New stratigraphic section to define the Cambrian-ordovician boundary in Eastern Cordillera, northwest Argentina

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The Eastern Cordillera and the Famatina System, northwestern Argentina, are the unique regions of South America where the Cambrian-Ordovician boundary has been documented by means of trilobites, graptolites and conodonts. In the Eastern Cordillera, the most complete paleontological record is found in the Cajas Range, and the Cambrian-Ordovician boundary is defined at the Cardonal Formation. In the Famatina System, the late Cambrian - early Ordovician succession is represented by the Volcancito Formation. The present work proposes a biostratigraphical analysis for a new section, located at El Angosto del Moreno, western flank of the Eastern Cordillera, south of the Cajas Range, Jujuy province.

El Angosto section does not present structural complications and its stratigraphic development allows us to analyze geological and faunal events occurred during the late Cambrian - early Ordovician span of time. Exposed deposits, consist of a marine-platform clastic succession, main1y made up of alternating lithostratigraphical intervals of sandstones and shales, whose development has been probably caused by eustatic fluctuations that affected the marginal environments of Gondwanaland. In El Angosto area, the lithostratigraphical units are identified as Padrioc (sandstones), Lampazar (shales), Cardonal (sandstones) and Saladillo (shales) formations. The Padrioc Formation is unconformably overlying the Middle?-Upper Cambrian sequences (Iruya unconformity), while the Saladillo Formation underlies the shaly Parcha Formation, by means of the Tumbaya unconformity, bearing typical graptolites of the *Tetragraptus approximatus* Zone (early Arenigian). The Ordovician succession ends up with the heterolithic Sepulturas Formation. The preliminary paleontological record throughout El Angosto section, proceeds mainly from the two shaly bodies in the Cambrian-Ordovician boundary interval (Lampazar andSaladillo formations). It allows to propose the involved systemic boundary could be defined within the interval covering the upper part of the Cardonal Formation and the lower part of the Saladillo Formation.

A synthesis on the litho-faunistic characteristics recognized in El Angosto critical interval includes: The Lampazar Formation, ca. 70 m thick, is represented by wackes and grey-black shales, interbedding carbonate coquinites in its upper half, which were processed for conodonts. This formation bears an abundant trilobite fauna that corresponds to the *Parabolina (Neoparabolina) frequens* Zone, including the index fossil and the following taxa, ***Parabolinella argentinensis*** Kobayashi, ***Angelina hyeronimi*** (Kayser), Rossaspis *rossi* Harrington and Leanza, ***Plicatolina scalpta*** Harrington and Leanza, ***Lloydia (Leiostegium)douglasi*** Harrington, and numerous agnostids. Interbedded coquinites yielded conodonts from the ***Hirsutodontus hirsutos*** Subzone of the ***Cordylodus proavus*** Zone (upper Cambrian), which is represented by ***Cordylodus proavus*** Müller,C. cf. ***proavus*** Müller, C. ***primitivus*** Bagnoli et al., ***C. andresi*** Viira et al.,***Eoconodontus notchpeakensis*** (Miller), ***Hirsutodontus hirsutos*** Miller, ***Proconodontus muelleri*** Miller, ***Furnishina sp.*** and ***Prooneotodus sp.*** In diverse localities for global reference, particularly from Nórth America, this subzone is developed through the transgressive cycle following the Lange Ranch Eustatic Event, whose regressive peak could correspond to the Iruya unconformity in the Eastern Cordillera.

Overlying the Lampazar Formation, quartzites of the Cardonal Formation, ca. 100 m thick, did not produce identifiable fossils at the moment. Over this unit, the Saladillo Formation, ca. 70 m thick, begins with green shales and siltstones, and fequent quartzite strata. Trilobite faunas from this interval define a transitional biostratigraphic interval between the P. (N.) frequens and the ***Kainella meridionalis*** zones, being absent both index species. Registered trilobites include, ***Angelina byeronimi*** (Kayser), ***Rossaspis rossi*** (Harrington and Leanza), ***Lloydia (Leiostegium) douglasi*** Harrington, ***Parabolinella argentinensis*** Kobayashi,***Leptaplastides marianus*** (Hoek), ***Apatokephalus exiguos*** Harrington and Leanza, diverse species of the genera ***Onycopyge, Shumardia, Asaphellus,*** and agnostids. The first appearance of planktic graptolites, e.g. ***Rhabdinopora parabola*** (Bulman), R***. flabelliformis*** cf. R. f. *socialis* (Salter) and species of the genus ***Anisograptus***are recorded from the same interval. A coquinite sample processed for conodonts produced unidentifiable fragments. However, the existence of these microfossil remains promote new detailed sampling throughout the critical interval for the establishment of the Cambrian-Ordovician boundary, by means of index conodont species, as it is currently accepted for global correlation. The appearance of *Kainella meridionalis* Kobayashi occurs in the upper portion of the Saladillo Formation, through the uppermost 20 m, underlying the lower Arenigian shales. In this part of the section, the Saladillo Formation is represented by a conspicuous facies of carbonate sandstones, shales and abundant coquinite levels. The identified fauna includes: K. *meridionalis, Angelina kayseri* Harrington and Leanza, *Pseudokainella lata* (Kobayashi), *Shumardia erquensis* Kobayashi, *Leptoplastides marianus* (Hoek), *Asaphellus catamarcensis* Kobayashi and diverse forms of the *Rhabdinopora* and *Anisograptus* genera. The interbedded levels of carbonate coquinites yielded conodonts of the *Cordylodus angulatus* Zone (late Lower Tremadocian), representing a low abundance and diversity fauna, that includes the eponymous species,*Monocostodus sevierensis* Miller, *Teridontus nakamurai* (Nogami) and T. *obesus Ji* and Barnes.

It is important to note the excellent preservation of collected fossils, that permits a precise taxonomic study. Particularly, conodonts present CAI values of 1.5-2, differing from those contemporaneous elements previously documented from Cajas and Volcancito sections, which exhibit black color alteration (CAI 5) and frequently show textural alteration, indicating high diagenetic (anchizone) or very low metamorphic processes. This preliminary biostratigraphic survey of El Angosto section suggests new sampling, and detailed paleontologic analysis, shall allow to propose it as a reference section (hypostratotype) for South America to establish the Cambrian-Ordovician boundary by means of high resolution biostratigraphy.