

SUPPLEMENTARY ONLINE MATERIAL FOR

**Unusual environmental conditions preserve a Permian mesosaur-bearing Konservat-Lagerstätte from Uruguay**

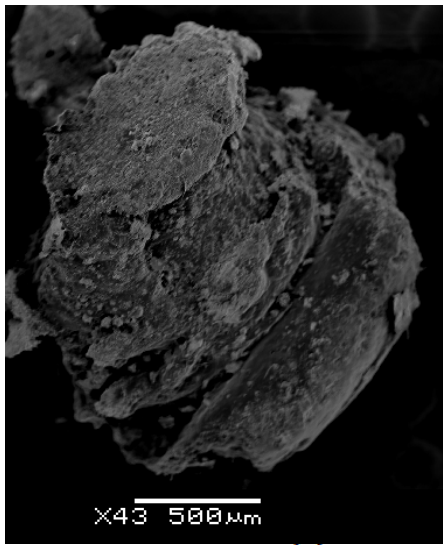
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Published in *Acta Palaeontologica Polonica* 2012 57 (2): 299-318.

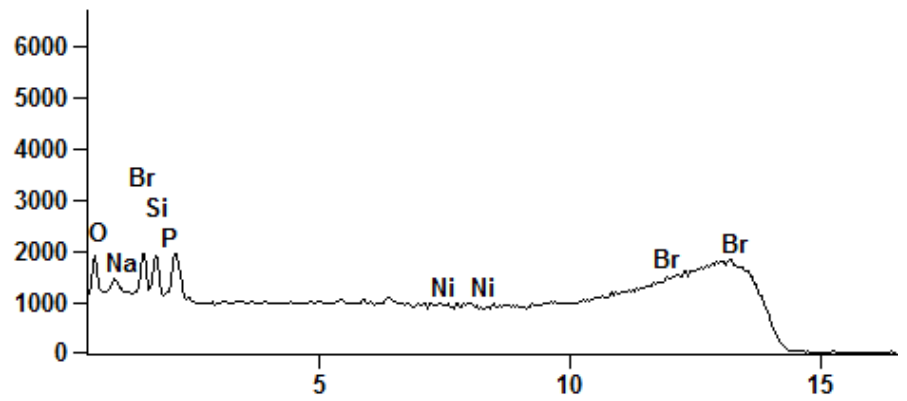
doi: <http://dx.doi.org/10.4202/app.2010.0113>

SOM Table 1. Quantitative biodiversity of the Geraldine bonebed, assessed by a calculation of the Shannon index solely on the basis of stegocephalian data (no specimen counts are available for the ostracods and insects, precluding incorporation of these taxa into the calculation). These data, from Sander (1987), yield a Shannon index of 1.40.

Taxon	Number of specimens
<i>Archeria crassidisca</i>	44
<i>Eryops megacephalus</i>	16
<i>Trimerorhachis insignis</i>	1
<i>Zatrachys</i>	1
<i>Diadectes</i>	1
<i>Ophiacodon uniformis</i>	1
<i>Edaphosaurus boanerges</i>	14
<i>Dimetrodon natalis</i>	3
<i>Bolosaurus striatus</i>	3
Total	84



