Appendix C

Images of sedimentary rocks and fossils from Maio Island

Internal igneous growth, doming and rapid erosion of a mature ocean island: The Miocene evolution of Maio (Cabo Verde)
In
International Journal of Earth Sciences (Geologische Rundschau)

Lisa K. Samrock*, Thor H. Hansteen, Wolf-Christian Dullo, Jo-Anne Wartho
GEOMAR Helmholtz Centre for Ocean Research Kiel, Wischhofstr. 1-3, 24148 Kiel
*corresponding author: lsamrock@geomar.de

In the following section, we present field images of rocks of the Batalha, Morro, Carqueijo and Coruja Formations, as well as photographs of macrofossils, thin section images, and SEM secondary electron (SE) images of the respective rocks. The SEM images were recorded at the Institute of Geosciences and the Institute of Material Sciences at the Christian-Albrecht University of Kiel, Germany. To identify the nannofossils, we used the Nannotax3, Fossilworks and Global Biodiversity Information Facility websites (Young et al. 2017, Fossilworks.org, GBIF Secretariat 2017). The identification of the calpionellids was based on Grün and Blau (1997).

Content

1. Batalha Formation

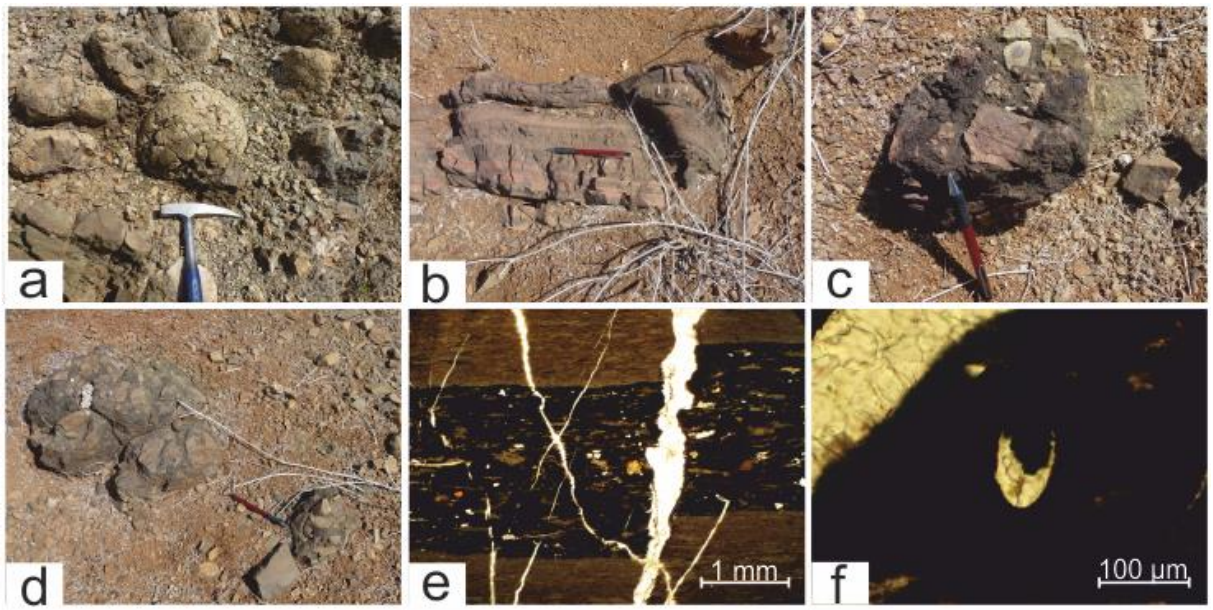
1.1. Sampling locations for the Batalha Fm intercalated sedimentary rocks

Sample	Location	Description	Coordinates	
			Latitude	Longitude
18-51	N of Mte Esgovere	Red intercalated sediments	15°09'57.25"N	23°10'53.72"W
18-53	N of Mte Esgovere	Brecciated dyke	15°09'54.85"N	23°11'01.81"W

1.2. Fossil content of the Batalha Fm intercalated sedimentary rocks

?*Calpionellites darderi* (Colom, 1934) Colom, 1948 (**Fig. C1f**).

