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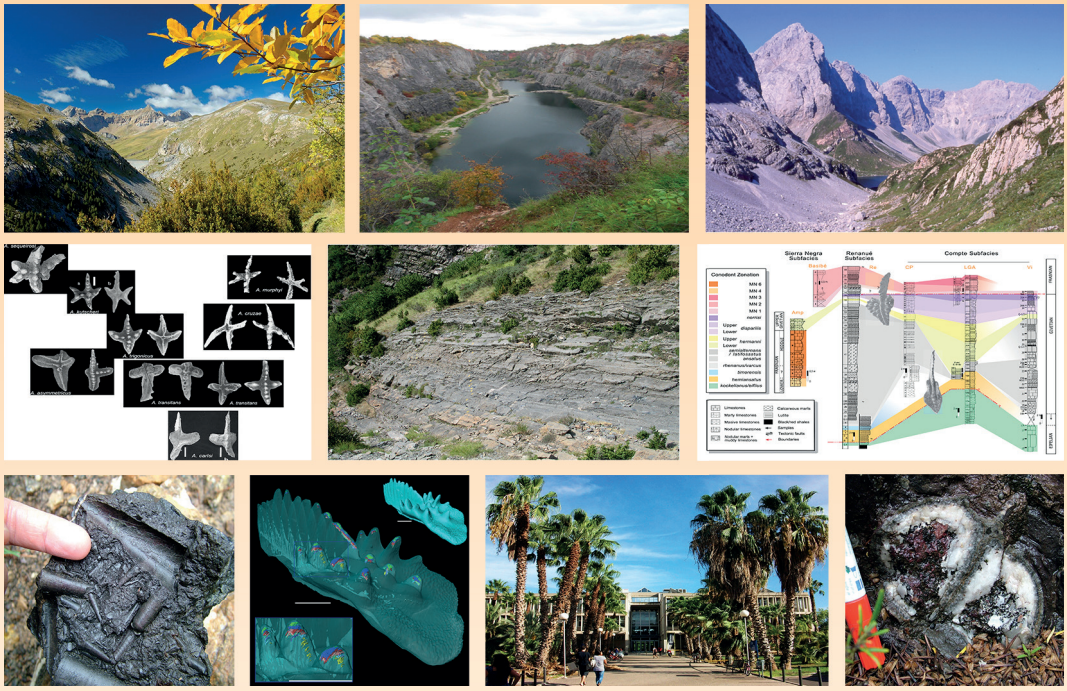

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José Ignacio Valenzuela-Ríos

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Instituto Geológico
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FOURTH INTERNATIONAL CONODONT SYMPOSIUM

ICOS IV

"PROGRESS ON CONODONT INVESTIGATION"

JOINTLY WITH:

THE INTERNATIONAL SUBCOMMISSION ON DEVONIAN STRATIGRAPHY ***SDS***

THE INTERNATIONAL SUBCOMMISSION ON SILURIAN STRATIGRAPHY ***ISSS***

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EDITORS: JAU-CHYN LIAO AND JOSÉ IGNACIO VALENZUELA-RÍOS

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Upper left: Palaeozoic outcrops of the Tena valley, Aragonian Pyrenees (Spain). Photo by Jau-Chyn Liao.
Upper centre: Lower Palaeozoic succession in the Barrandian area (Bohemian Massif, Czech Republic). Photo by Ladislav Slavík.
Upper right: Palaeozoic succession in the Volayer Area (Carnic Alps, Italy-Austria border). Photo by Carlo Corradini.
Middle left: Ancyrodelloides lineage proposal, lower to middle Lochkovian (Lower Devonian) in the Central Pyrenees (Spain). Photo by José I. Valenzuela-Ríos.
Middle centre: Pragian-Emsian succession in the Baliera section, Benasque area, Aragonian Pyrenees. Photo by José I. Valenzuela-Ríos.
Middle right: Regional correlation in the southern part of the Central Pyrenees for the Middle to Upper Devonian. Photo by Jau-Chyn Liao.
Lower left: Orthoceras limestones (Lower Devonian) from Gerri La Sal section, Noguera Pallaresa valley. Photo by Jau-Chyn Liao.
Lower centre one: Reconstruction in 3D of the Epigondolella quadrata (Upper Triassic) of the Pizzo Mondelo (Italy). Photo by Michele Mazza and Carlos Martínez-Pérez.
Lower centre second: Main library "Eduard Boscà" in the Campus of Burjasot, University_of_Valencia (Spain).
Lower right: Schiphocrinites from the Silurian/Devonian in Gerri La Sal section. Photo by Jau-Chyn Liao.