Full scale counts: 4892      NERVIO 2(2)\_pt1

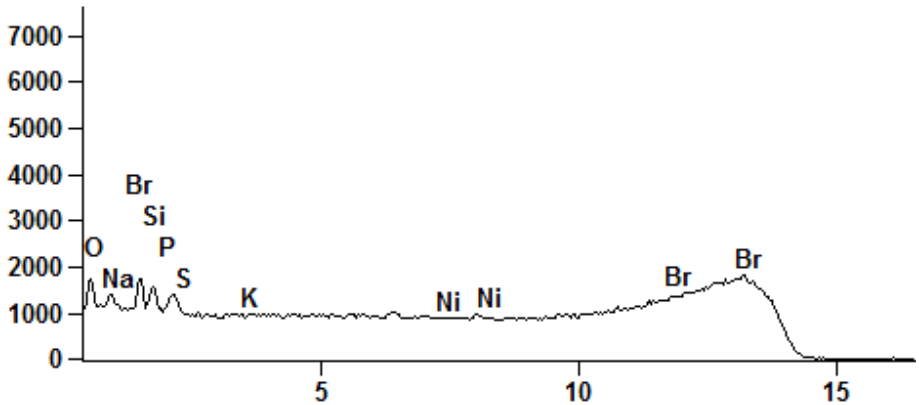
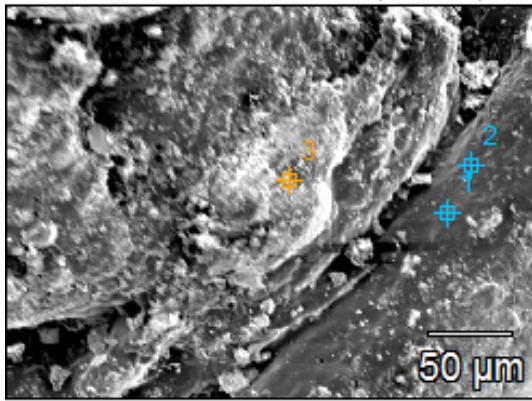


klm - 4 - Be

keV

Full scale counts: 4892

NERVIO 2(2)\_pt2

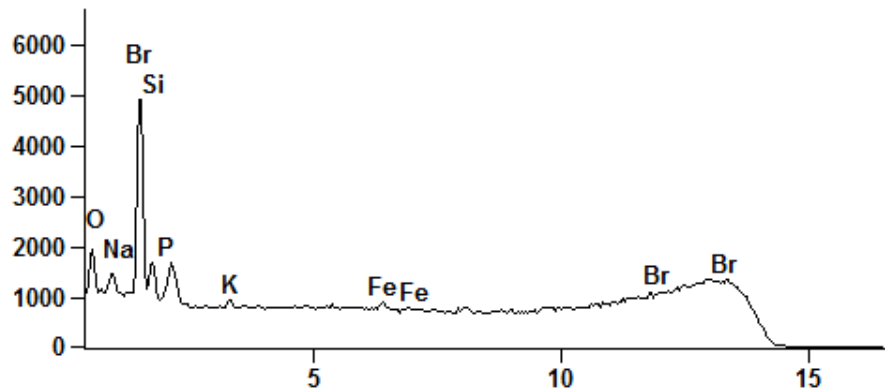


klm - 4 - Be

keV

Full scale counts: 4892

NERVIO 2(2)\_pt3



klm - 4 - Be

keV

SOM Figure 1. SEM images and spectroscopy analyses of a mesosaur main mandibular nerve fragment (probably the trigeminus ramus) from the Mangrullo Formation of Uruguay. The pictures show the mould of one of the last alveoli and the corresponding mandibular nerve fragment firmly attached to it (the complete image to the left, and a close up view of the nerve to the right). The location of analyzed samples indicate differences in the mineralogical spectrum between nerve (parts 1 and 2 ) and sediment (part 3).

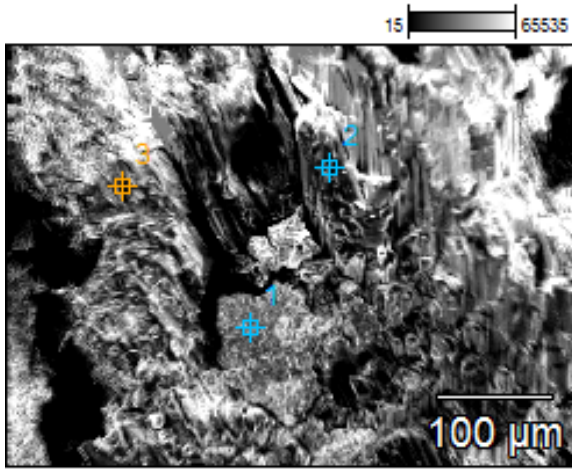
Weight % Error (+/- 1 Sigma)