1.3. Field and thin section images



FigureC1: Batalha Fm. **a**: Pillow lava on the northern flank of Mte Branco, with hammer for scale. **b**: Red intercalated sediments in the upper Batalha Fm, N of Mte Esgovere, with pencil for scale. **c, d**: Breccia in the upper part of the Batalha Fm, N of Mte Esgovere, with angular fragments of altered sedimentary rocks. Pencil is shown for scale**. e, f**: Thin section images of organic-rich red intercalated sediment (Mte Esgovere), showing a micro-fault (**e)** and ?*Calpionellites darderi* (Colom 1934) Colom 1948 (**f**).

2. Morro Formation

2.1. Sampling locations for the Morro Fm sedimentary rocks

Sample	Location	Description	Coordinates		Bedding (dip direction/dip)
			Latitude	Longitude	
17-75/5	N of Mte Branco	Pebble of Morro Fm limestone	15°12'14.09"N	23°07'6.78"W	
18-6	S of Mte Branco	Limestone with macrofossils	15°11'44.20"N	23°07'31.57"W	
18-14	Mte Branco	Pelagic limestone	15°11'42.47"N	23°07'14.28"W	076/36
18-42	Rib da Baia	Massive limestone with chert bands	15°11'19.85"N	23°06'30.63"W	074/23
18-62	Mte Esgovere	Limestone with ammonites and aptychi	15°09'46.57"N	23°10'55.98"W	251/64
18-63	Mte Esgovere	Limestone with ammonites and aptychi	15°09'38.37"N	23°10'51.74"W	245/70
18-64	Mte Esgovere	Limestone, bioturbatetd	15°09'35.43"N	23°10'57.58"W	231/30
18-65	Rib do Morro	Limestone with ammonite remnants	15°11'1.08"N	23°12'8.58"W	264/43

2.2. Fossil content of Morro Fm rocks

Macrofossils:

- Aptychi **(Fig. C2g).**
- Ammonites:
  - *Phylloceras* cf. *infundibulum* (d'Orbigny 1840); **Fig. C2h.**
  - *Neocomites neocomiensis* (d'Orbigny 1841); **Fig. C2i.**
- Gastropods (**Fig. C3a**).
- Sponge spicule fragments.
- Echinoid fragments.
- Bivalce fragments.

Micro- and nannofossils:

- Radiolaria.
- Foraminifera.
- Calpionellids (*Tintinnopsella* cf. gr. *carpathica* (Murgeanu & Filipescu 1933) Colom 1948; **Fig. C3c**).
- *Cadosina* sp. (**Fig. C3g**).
- *Nannoconus sp.* (**Fig. C4a**).
- *Watznaueria fossacincta* (Black 1971) Bown in Bown & Cooper 1989 (**Fig. C4b**).
- *Watznaueria britannica* (Stradner 1963) Reinhardt 1964 (**Fig. C4d**).
- *Cyclagelosphaera* cf. *argoensis* Bown 1992 (**Fig. C4c).**