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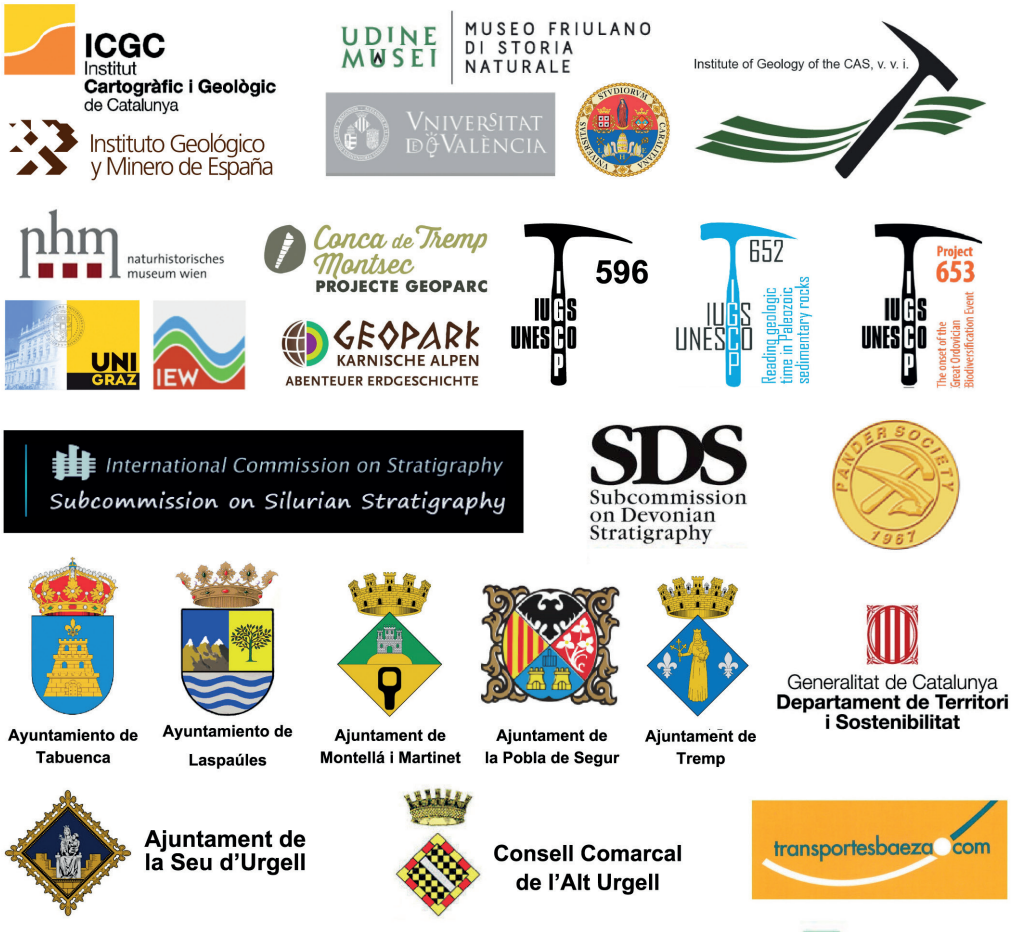
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THE EVOLUTION OF CONODONT FORM THROUGH TIME

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Conodont elements are the only mineralized skeletal remains of an extinct group of soft-bodied, nektonic chordates that inhabited the oceans from the late Cambrian through the Triassic (some 300 million years). Interest in the effectiveness of conodont elements as chronostratigraphic markers, coupled with the search for the biological affinities of the conodont animal, has often obscured the fact that conodonts not only witnessed all major global changes during their 300 million year existence (e.g., major chemical perturbations to the ocean-atmosphere system, extinction and diversification events, the evolution of major new Bauplane as life emerged from the water and invaded the land), and were themselves affected by these changes. During this time the development of novel predation strategies initiated successive waves of "arms races". In addition, three major extinction events – two of which were among the largest in Earth's history – resulted in the complete taxonomic and ecological restructuring of marine communities. But curiously, irrespective of this tremendous explosion of environmental change, conodonts have generally been considered more-or-less static entities dwelling within the confines of their oceanic environment, a morphological "constant" in an ever-evolving world.

The classification of conodonts has traditionally been based on the analysis of their elemental morphology. Three main categories of conodont elements have been identified: coniform (including rastrate), ramiform, and pectiniform. If observed through their entire stratigraphic range, conodont elements and apparatuses have undergone substantial modification both in their architecture and in their elemental shapes. Apparatuses composed of only coniform elements characterize most of the earliest evolutionary history of the group, while multi-elemental shapes grew and diversified in later periods. Interestingly recent comparisons within the same morphological category have revealed both persistencies as well as morphologic innovations. For

example, Jones et al. (2012) explored morphological variation in *Wurmiella excavata* in order to better constrain the function of this element in food processing. We address this issue of characterizing the evolution of conodont element form (size + shape) quantitatively using both geometric and image-based approaches previously applied to the analysis of vertebrate, invertebrate and microplankton form within an explicitly phylogenetic context. Our intention is to document the evolution of conodont form independently from any interpretation of the function conodonts had in the living animal so that correlations between form and function can be investigated using standard statistical hypothesis tests.

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Jones, D., Evans, A.R., Siu, K.K.W., Rayfield, E.J. and Donoghue P.C.J. 2012. The sharpest tools in the box? Quantitative analysis of conodont element functional morphology. *Proceedings of the Royal Society*, Biological Series, 279, 2849-2854.