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ПАЛЕОНТОЛОГИЧЕСКИЙ ИНСТИТУТ РОССИЙСКОЙ АКАДЕМИИ НАУК

# THE 13TH INTERNATIONAL FIELD CONFERENCE OF THE CAMBRIAN STAGE SUBDIVISION WORKING GROUP

## The Siberian Platform, Western Yakutia

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# XIII МЕЖДУНАРОДНАЯ ПОЛЕВАЯ КОНФЕРЕНЦИЯ РАБОЧЕЙ ГРУППЫ ПО ЯРУСНОМУ РАСЧЛЕНЕНИЮ КЕМБРИЯ

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THE 13TH INTERNATIONAL FIELD CONFERENCE OF THE CAMBRIAN STAGE SUBDIVISION WORKING GROUP. The Siberian Platform, Western Yakutia = XIII МЕЖДУНАРОДНАЯ ПОЛЕВАЯ КОНФЕРЕНЦИЯ РАБОЧЕЙ ГРУППЫ ПО ЯРУСНОМУ РАСЧЛЕНЕНИЮ КЕМБРИЯ. Сибирская платформа, Западная Якутия [Текст]. – Новосибирск : СНИИГГиМС, 2008. – 98 с.

Сборник содержит тезисы докладов и короткие статьи, посвященные стратиграфии, палеонтологии, геохимии и некоторым аспектам палеогеографии и тектоники Сибири, Казахстана, Китая, Ближнего и Среднего Востока, Северо-Восточной Африки, Испании и Северной Америки. Подведены итоги деятельности международной подкомиссии по кембрийской стратиграфии и ее рабочих групп по расчленению и границам нижнего и среднего кембрия в традиционном понимании. Приведены материалы разрезов кембрийских отложений, предлагаемых в качестве потенциальных стратотиплов ярусных подразделений и их нижних границ Международной стратиграфической шкалы.

The Conference proceedings include abstracts and short papers covering numerous topics of Cambrian stratigraphy, palaeontology, as well as some aspects of palaeogeography, tectonics and geochemistry of Siberia, Central and Southeastern Asia, Europe, the Middle East and Northern America. Results of activity of the ISSC and its working groups are summarized in this volume. Detailed geological information on sections proposed as potential stratotypes for the Global Stages and their lower boundaries is also presented.

*Фотография на обложке О. Б. Олейникова*

# PROPOSED GLOBAL STRATOTYPE SECTION AND BOUNDARY POINT (GSSP) FOR CAMBRIAN SYSTEM STAGE 5 AND SERIES 3 IN MURERO (SPAIN)

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Following the ISCS recommendations, we nominate the *Acadoparadoxides mureroensis* FAD in the Rambla de Valdemiedes 2 (RV2) section near Murero (Cadenas Ibéricas, Zaragoza Province, north-eastern Spain; Figs. 1, 2) as the GSSP for the base of the Cambrian Stage 5 (Jilocan, herein proposed) and, respectively, Series 3. This polymeroid trilobite species is widely distributed across one palaeocontinent at least,

