

A GENTLER APPROACH?

TESTING REWOQUAT AS AN ALTERNATIVE TO AIR ABRASION ON EXCEPTIONALLY PRESERVED ECHINODERMS FROM THE FOREST MARBLE FORMATION

Kieran Miles and Dr Timothy A.M. Ewin

INTRODUCTION

In 2021, The Natural History Museum took part in fieldwork at a private quarry in Wiltshire, in collaboration with non-professional palaeontologists Sally and Neville Hollingworth, who made the initial discovery. The expedition yielded a substantial amount of exceptionally preserved echinoderms from the Middle Jurassic (Bathonian) Forest Marble Formation. Air abrasion with aluminium oxide powder has proven effective at preparing the material, but can result in partial or complete loss of fine surface detail under SEM (Graham and Allington-Jones, 2018).

Chemical preparation using Rewoquat® W3690 PG was trialled as an alternative, with several methods being tested. Specimens were either fully immersed, partially immersed or had Rewoquat® applied to the surface by brushing, and results compared with air abrasion at both a macro level and under SEM.

REWOQUAT® (Fig 1.) is an organic surfactant. It disaggregates clays and marls but does not affect calcite fossils, although disarticulation may occur in matrix-supported fossils (Jarochowska, 2013).

Health and safety: use PPE and only carry out work under extraction. It is hazardous to the environment - do not pour it down the sink.



Fig 1. Rewoquat® (supplied by ZOIC PalaeoTech).

METHOD

Three methods of Rewoquat® preparation were trialled (inspired by Hellemond et al, 2021) – one sample was fully immersed (Fig 5.), one semi-immersed upside down (Fig 4.), and one had Rewoquat® applied directly to the surface by paintbrush (Fig 3.). In all cases the method was similar:

1. Dilute Rewoquat® with isopropanol at 4:1 ratio.
2. Immersion or application of Rewoquat®, within sealed container in fume hood.
3. Leave for 2 days. Specimens were monitored occasionally, and surfaces gently brushed with a stiff bristle brush and isopropanol.
4. Rewoquat® carefully decanted and saved for reuse. Specimens rinsed or bathed in lukewarm water.
5. Water was changed over the next several days until no bubbles formed (Fig 2.).
6. Specimens left to dry.



Fig 2. After treatment, the specimen was bathed in lukewarm water.

RESULTS

All the methods were effective to some degree. The process greatly increased the contrast between specimen and matrix (but left them with a permanent 'damp look'). It can be hard to control the process – disaggregation of the matrix caused many surface specimens to drop off (though unlike air abrasion, these were relatively easy to recover by sieving and drying the residue). A particularly good result was achieved by the paint-on method (Fig 6.), which also has the advantage of being easy to apply directly to specific areas; however, unlike the other two methods, the Rewoquat cannot be saved for re-use.

Under SEM, a specimen prepared with Rewoquat (Fig 8.) retained much more surface detail in comparison with preparation by air abrasion (Fig 7.).



Fig 6. Detail of specimen treated by brushing with Rewoquat®.

BEFORE

TREATMENT

AFTER



Fig 3. Rewoquat® applied directly to specimen surface by brush.



Fig 4. Specimen semi-immersed upside down in Rewoquat®.



Fig 5. Specimen fully immersed in Rewoquat®.