2.3. Images of Morro Fm rocks and samples

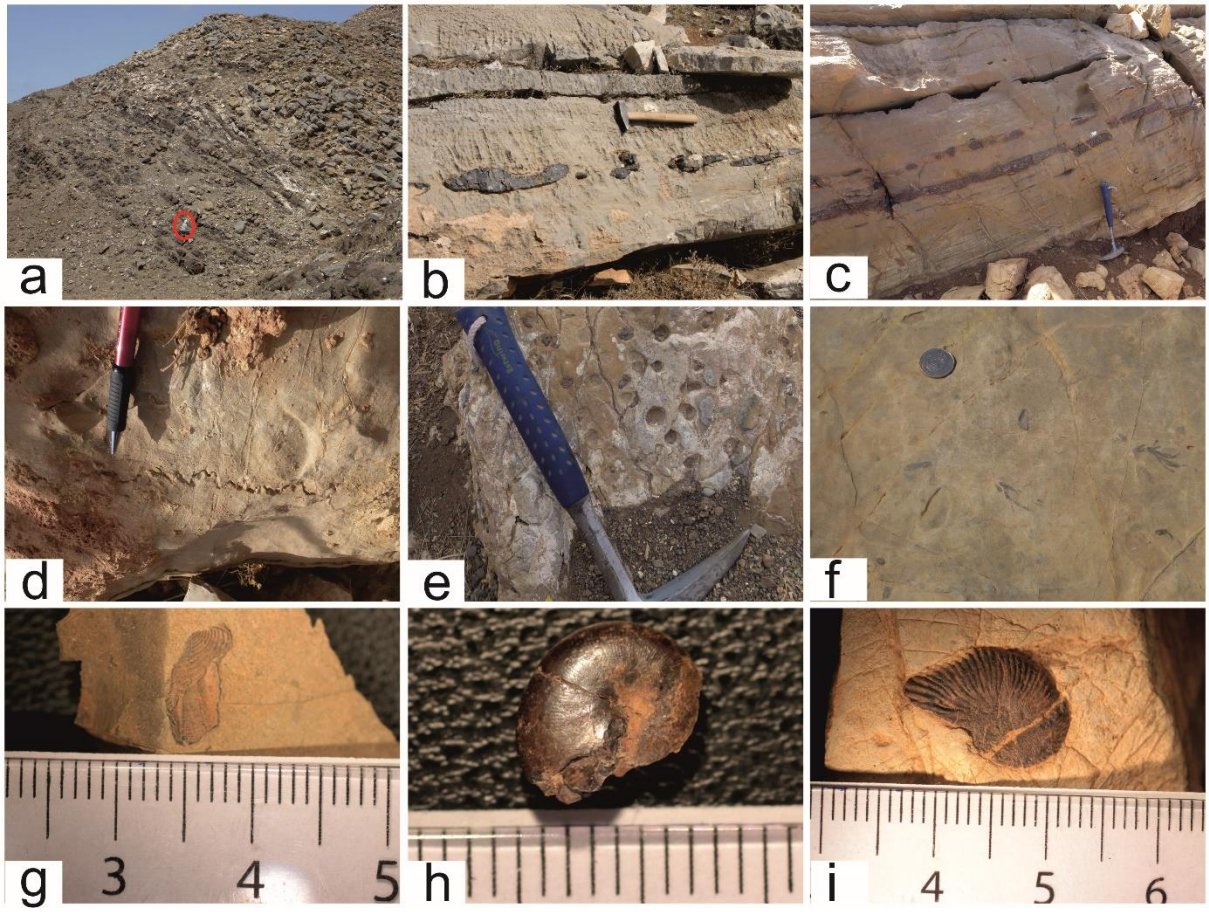


Figure C2: Morro Fm **a**: Massive pelagic limestones, intruded by dykes (left side) at Mte Branco. Person encircled in red for scale. **b, c**: Chert lenses in Morro Fm limestones at Mte Branco (**b**) and Mte Esgovere (**c**). **d**: Stylolites in Morro limestones. **e**: Remnants of ammonites at Rib do Morro. **f**: Macrofossils at Mte Branco. **g**: Aptychus. **h, i**: Ammonites *Phylloceras* cf. *infundibulum* (d'Orbigny 1840) (**h**) and *Neocomites neocomiensis* (d'Orbigny 1841) in **i**. Hammers (**b**, **c** and **e**), a pen (**d**), and a coin (**f**) are shown for scale. In **g-i,** cm-scale (**g, i**) and mm-scale (**h**) bars are shown.