	<i>C-K</i>	<i>O-K</i>	<i>Na-K</i>	<i>Mg-K</i>	<i>Si-K</i>	<i>P-K</i>	<i>S-K</i>	<i>K-K</i>	<i>Ti-K</i>	<i>Fe-K</i>	<i>Co-K</i>	<i>Ni-L</i>	<i>Cu-K</i>	<i>Zn-K</i>	<i>Br-L</i>	<i>Au-M</i>
<i>NERVE 2(2)_p</i>		+/-	+/-		+/-	+/-						+/-			+/-	
<i>t1</i>		0.22	0.13		0.09	0.09						0.25			0.15	
<i>NERVE 2(2)_p</i>		+/-	+/-		+/-	+/-	+/-	+/-				+/-			+/-	
<i>t2</i>		0.23	0.13		0.08	0.09	0.07	0.10				0.25			0.14	
<i>NERVE 2(2)_p</i>	+/-	+/-	+/-	+/-	+/-			+/-	+/-	+/-	+/-		+/-	+/-		+/-
<i>t3</i>	0.27	0.35	0.34	0.10	0.11			0.14	0.00	0.49	0.00		0.00	0.00		0.31

SOM Table 2. Quantitative measurements of the composition of the mesosaur main mandibular nerve fragment (see SOM Figure 1 for the location of the samples).

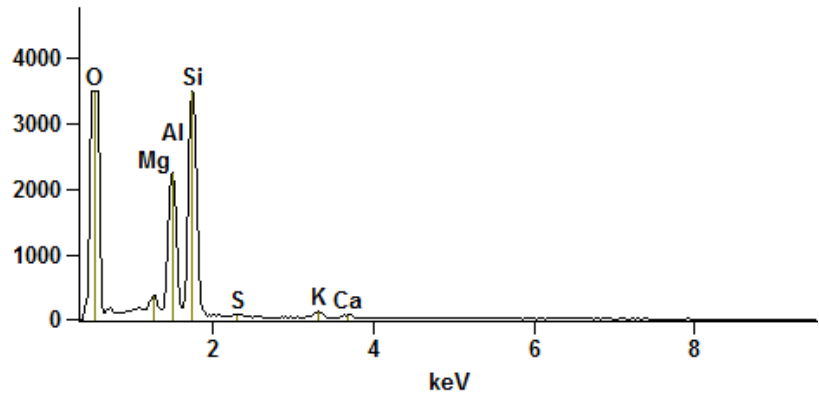
	<i>C-K</i>	<i>O-K</i>	<i>Na-K</i>	<i>Mg-K</i>	<i>Si-K</i>	<i>P-K</i>	<i>S-K</i>	<i>K-K</i>	<i>Ti-K</i>	<i>Fe-K</i>	<i>Co-K</i>	<i>Ni-L</i>	<i>Cu-K</i>	<i>Zn-K</i>	<i>Br-L</i>	<i>Au-M</i>
<i>NERVE 2(2)_pt1</i>		30.6	11.0									29.9			12.9	
<i>NERVE 2(2)_pt2</i>		30.7	12.5		8.02	7.40						30.8			11.4	
<i>NERVE 2(2)_pt3</i>		42.4	11.7		6.60	5.51	2.25	0.01					0.0	0.0		27.7
	0.01			6.79	8.72			1.37		1.10						

CRISTAL 2(2)



