nature ecology & evolution

SUPPLEMENTARY INFORMATION

https://doi.org/10.1038/s41559-019-0820-7

In the format provided by the authors and unedited.

Simple sediment rheology explains the Ediacara biota preservation

Ilya Bobrovskiy[1]*, Anna Krasnova[2,3], Andrey Ivantsov[2], Ekaterina Luzhnaya (Serezhnikova)[2] and Jochen J. Brocks[1]*

[1]Research School of Earth Sciences, Australian National University, Canberra, Australian Capital Territory, Australia. [2]Borissiak Paleontological Institute, Russian Academy of Sciences, Moscow, Russia. [3]Faculty of Geology, Lomonosov Moscow State University, Moscow, Russia.
*e-mail: ilya.bobrovskiy@anu.edu.au; jochen.brocks@anu.edu.au

Simple sediment rheology explains the Ediacara biota preservation

Supplementary Figures

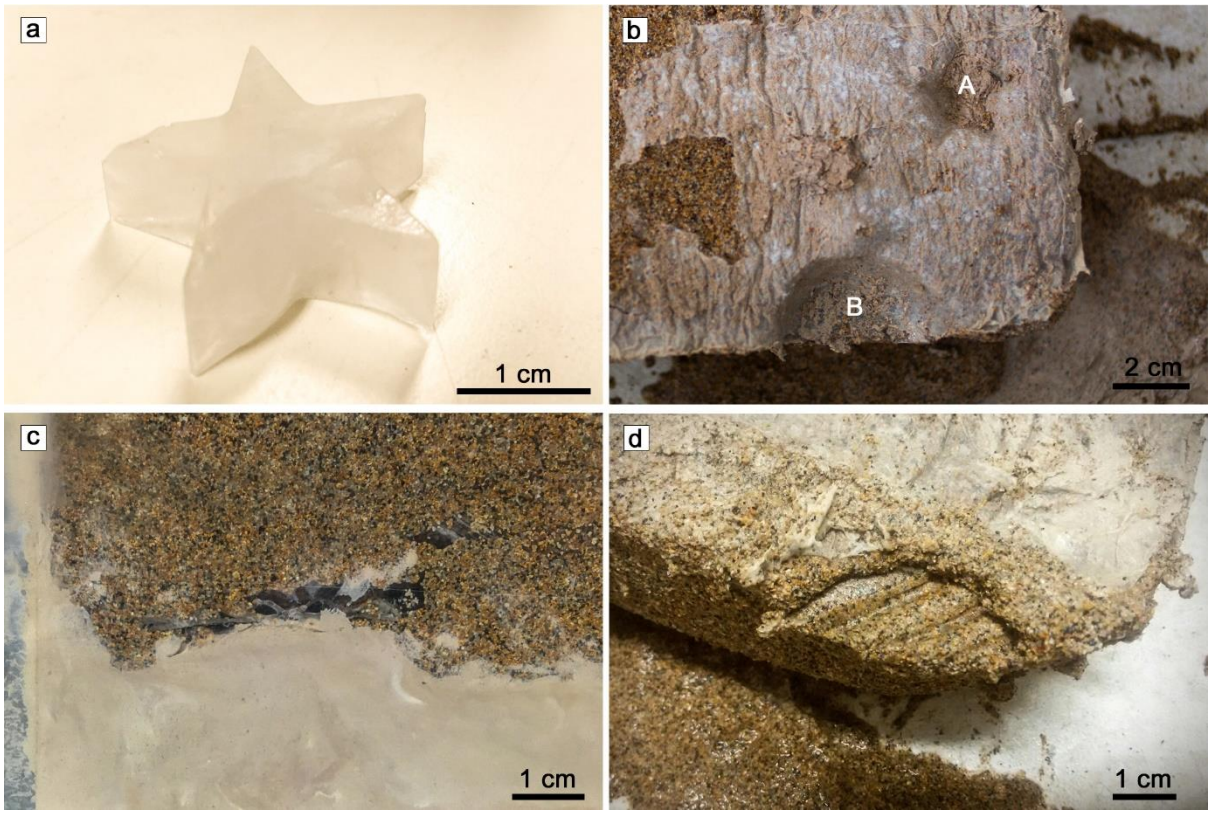
Ilya Bobrovskiy[1]*, Anna Krasnova[2,3], Andrey Ivantsov[2], Ekaterina Luzhnaya (Serezhnikova)[2], Jochen J. Brocks[1]*

[1]Research School of Earth Sciences, Australian National University, Canberra, ACT 2601, Australia