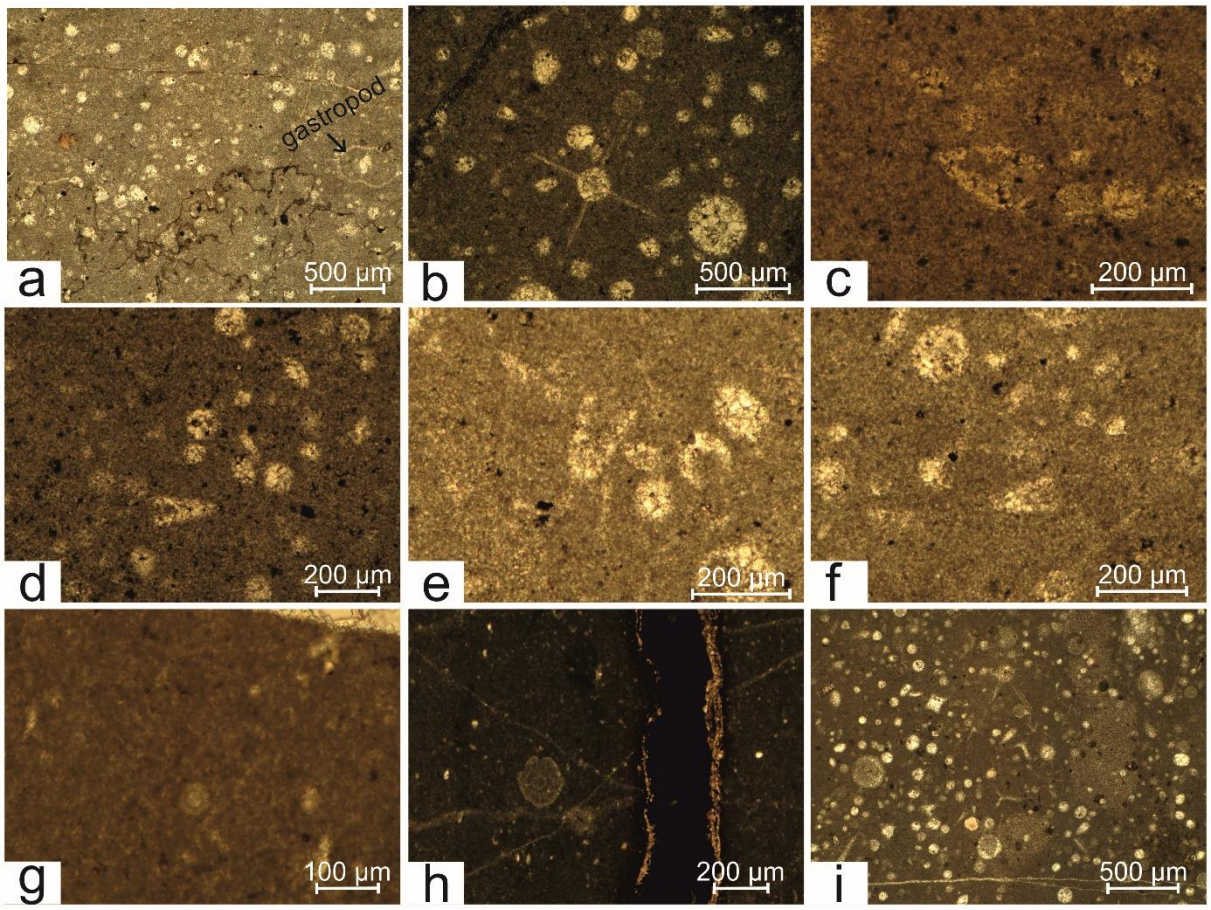


Figure C3: Thin section images of Morro Fm limestones. **a:** Gastropod and stylolites. **b**: radiolarians. **c-f**: calpionellids (*Tintinnopsella* cf. gr. *carpathica* (Murgeanu & Filipescu 1933) Colom 1948) in **c**). **g**: *Cadosina* sp. **h**: foraminifera and organic-rich seam. **i**: Radiolaria and bioturbation, containing dolomite rhombs.

