

and Lund 2002). The monsoonal climate, the productivity of the water column, and the physical oceanography of the embayment combined to produce periodic stratification in the bay, resulting in hypoxic and anoxic conditions.

The high water column productivity and the rapid deposition of sediments during the

photo is taken at a different elevation with the fossil in focus. For this study, each photo was

The number of photos taken depended on the height of the fossil (difference between the highest and lowest point on the fossil). Those with a larger difference required more photographs. All photos taken for one fossil were then combined into a single image using the Horizon™ program. The resulting combined image displays every part of the fossil in focus and allows for morphological structures to be clearly seen.

Alcohol and Polarized Light Photography:

Another series of stacked photos were taken using a polarized lens and a thin layer of ethyl alcohol over the fossil, which brings out any chitin that may be in the fossils. Photos were prevent the alcohol from evaporating before the photos were complete. The stacks were then combined using the same Horizon™ program..



Figure 2: RTI in Digital Lab at Yale University West Campus

Reflectance Transformation Imaging (RTI)

RTI is a photographic technique that dome fitted with 45 halogen lights distributed on 4 levels and fixed at specific angles (Figure 2). Images produced using RTI can be manipulated and viewed under the direction of light at different angles, which allows for different features to be seen. Photos are viewed using the program or as nearly 3D images in the program (shown in Figure 3). A total of 6 specimens were photographed with RTI. Manipulation of these images in RTI Viewer™ and MeshLab™ revealed structural details that were otherwise invisible to the eye.

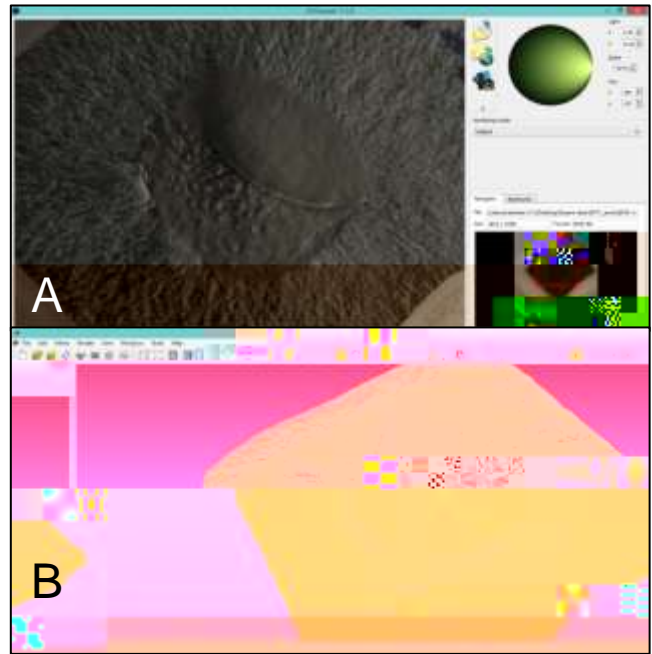


Figure 3 programs RTIviewer™ (A) and MeshLab™ (B).

Results:

Shape and Size:

A total of 158 i were assigned to 6 different shape categories (gumdrop, circle, rectangle, oval, triangle and other). Fossils assigned to th were missing too much of the original fossil to determine the shape. The largest groups were gumdrops (82 individuals) and circles (16 individuals); all other groups had ≤ 5 specimens. A total of 10 specimens were assigned to the category but the unique shape of each specimen in this group prevented comparisons from being made . The distribution of sizes for gumdrops and circles are shown in Figure 4.

Photography:

The stacked photographs of the specimens provided a clear, focused image of each fossil that was used to look for more details. The polarized photographs showed no evidence of chitin in the fossils, but did emphasize other features within some specimens. Examples of each are shown in Figure 5.

The various renderings and lighting angles from RTIviewer and MeshLab files provided vital morphological information about very small details in the fossils that would not have been visible otherwise.

fossil. Thus, the fossils that have all been called
are actually a mixed grouping of
several different fossil organisms that are difficult

Discussion:

The data collected in this study has brought to light two very important facts about the
ll of the
in fact, very few of
them are actually square in shape. The majority of
them possess a gumdrop shape, which is slightly
flatter on the bottom with an arch shape on top
(see Figure 1). The rest are a variety of shapes,
none of which are actually a true square. The
second fact is that
fossilized remains of animals belonging to more
displayed unique characteristics (e.g. spicules,
bumps, textures) that were not found in any other

being employed to further elucidate the chemical composition of each fossil relative to modern analogues. Experimental taphonomic studies are also being carried out to better understand the preservation potential of tunicates, ctenophores, and cnidarians. It is anticipated that such studies will shed light on these and other exceptionally-preserved soft-bodied fauna.

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