

## Supporting Information Notes S1 & S2 and Figs S1–S4

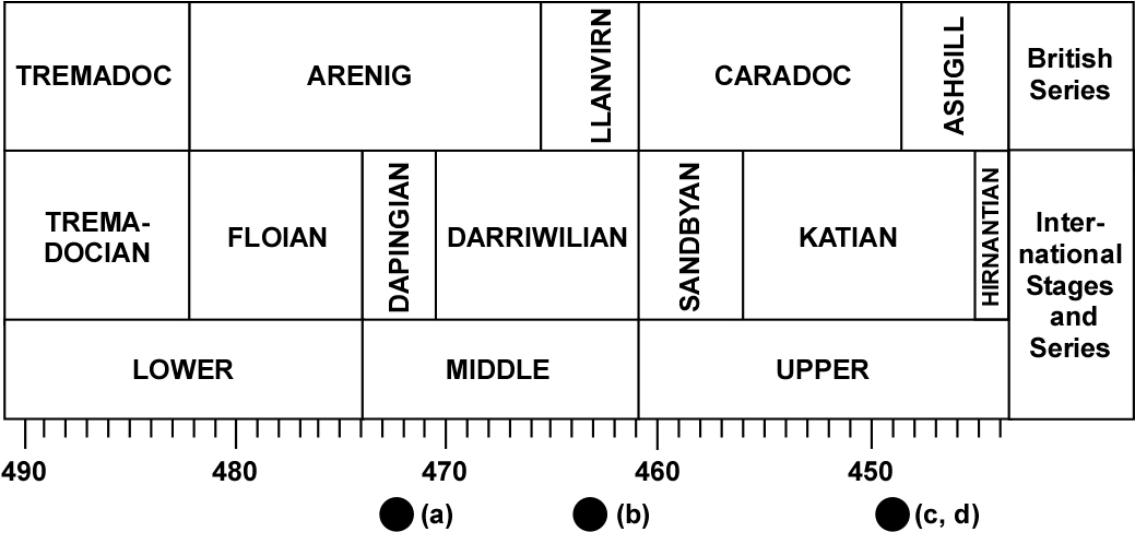
**Note S1** The sequence from the Zanjón Formation up to the Capillas Formation is almost devoid of macrofossils, but it could be biostratigraphically constrained by palynomorphs. Ten samples were collected from the section. All of them yielded phytoplankton (acritarchs, prasinophytes), chitinozoans, scolecodonts, and cryptospores in variable abundance, diversity and preservation state. One of those samples is located at the transition with the Laja Morada Member. This part of the section, previously supposed to be older (Floian in age), is now attributed a middle Dapingian age (early Middle Ordovician), on the basis of the presence of the chitinozoan biostratigraphic marker *Lagenochitina combazi* Finger, 1982.

**Note S2** The biological affinities of *Chomotriletes* are unclear. The genus has been considered by some authors as an alete spore and by others as an algae. The genus is most probably polyphyletic. The well preserved specimens attributed to *Chomotriletes?* from an Early Silurian locality from Brazil are considered as *Incertae sedis*. They are ornamented by irregular circular ribs, which may be interrupted, resembling fingerprints. Most of the specimens have a proximal laevigate hilum which may be folded. It is bordered by a slightly thicker crassitude (clearly visible on the Argentinean material). Rare specimens are associated in dyads. In such case, the ribs of the two cells, seen by transparency, seem to intersect. One folded specimen from Brazil is clearly composed of two loosely adpressed cells. Considering the shape of the ribs, these palynomorphs may be assigned to *Chomotriletes*. However this taxonomic attribution is based only on the morphological similarities, which justifies the question mark (*Chomotriletes?*). In addition, no “true” *Chomotriletes* have been found before Middle Devonian times. According to our

observations, the Brazilian specimens are very similar to loosely attached cryptospore dyads which can frequently dissociate into monads. Without the ornamentation, the specimens from Brazil as well as those from Argentina would have been considered as *Gneudnaspora*.