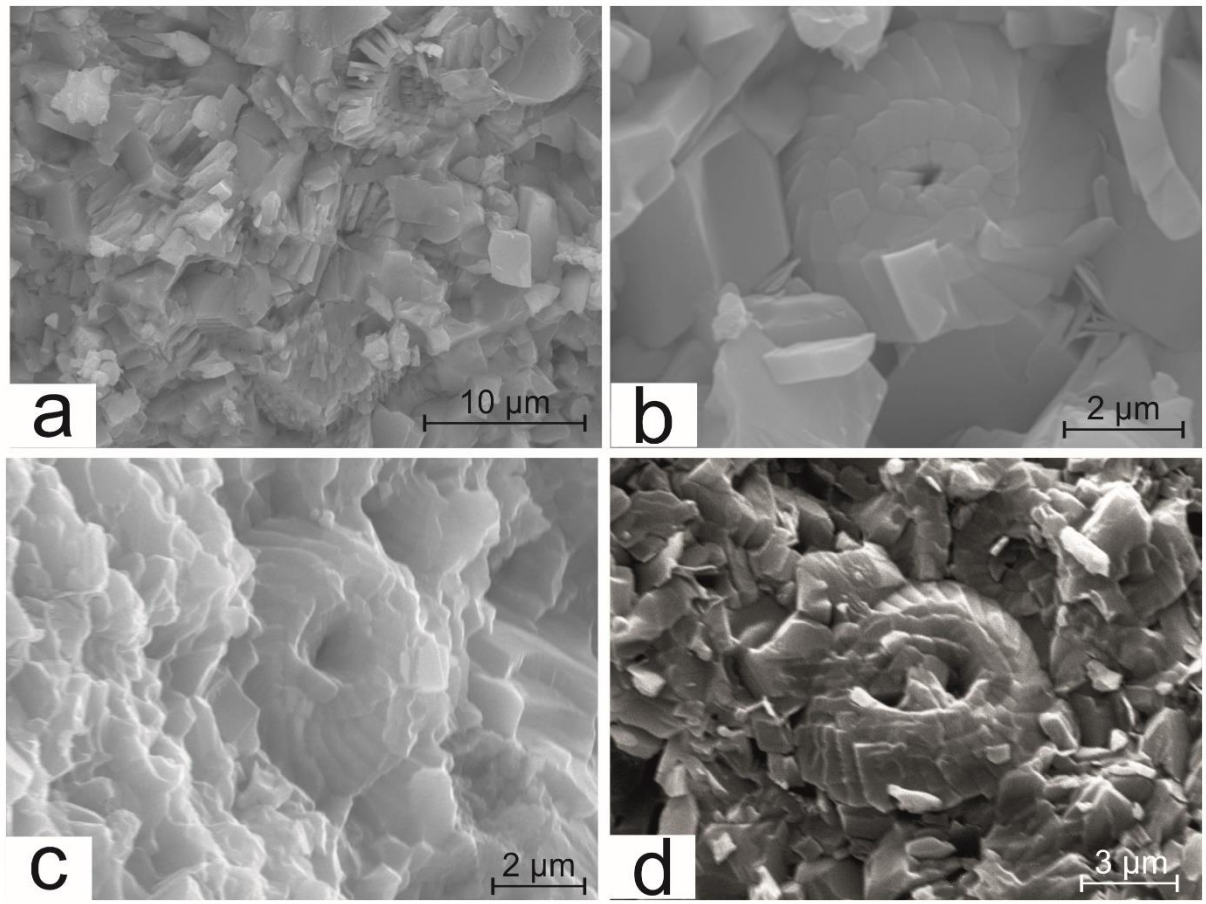


Figure C4: SEM-SE images of microfossils from the Morro Fm limestones. **a**: Remnants of *Nannoconus* sp. **b**: *Watznaueria fossacincta* (Black 1971) Bown in Bown & Cooper 1989. **c**: *Cylcagelosphaera* cf. *argoensis* Bown 1992. **d**: *Watznaueria britannica* (Stradner 1963) Reinhardt, 1964.

3. Carqueijo Formation and Coruja Formation

3.1. Sampling locations for the Carqueijo Fm sedimentary rocks:

Sample	Location	Description	Coordinates		Bedding (dip direction/dip)
			Latitude	Longitude	
18-40/8	N of Lomba da Vigia	Marl with iron stones above upper beds of Morro Fm	15°11’37.42”N	23°06'37.07"W	078/36
18-69	Rib do Morro	Marl with ironstones and nannofossils, just above Morro Fm	15°11'3.66"N	23°12'16.20"W	279/70

3.2. Fossil content of Carqueijo Fm rocks

Macrofossils

- Radiolaria.

Micro- and nannofossils:

- *Cyclagelospahera* cf. *argoensis* Bown 1992 (**Fig. C6a**).
- *Prediscosphaera* cf. *cretacea* (Arkhangelsky 1912) Gartner 1968 (**Fig. C6i**).
- *Zeugarhabdotus* cf. *diplogrammus* (Deflandre in Deflandre & Fert 1954) Burnett in Gale et al. 1996 (**Fig. C6h**).
- *Watznaueria* cf. *britannica* (Stradner 1963) Reinhardt 1964 (**Fig. C6b**).
- *Watznaueria* cf. *ovata* Bukry 1969 (**Fig. C6f**).
- *Watznaueria fossacincta* (Black 1971) Bown in Bown & Cooper 1989 (**Fig. C6**).
- *Watznaueria* cf. *manivitae* Bukry 1973.