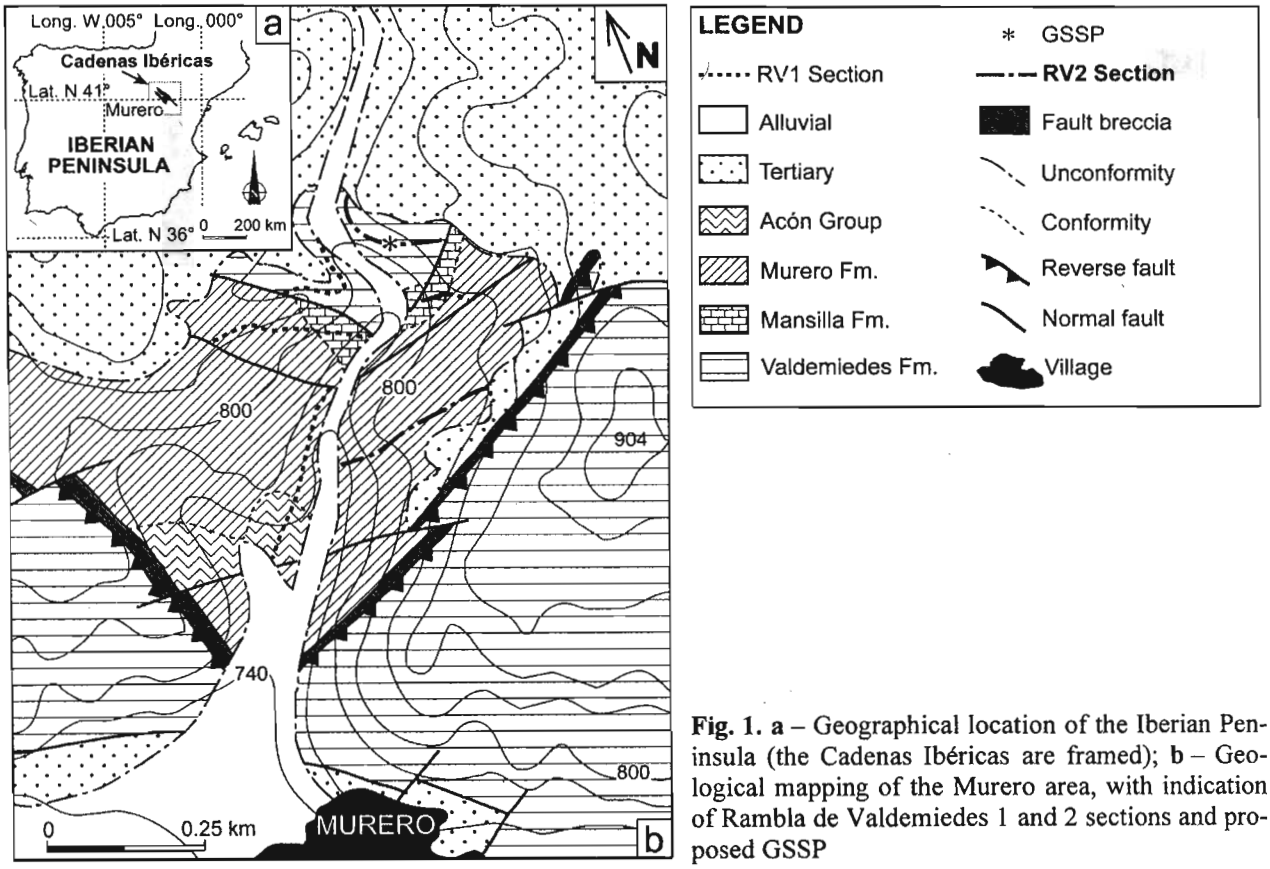


**Fig. 1. a** – Geographical location of the Iberian Peninsula (the Cadenas Ibéricas are framed); **b** – Geological mapping of the Murero area, with indication of Rambla de Valdemiedes 1 and 2 sections and proposed GSSP

namely Eastern Gondwana (Spain, Morocco, Italy, Turkey), where its occurrences are documented in numerous sections, and is recorded also in Siberia and probably Poland. *A. mureroensis* is one of the most