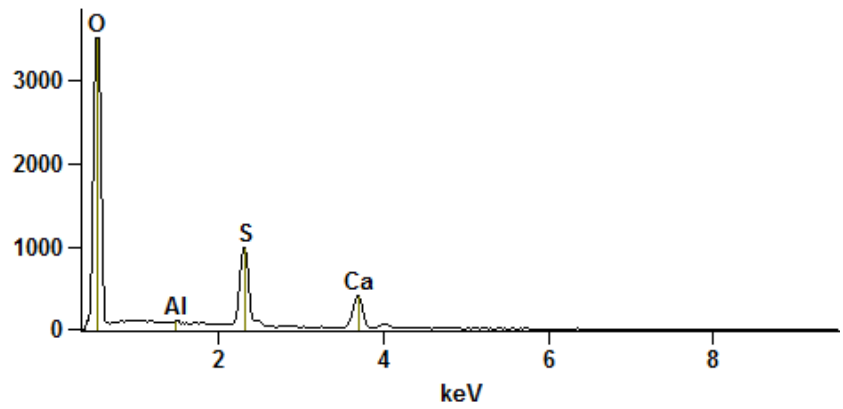
Full scale counts: 3494

CRISTAL 2(2)\_pt1



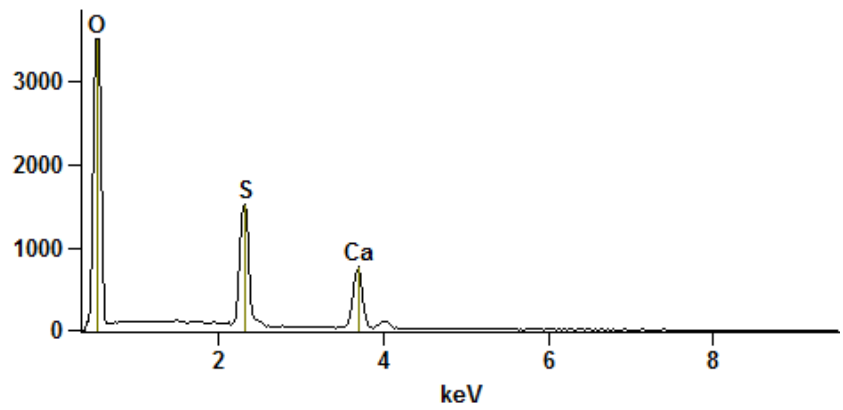
Full scale counts: 3494

CRISTAL 2(2)\_pt2



Full scale counts: 3494

CRISTAL 2(2)\_pt3



SOM Figure 2. SEM images and spectroscopy analyses of gypsum crystals from the Mangrullo Formation of Uruguay. Data taken from three different places of the crystal fragment: part 1 shows remains of the surrounding clay sediments; part 2 and 3 show clearly the presence of the main components of gypsum.

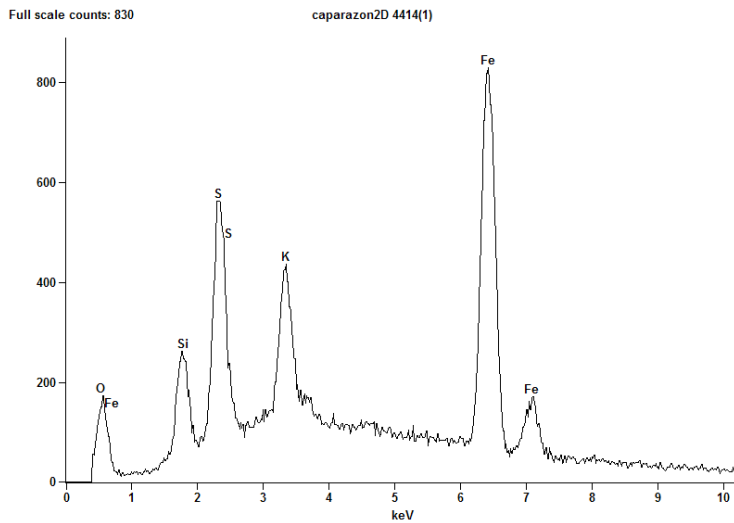
SOM Table 3. Quantitative measurements of the composition of the gypsum crystals (see SOM Figure 2 for the location of the samples).