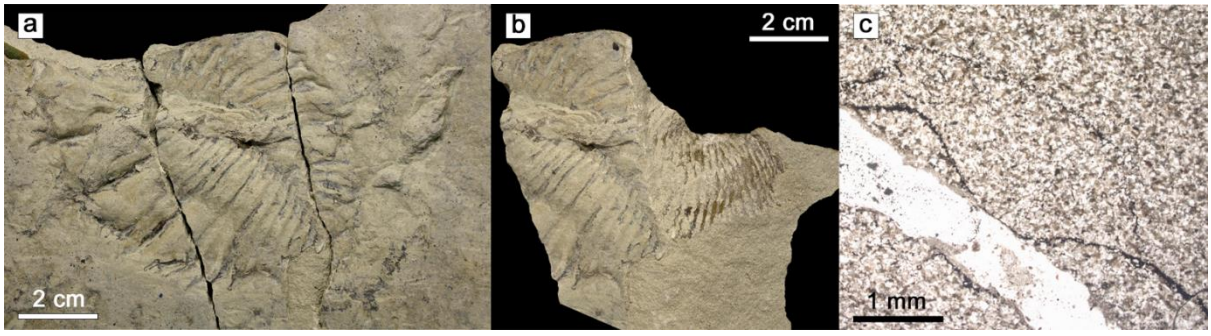
[2]Borissiak Paleontological Institute, Russian Academy of Sciences, Moscow 117997, Russia

[3]Faculty of Geology, Lomonosov Moscow State University, Moscow 119991, Russia

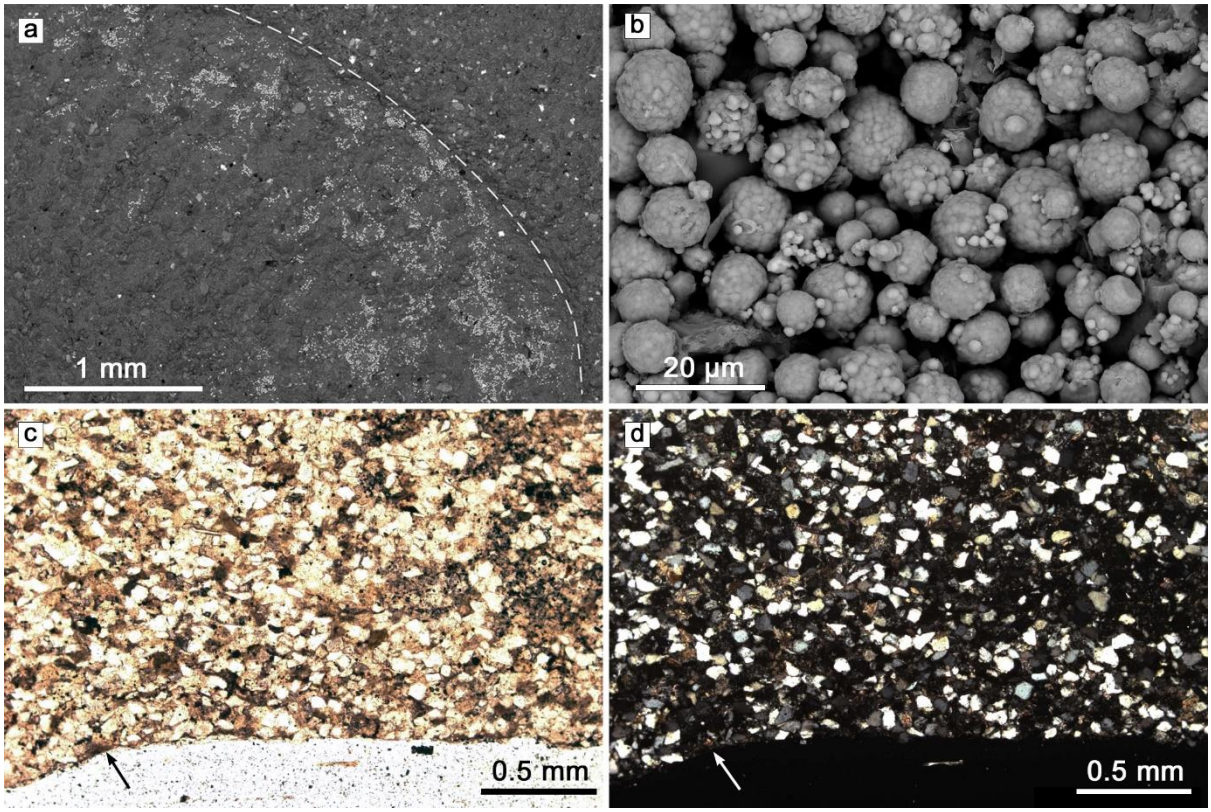
*Correspondence to: ilya.bobrovskiy@anu.edu.au, jochen.brocks@anu.edu.au