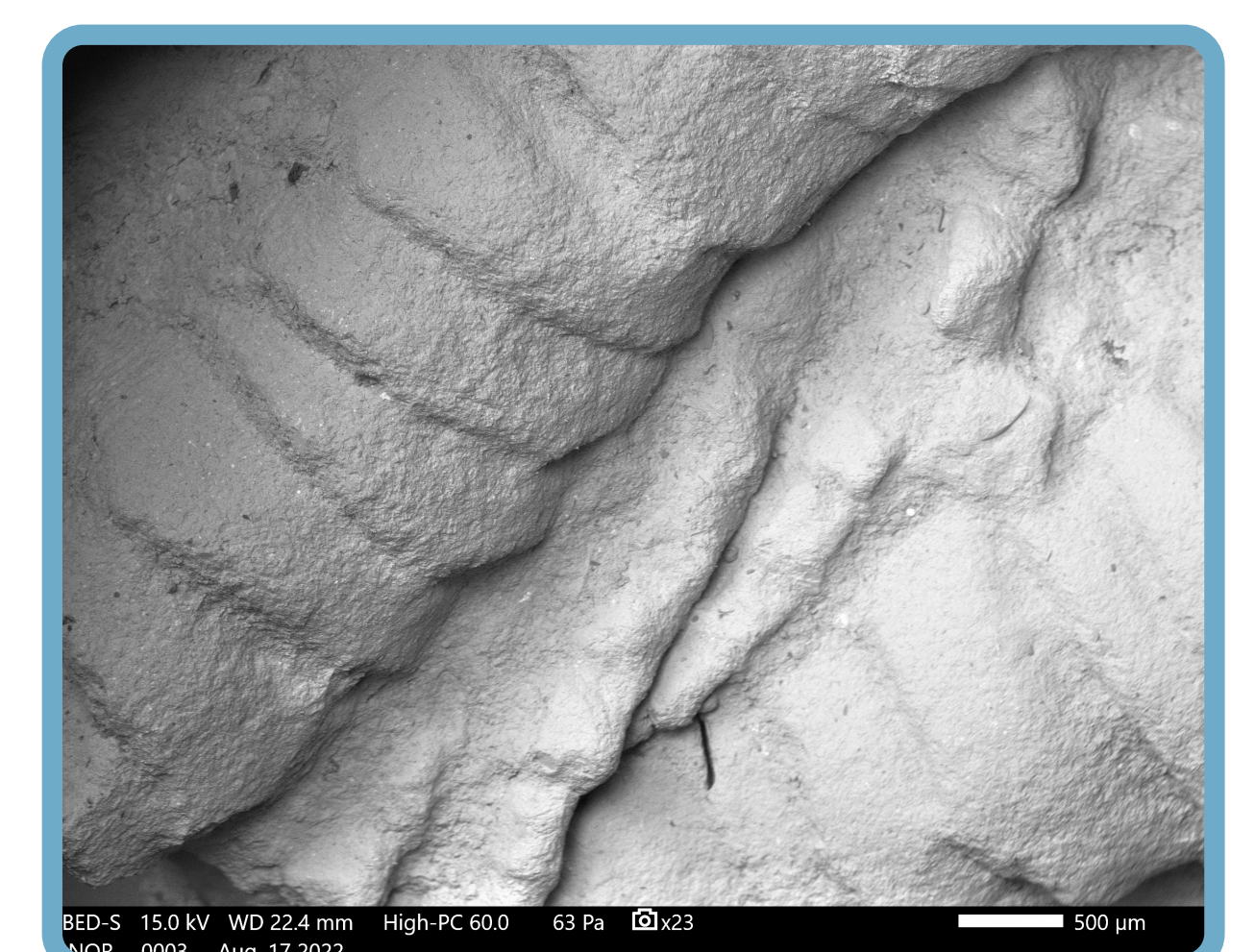


Fig 7. SEM image of specimen prepared by air abrasion with aluminium oxide; much of the surface detail has been lost and the plate boundaries have become obscured.

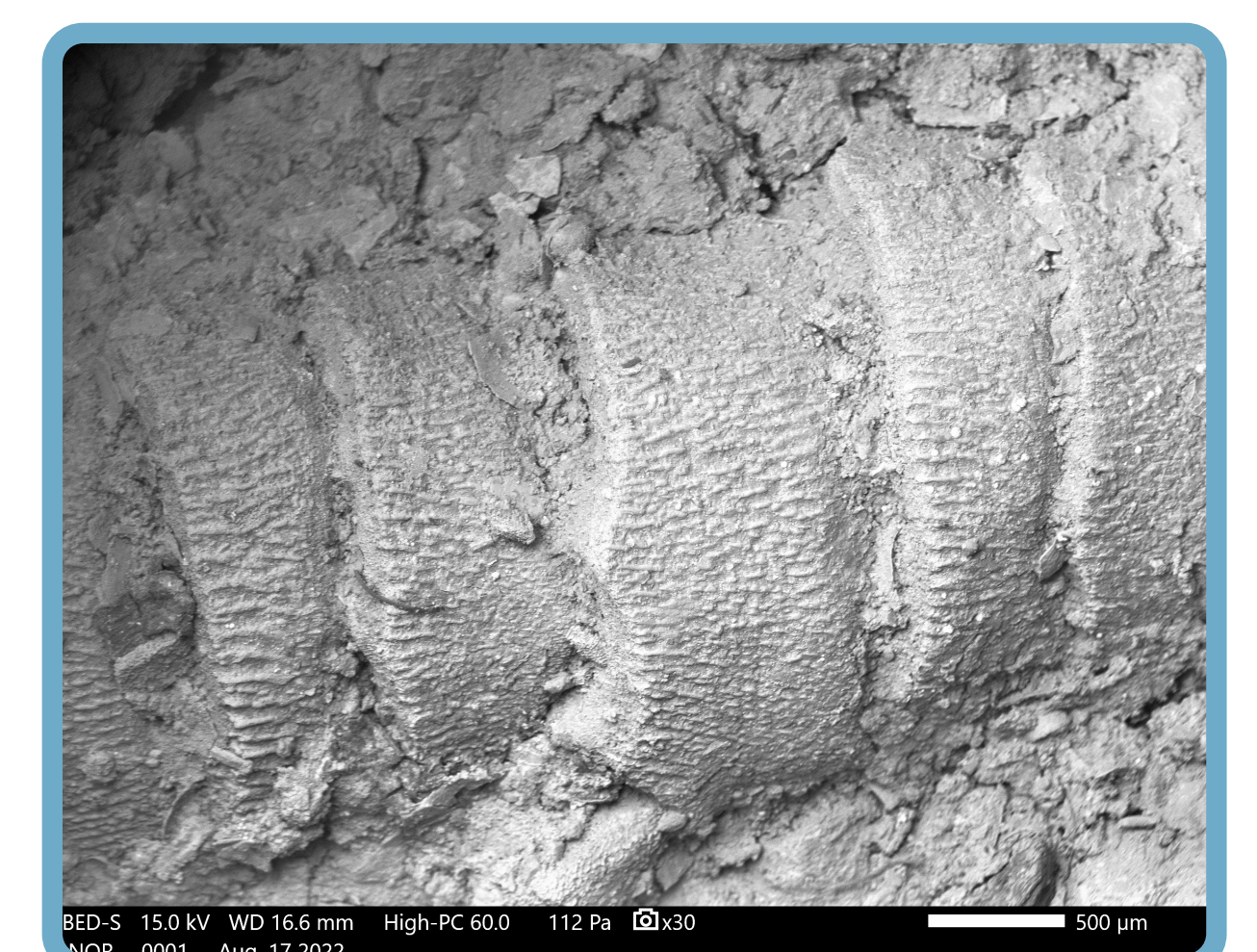


Fig 8. SEM image of part of same specimen as above, treated with Rewoquat®. The surface is much more intact, retaining potentially significant taxonomic details.

REFERENCES:

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