ventral valve CEGH-UNC 22851, x2.5; F, dorsal valve exterior CEGH-UNC 22852, x3; G, internal mould of ventral valve CEGH-UNC 22853, x3; H, incomplete dorsal interior CEGH-UNC 22854, x2.5; I, dorsal interior CEGH-UNC 22855, x3.5; J, external mould of dorsal valve CEGH-UNC 22856, x2.8; P, dorsal interior CEGH-UNC 22857, x3.8; K-M, *Tivertonia jachalensis* (Amos). K, internal mould of ventral valve CEGH-UNC 22858, x2; L, internal mould of ventral valve CEGH-UNC 22859, x2.5; M, internal mould of ventral valve CEGH-UNC 22860, x2.5; N, *Streptorhynchus inaequioratus* Leanza, fragmentary internal mould of ventral valve CEGH-UNC 22861, x1; O, Q-R, *Septosyringothyris* sp. aff. *Septosyringothyris jaguelensis* Lech. O, internal mould of dorsal valve CEGH-UNC 22862, x1; Q, incomplete ventral valve in ventral view CEGH-UNC 22863, x1; R, incomplete ventral valve in ventral view CEGH-UNC 22864, x1.
and Río del Peñón Formation (Río Blanco basin), the *Tivertonia jachalensis-Streptorhynchos inaequiornatus* fauna has been described immediately above of beds carrying the Latest Carboniferous megafloristic assemblages NBG (Archangelsky and Azcuy, 1985) and the Interval Phytozone (Archangelsky and Cúneo, 1991). This relationship, as well as the palinological data from the associated horizons to this fauna (Vergel and Fasolo, 1999), allowed to identify the Latest Carboniferous-Earliest Permian interval in Pre-cordillera. From the lower part of the Quebrada Larga Formation at the type locality, the megafloristic assemblage NBG has been documented by Arrondo (in Scalabrini Ortiz, 1971). Hence, because of the presence of early Permian *Tivertonia jachalensis-Streptorhynchos inaequiornatus* fauna, the Quebrada Larga Formation is also proposed as a key section for studies of the Carboniferous-Permian boundary.

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