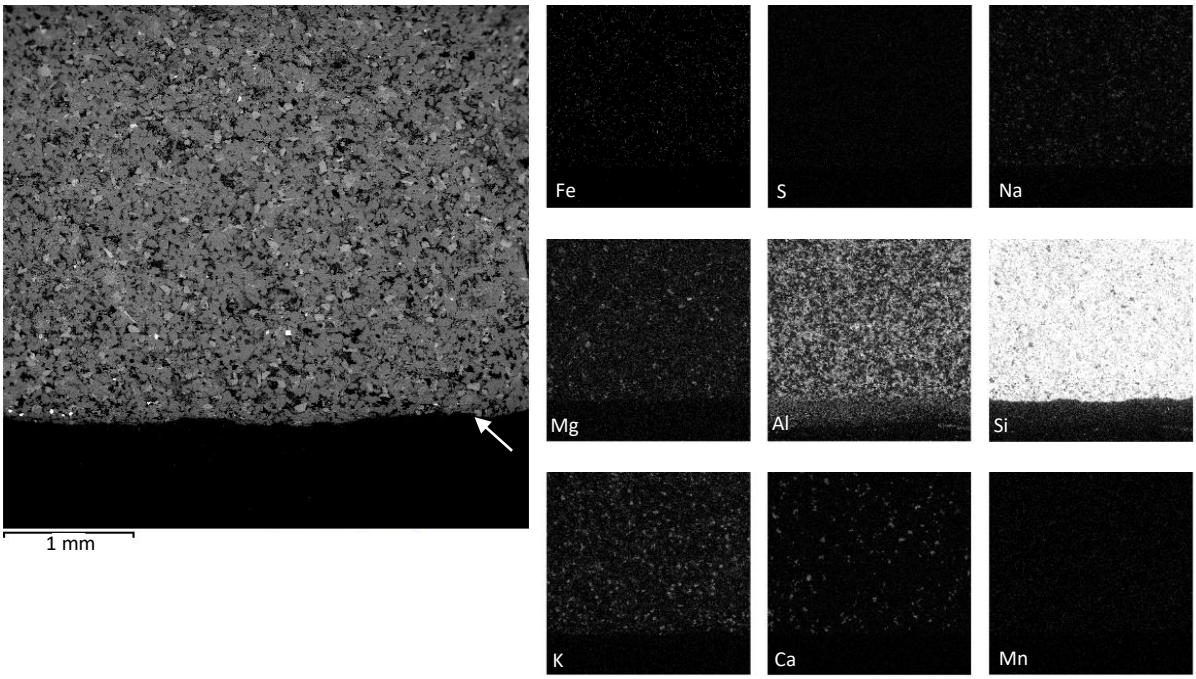
Supplementary Fig. 1. Taphonomic laboratory simulations, a, star-shaped ice mould used in experiment 3; **b,** experiment 3, negative hyporelief impression on sand base; A – impression of the star-shaped ice mould; B – impression of the Death Star ice mould; **c, d** – experiment 1, negative hyporelief impression on sand base. The diameter of the impressions is 5 cm in all experiments.