3.3. Images of Carqueijo Fm and Coruja Fm rocks

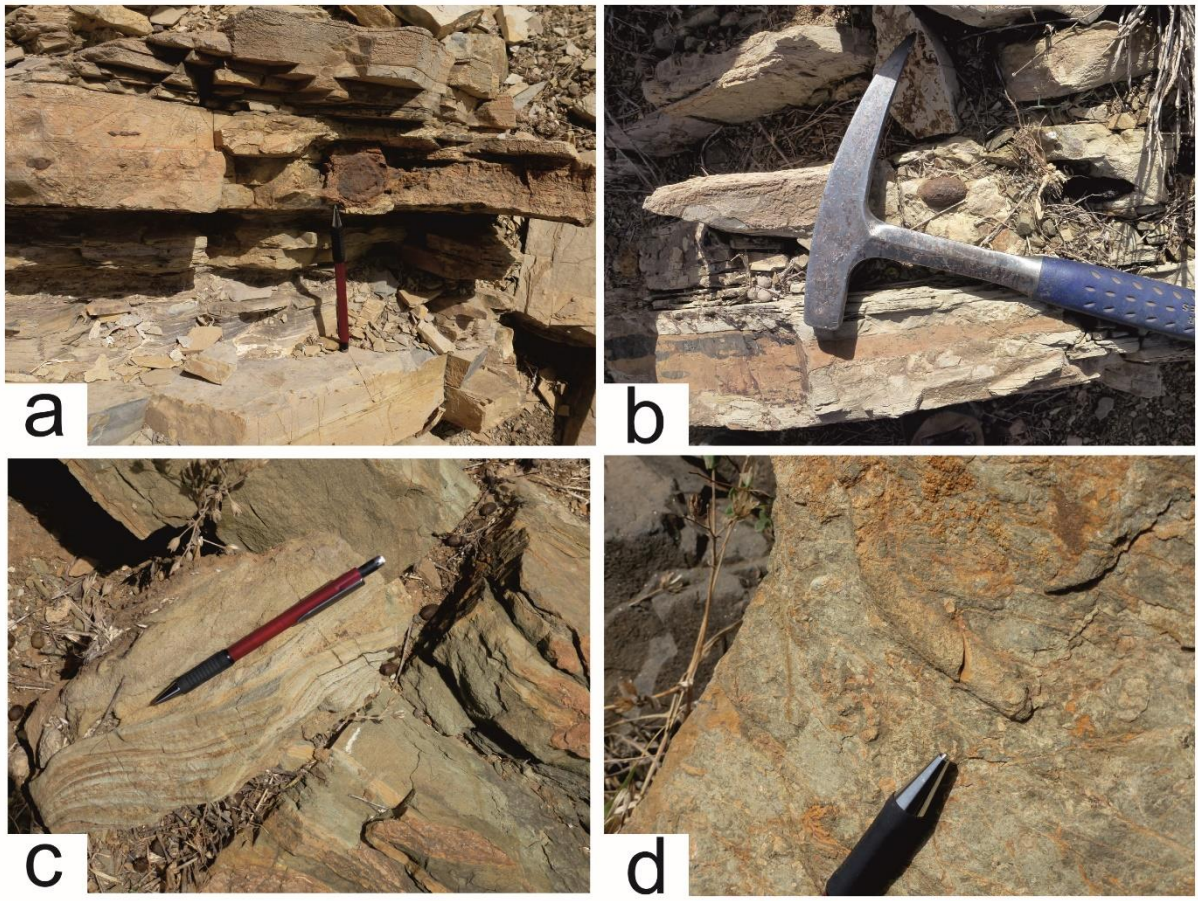


Figure C5: Marls and lime-mudstones of the Carqueijo Fm, including iron-sulfide concretions (**a, b**); and images of Coruja Fm sandstones, including burrows (**c, d**). Pens (a**, c** and d**)** and a hammer (**b**) are shown for scale.