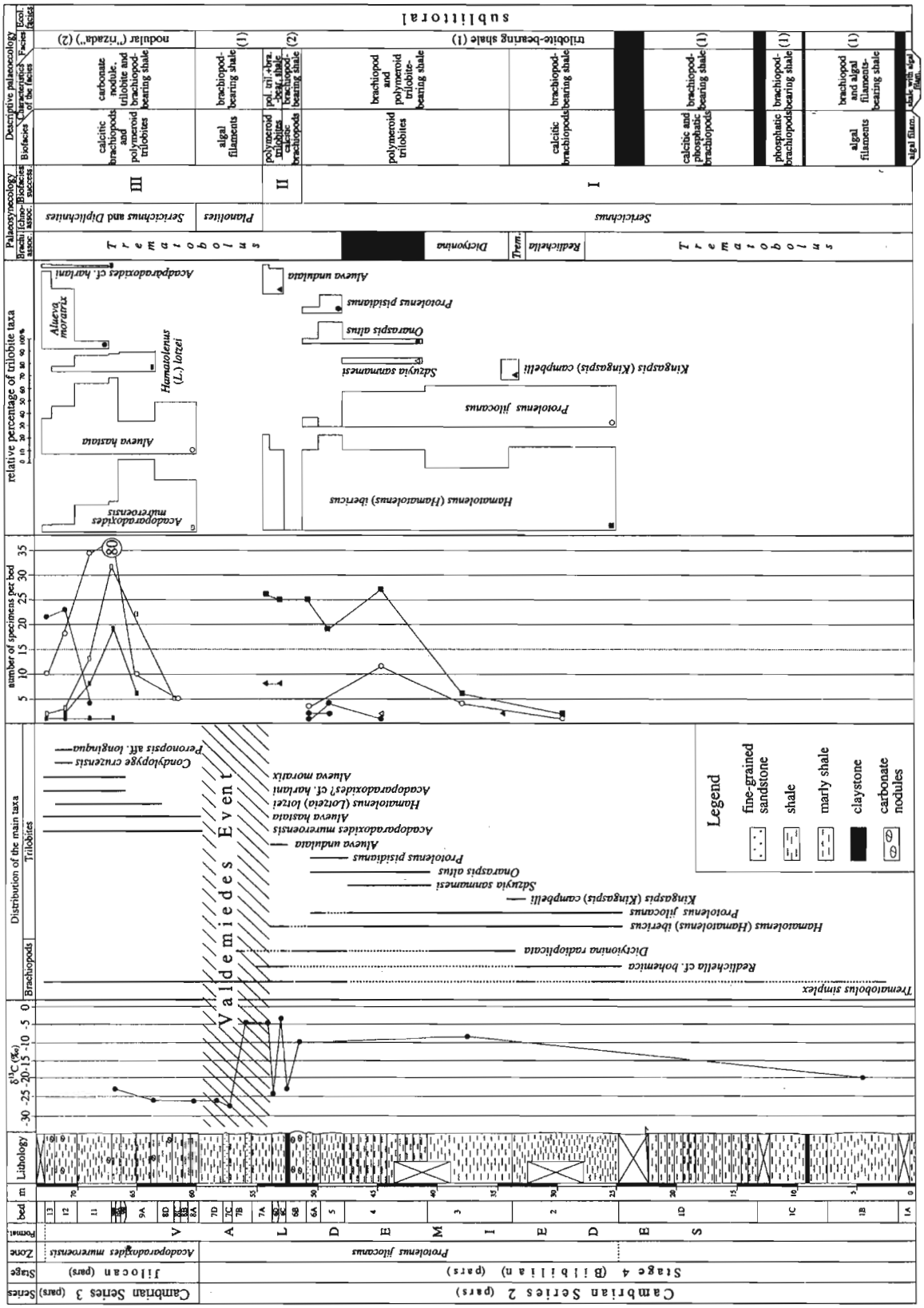


**Fig. 2.** Biostratigraphy, sampling results, palaeoecology and C-isotope geochemistry of the Valdemiedes Formation at Rambla de Valdemiedes 2 section (modified from Dies Álvarez, 2004). (*) A normative sampling was performed for each bed: only complete specimens and cranidia were collected during a standardized sampling time

widespread species for the interval under discussion. Besides, its FAD is very close to the traditional Lower–Middle Cambrian series' boundary established as early as late XIX century by Brøgger and Westergård. In Europe, Africa, eastern North America, and Russia, the appearance of paradoxidids has been considered as the beginning of the former Middle Cambrian Series. Furthermore, the *A. mureroensis* FAD is framed be-

tween the FADs of other relatively widespread species, *Palaeolenus antiquus* from below and *Ovatoryctocara granulata* from above that allow stratigraphers recognize this level with relative ease.