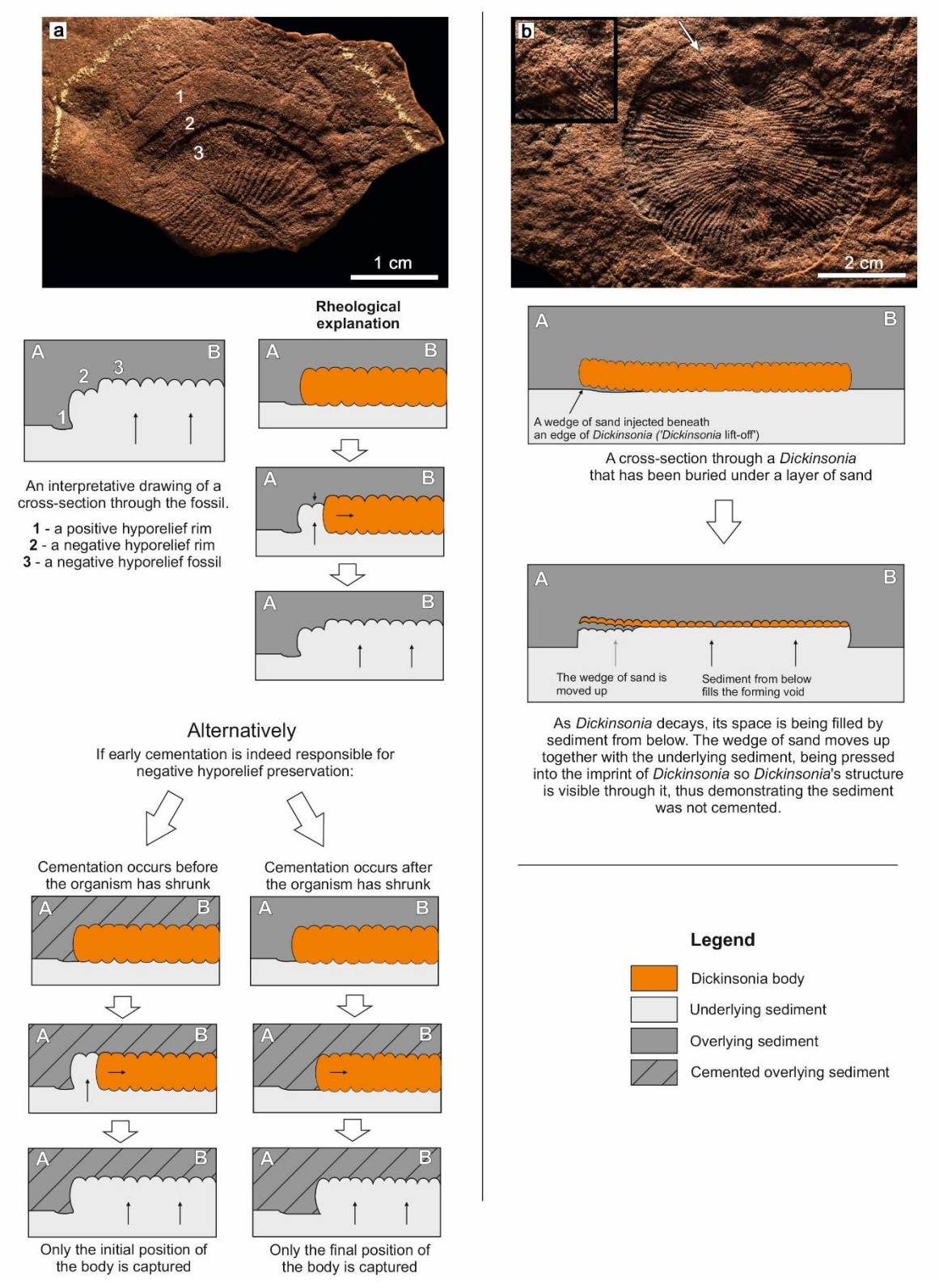
Supplementary Fig. 2. *Dickinsonia* with its middle part dragged into overlying sandstone, **a**, impression at the base of sandstone; **b,** part of impression at the base of sandstone and the part of *Dickinsonia* dragged into sandstone (Nama-style preservation); **c,** thin section through this *Dickinsonia*; note how pyrite (black) forms a thin line, replacing residual organic matter of *Dickinsonia.*