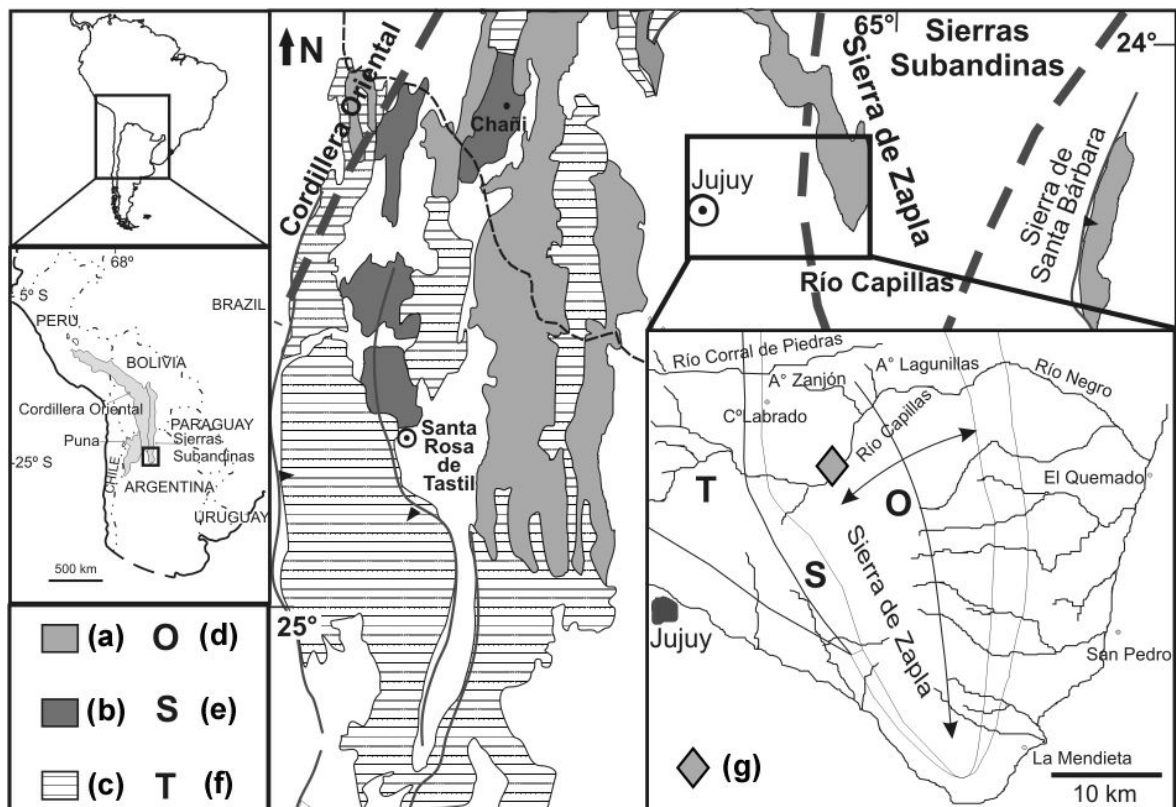
**Figs S1–S4**

**Fig. S1** Ordovician chronostratigraphic scale. Correlation between the former British Series nomenclature and the new international Stages and Series. (a) Stratigraphic position of the Argentinean palynological samples studied here. (b) Stratigraphic position of previous earliest cryptospore occurrences (Saudi Arabia and the Czech Republic). (c) Earliest trilete spores (Saudi Arabia). (d) Earliest mesofossils of plant sporangia containing cryptospores (Oman).

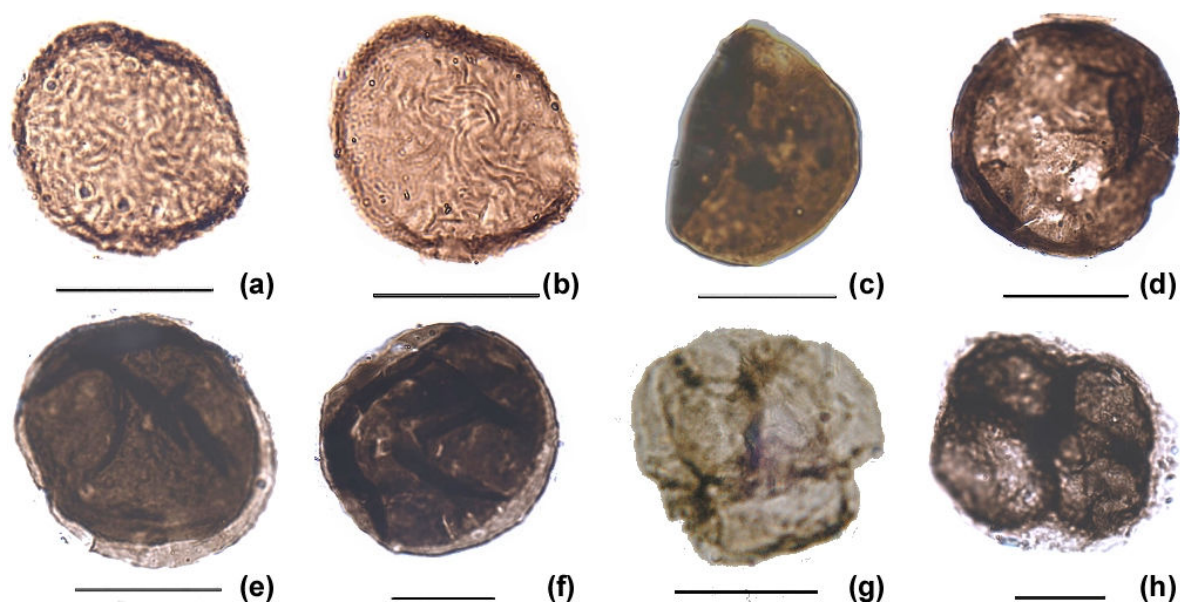


**Fig.**

**Fig. S2** Location map and regional geological map of the studied area along the Rio Capillas. Stratigraphy: (a) Cambro-Ordovician. (b) Cambro-Ordovician igneous rocks. (c) Neoproterozoic-Eopaleozoic. (d) Ordovician. (e) Silurian. (f) Tertiary. (G) Position of the sampled section.



**Fig. S3** Color plate of cryptospores from the upper part of the Zanjón Formation. (a) Distal face of *Chomotriletes?* sp. (b) Proximal face of *Chomotriletes?* sp. (c,d) *Gneudnaspora* (*Laevolancis*) *divellomedia* or *Laevolancis* *chibrikova* . (e,f) *Sphaerasacus glabellus*. (g) *Tetrahedraletes* cf. *medinensis*. (h) New genus. Scale bars, 20  $\mu$ m. The palynological slides are housed in the paleopalynological slide collection of the Unit of Paleopalynology, IANIGLA, CCT- CONICET Mendoza.



**Fig. S4** Schematic Middle Ordovician paleogeographic map (modified from Scotese, <http://www.scotese.com/Default.htm>) showing the position of Saudi Arabia on the western margin and Argentina on the eastern margin of Gondwana.