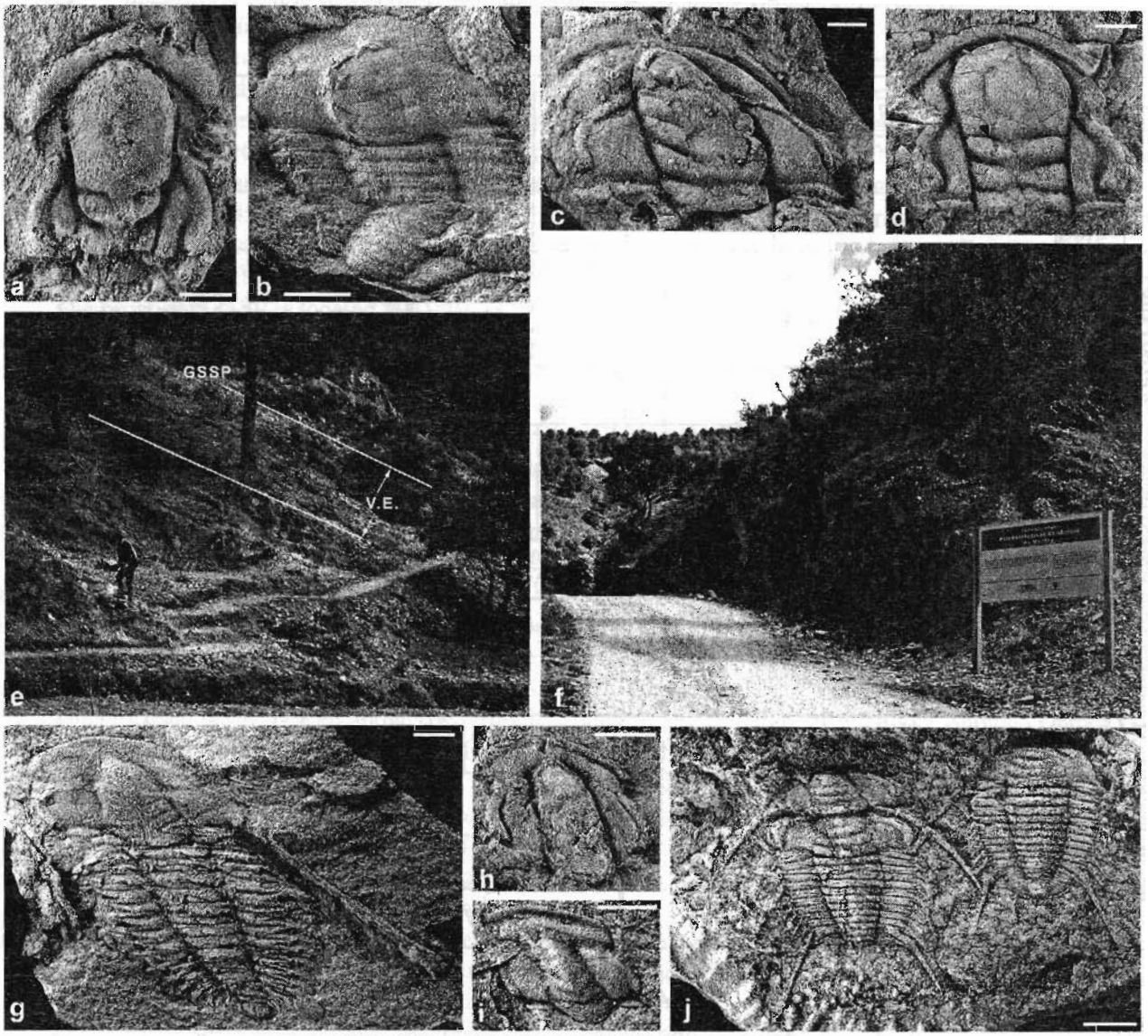


**Fig. 3. a–d**: Early Jilocan trilobites from Rambla de Valdemiedes 2 (RV2) section. **a**. *Acadoparadoxides mureroensis* Sdzuy, 1958. Specimen MPZ 2003/682 (Museo Paleontológico de la Universidad de Zaragoza, Spain). Internal mould of cranidium. Scale bar = 5 mm. **b**. *Alueva hastata* (Sdzuy, 1958). MPZ 2003/268. Latex replica of cranidium and thorax. Scale bar = 5 mm. **c**. *Hamatolenus* (*Lotzeia*) *lotzei* Sdzuy, 1958. Gypsum replica of cranidium. Holotype. Scale bar = 5 mm. **d**. *Acadoparadoxides* cf. *harlani*. MPZ 2004/96. Internal mould of cranidium. Scale bar = 5 mm. **e**. Cambrian Series 2/3 boundary interval in Rambla de Valdemiedes 2 section in Murero (V.E., beds recording the Valdemiedes Event), and location of proposed GSSP for the base of the Cambrian Stage 5 (Jilocan). **f**. Access to the protected fossiliferous site of Murero (Zaragoza Province, NE Spain). **g–j**: Late Bilbilian trilobites. **g**. *Hamatolenus (H.) ibericus* Sdzuy, 1958. MPZ 99/184. Complete specimen with the rigth librigena separated. Scale bar = 10 mm. **h**. *Protolenus jilocanus* (Liñán & Gozalo, 1986). MPZ 858. Internal mould of cranidium. Holotype. Scale bar = 5 mm. **i**. *Alueva undulata* Sdzuy, 1961. MPZ 99/173. Internal mould of cranidium. Scale bar = 5 mm. **j**. *Onaraspis altus* (Liñán & Gozalo, 1986). MPZ 99/515 (left) and MPZ 99/586 (right). Latex replica of two complete specimens and one cranidium. Scale bar = 5 mm