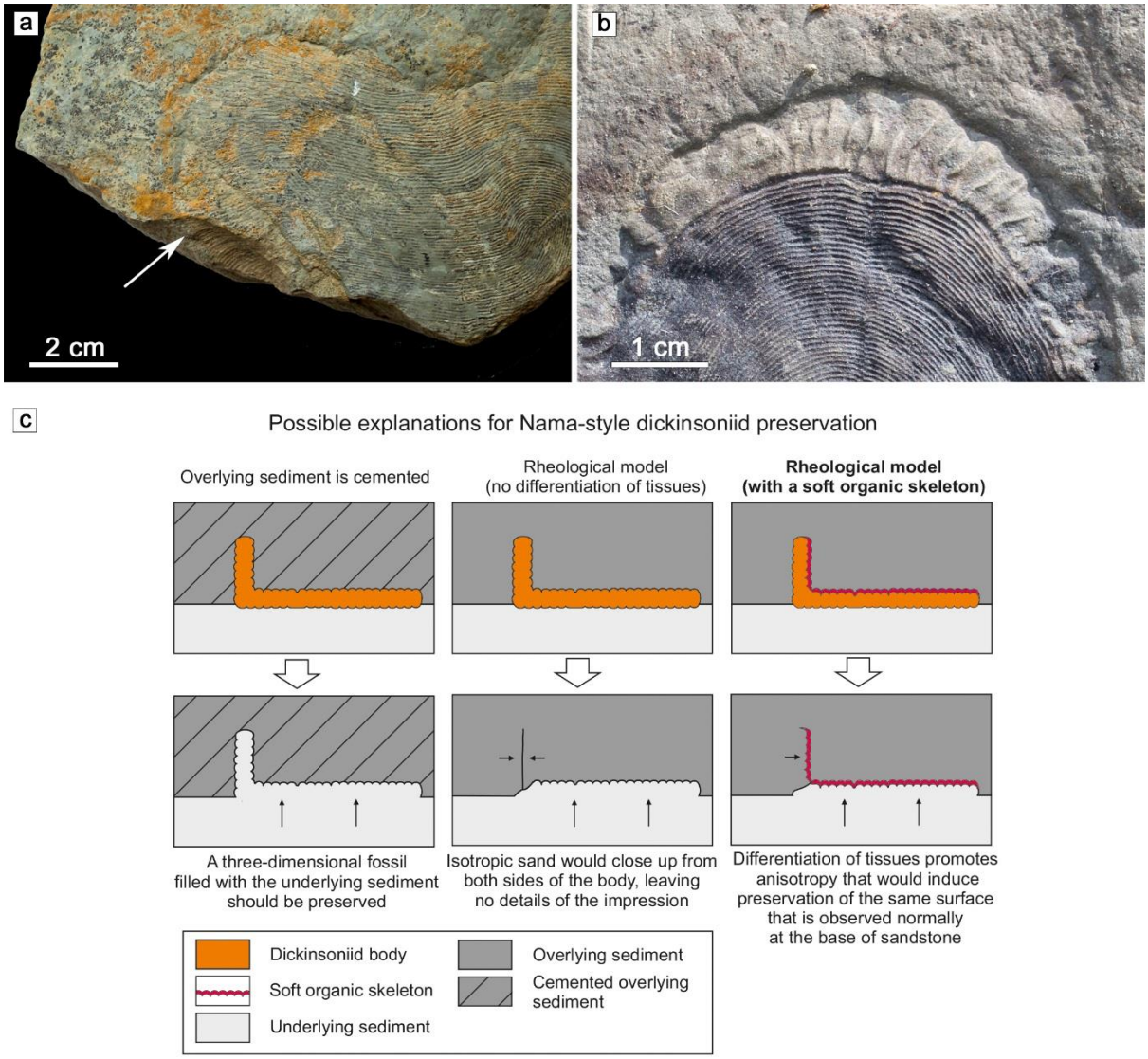
Supplementary Fig. 3. Tracking early diagenetic mineralization. a, SEM image of *Dickinsonia;* dashed line outlines the fossil, light-grey tone represents pyrite; note that large areas of the fossil lack pyrite, but *Dickinsonia*'s preservation is not affected by this; **b,** – magnified SEM image of the same surface on the area where pyrite is concentrated, demonstrating perfect preservation of pyrite framboids; **c,** photomicrograph of a thin section through *Dickinsonia*, Nichols parallel and **d,** Nichols crossed. In **c** and **d**, arrows point at the surface of the fossil; note that the pore space is filled with clay, not pyrite, silica or carbonate material.



Supplementary Fig. 4. SEM elemental mapping of a cross section through a *Dickinsonia*. Note the distribution of Fe and S, reflecting virtual absence of pyrite and the distribution of Ca and Mg, reflecting low abundance of dolomite. Arrow points at the surface of the fossil.



Supplementary Fig. 5. Schematic explanation for contraction rims around *Dickinsonia* and sand wedges taphonomy (compare Fig. 2). a, Contraction rims around *Dickinsonia* from South Australia (South Australian Museum, sample P40944) and their formation mechanism; **b,** *Dickinsonia* from South Australia with a thin wedge of sand material intruded beneath its edge (South Australian Museum, sample P12557), arrow points at *Dickinsonia*'s isomers visible through the wedge (also shown in magnification in the insert).



Supplementary Fig. 6. Evidence for differentiation of tissues in dickinsoniids. a, *Andiva* from the White Sea Area, partially preserved in both Flinders and Nama-style preservation (the arrow points at the area preserved in Nama-style); **b**, *Andiva* from the White Sea Area that demonstrates differential preservation of tissues: the metameric central part of the fossil is preserved organically, while the surrounding smoother area is not; **c**, a scheme that illustrates three alternative scenarios of Nama-style preservation of dickinsoniids, showing they must have relatively more and less resistant tissues to form the fossils that we observe.