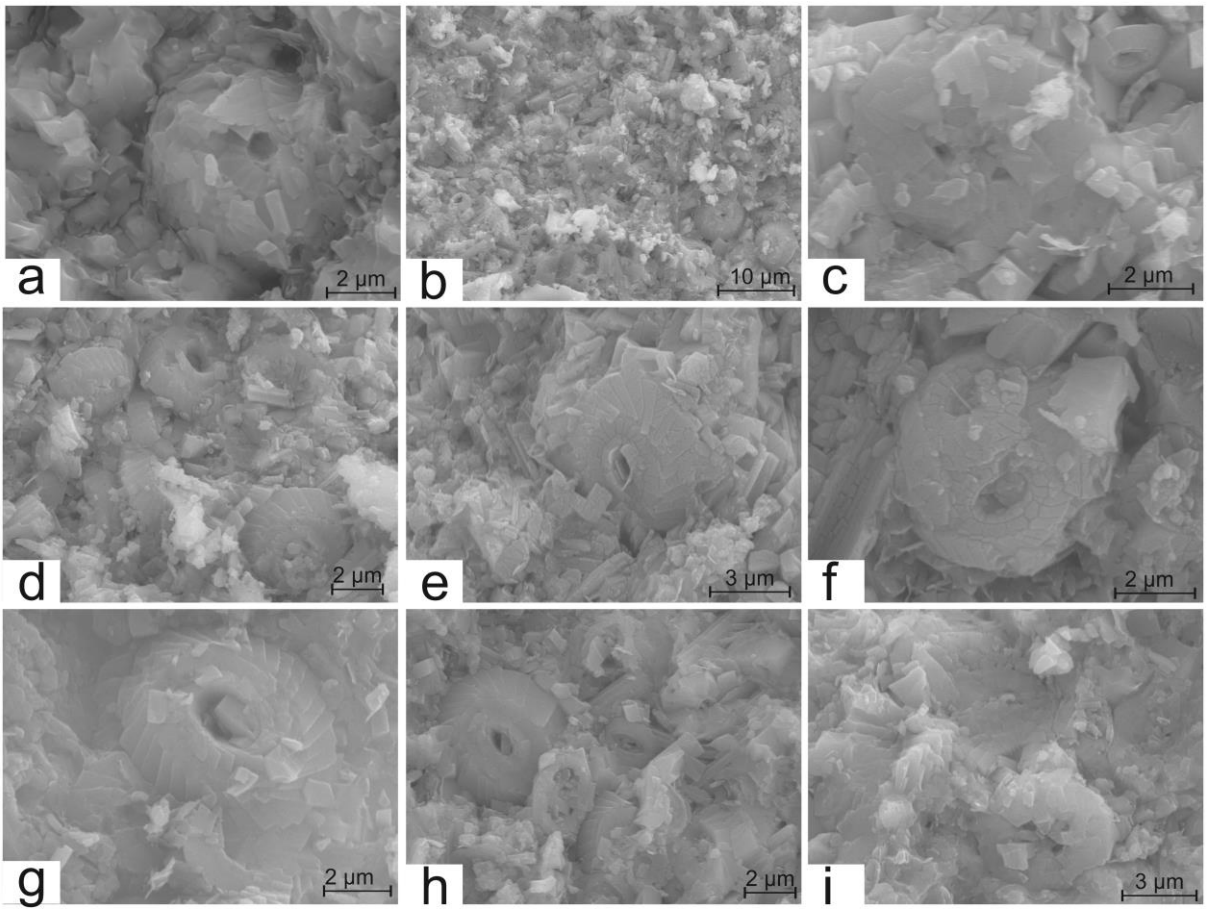


Figure C6: SEM-SE images of microfossils from the Carqueijo Fm. **a**: *Cyclagelosphaera* cf. *argoensis* Bown 1992 (Lomba da Vigia); **b**: *Watznaueria britannica* (Stradner 1963) Reinhardt 1964 (enlarged in **c**); **d**: *Watznaueria* cf. *britannica* (Stradner 1963) Reinhardt 1964 and *Watznaueria fossacincta* (Black 1971) Bown in Bown & Cooper 1989; **f**: *Watznaueria* cf. *ovata* Bukry 1969; **e, g**: *Watznaueria fossacincta* (Black 1971) Bown in Bown & Cooper 1989, **h**: *Watznaueria fossacincta* (Black 1971) Bown in Bown & Cooper, 1989 and *Zeugrhabdotus* cf. *diplogrammus* (Deflandre in Deflandre & Fert 1954) Burnett in Gale et al. 1996; **i**: *Prediscosphaera* cf. *cretacea* (Arkhangelsky 1912) Gartner 1968.

4. References

Fossilworks.org Paleobiology Database Fossilworks. http://fossilworks.org/bridge.pl?a=home. Accessed 25 March 2019.

GBIF Secretariat (2017) GBIF Backbone Taxnomy. https://doi.org/10.15468/39omei. Accessed via gbif.org on 17 July 2021.

Grün B, Blau J (1997) New aspects of calpionellid biochronology: proposal for a revised calpionellid zonal and subzonal division. Revue Paléobiol (Revue de Paléobiologie) 16(1):197–214.

Young JR, Bown PR, Lees JA (2017) Nannotax3 website. http://www.mikrotax.org/Nannotax3/. Accessed 01 April 2019.