The marine fine-grained siliciclastics and carbonates spanning the proposed GSSP in Murero belong to the Mesones Group, which is subdivided in ascending order into the Valdemiedes, Mansilla, and Murero formations. Each of them yields layers with fossils of exceptional preservation (Lagerstätten). Studies on clay minerals indicate a low anchizone grade for the rocks of the Mesones Group (Bauluz et al., 1998).

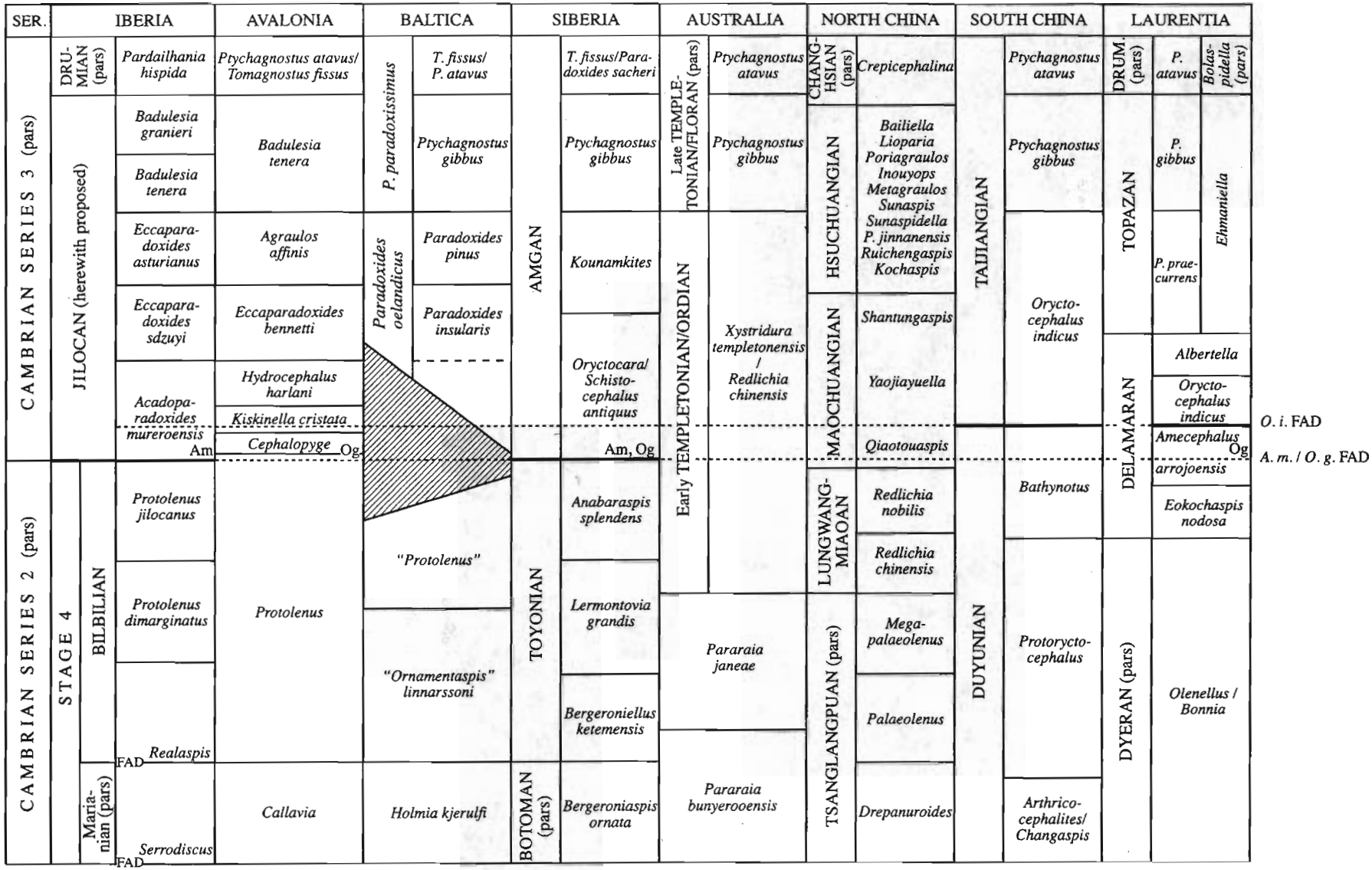


**Fig. 4**. Correlation chart of the proposed GSSP for the Jilocan Stage (based on The Lower–Middle..., 2007). *A. m.*: *Acadoparadoxides mureroensis*. *O g.*: *Ovatorycto-cara granulata*. *O. i.*: *Oryctocephalus indicus*

The Mesones Goup crops out in the RV-2 section. In chronostratigraphic sense, the proposed section includes the uppermost Bilbilian (Cambrian Stage 4 of Series 2), the entire proposed Jilocan Stage, and the lower to middle Drumian Stage.

The RV-2 section is monofacial and represents essentially continuous deposition under non-restricted marine, sublittoral conditions, yielding abundant and well-preserved fossils representing some of the most cosmopolitan species in this time interval of a non-restricted marine basin. Palaeoecological conditions evolved up the section to more open sublittoral settings (The Geology..., 2002). The section is well exposed, lacks synsedimentary and tectonic disturbances, strong metamorphism and diagenetic alteration but possesses a number of marker horizons enhancing the possibility for long-distance correlations. A minor oblique fracture is observed beyond the interval under discussion (Fig. 1b). It is well-studied and has enormous published history in accessible magazines.

The proposed GSSP is located at 41°10′03.5" N latitude and 01°28′34.4" W longitude. It is defined at the base of a shale layer of the uppermost Valdemiedes Formation containing the lowest occurrence (FAD) of the cosmopolitan polymeroid trilobite species *A. mureroensis* (base of the *A. mureroensis* Zone). It occurs 59.6 m above the base of the RV-2 section (bed number 8A of Liñán and Gozalo, 1986; Dies Álvarez, 2004; Figs. 1b, 2 herein), immediately above the Valdemiedes