Weight %

	<i>O-K</i>	<i>Mg-K</i>	<i>Al-K</i>	<i>Si-K</i>	<i>S-K</i>	<i>K-K</i>	<i>Ca-K</i>
<i>CRISTAL 2(2)_pt1</i>	66.92	1.25	11.17	19.10	0.21	0.82	0.53
<i>CRISTAL 2(2)_pt2</i>	79.57		0.77		10.92		8.75
<i>CRISTAL 2(2)_pt3</i>	75.28				12.18		12.55

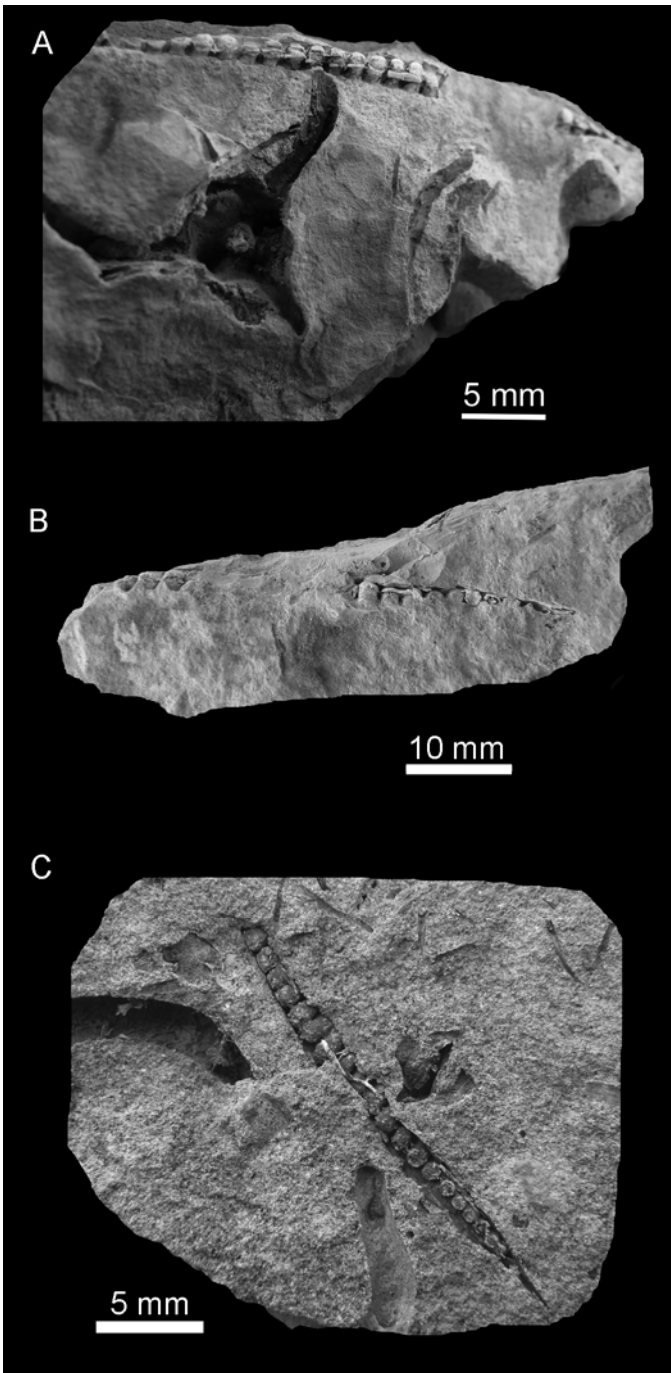
Weight % Error (+/- 1 Sigma)

	<i>O-K</i>	<i>Mg-K</i>	<i>Al-K</i>	<i>Si-K</i>	<i>S-K</i>	<i>K-K</i>	<i>Ca-K</i>
<i>CRISTAL 2(2)_pt1</i>	+/-0.38	+/-0.04	+/-0.09	+/-0.12	+/-0.02	+/-0.03	+/-0.03
<i>CRISTAL 2(2)_pt2</i>	+/-0.55		+/-0.04		+/-0.11		+/-0.13
<i>CRISTAL 2(2)_pt3</i>	+/-0.50				+/-0.11		+/-0.14