Extinction Event (Problemática..., 1993) (Fig. 3). Beds recording the Valdemiedes Event and those immediately below show quick oscillations in $\delta^{13}C$ values between –3.3 ‰ and –27.5 ‰, and strong geochemical anomalies of major and minor elements. Secondary markers of a probable global significance near the *A. mureroensis* FAD include an ongoing transgressive phase of an eustatic event. The pronounced negative $\delta^{13}C_{org}$ excursion recorded in the Valdemiedes Event is probably the same that is found at the level of the last olenellid appearance in Laurentia (Carbon, 2002) and at the level of the last redlichiid appearance in South China and named the ROECE (Redlichiid-Olenellid Extinction Carbon Excursion) by Zhu et al. (2006), and probably the former Lower–Middle Cambrian boundary established in Laurentia and in Europe really were drawing at the same level and coinciding with the *A. mureroensis* FAD.

The proposed GSSP is well above (two trilobite zones above) the strata of the lower Bilbilian Daroca Formation accumulated during the global Hawke Bay or Daroca Regression Event (Dies Álvarez et al., 2007).

The base of the new proposed Jilocan Stage (Fig. 3), once ratified, will automatically define the top of the Cambrian Series 2 and Stage 4. The name «*Jilocan*» derives from the Jiloca River (a tributary of the Jalón River), which goes by the village of Murero near its confluence with the Rambla (gully) de Valdemiedes. The upper boundary of the Jilocan Stage would coincide with the base of the ratified Drumian Stage (*Ptychagnostus atavus* FAD) which is an equivalent to the polymeroid trilobite *Pardailhania hispida* FAD (The Geology..., 2002), recorded at the base of the Murero Formation.

The new Jilocan Stage is divided by trilobites into zones, in ascending order: *A. mureroensis, Eccaparadoxides sdzuyi, E. asturianus, Badulesia tenera* and *B. granieri* zones (Fig. 4). Thus, the Jilocan Stage comprises the upper part of the Valdemiedes Formation, the Mansilla Formation and the base of the Murero Formation in all localities of Cadenas Ibéricas.

*Acknowledgment*

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