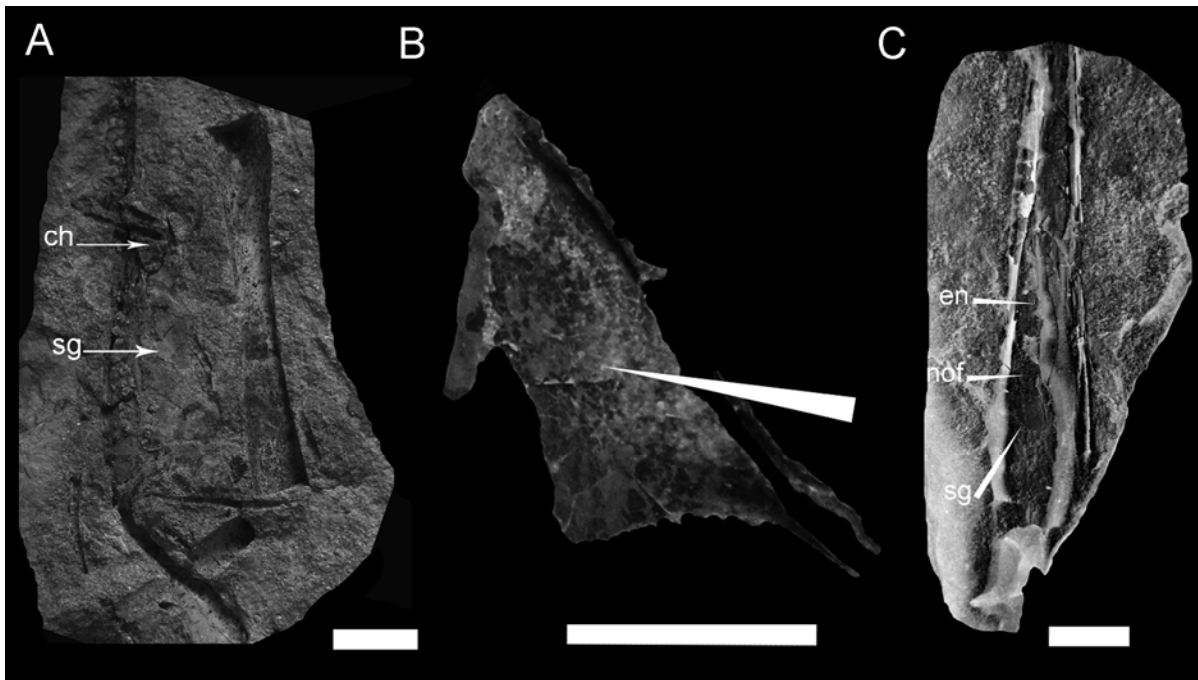


<i>Element Line</i>	<i>Atom %</i>	<i>Atom % Error</i>
<i>O K</i>	52.69	+/- 3.33
<i>Si K</i>	4.57	+/- 0.25
<i>Si L</i>	---	---
<i>S K</i>	10.76	+/- 0.35
<i>S L</i>	---	---
<i>KK</i>	5.84	+/- 0.32
<i>KL</i>	---	---
<i>Fe K</i>	26.14	+/- 0.54
<i>Fe L</i>	---	---
<i>Total</i>	100.00	

SOM Figure 3. Spectroscopy SEM analysis for mineralogical composition of compressed carapaces of pygocephalomorphs crustaceans from the claystone facies of the Mangrullo Formation. Increased Iron and sulphur suggest preservation under pyritization processes.



SOM Figure 4. Mesosaur specimens showing similar distribution of mandibular (A and C) and maxillary (B) nerves.



SOM Figure 5. A-C. Evidence for the presence of a salt gland in mesosaurs is showed by the presence of a similar concavity found over the palatine in several specimens. This structure can be seen from moulds that reproduce the ventral (A) or dorsal (C) views of the palatine bone. Salt glands seems to have been present from early stages of development, judging for the small size of the specimen showed in B. Abbreviations: ch, choana; en, external naris; nof, nariale obturatum foramen; sg, salt gland.