



Sam Noble Museum

2D Imaging for Paleontology  
Collection Objects

**Roger J. Burkhalter**

**Sam Noble Oklahoma Museum of Natural History  
University of Oklahoma**

# **Why Continue 2D Imaging?**

**2D imaging is the traditional method of visually conveying information about an object.**

**Legacy Data...**

**Imaging 2D and 3D Specimens**

**Existing Infrastructure**

**Publications**

**Web**

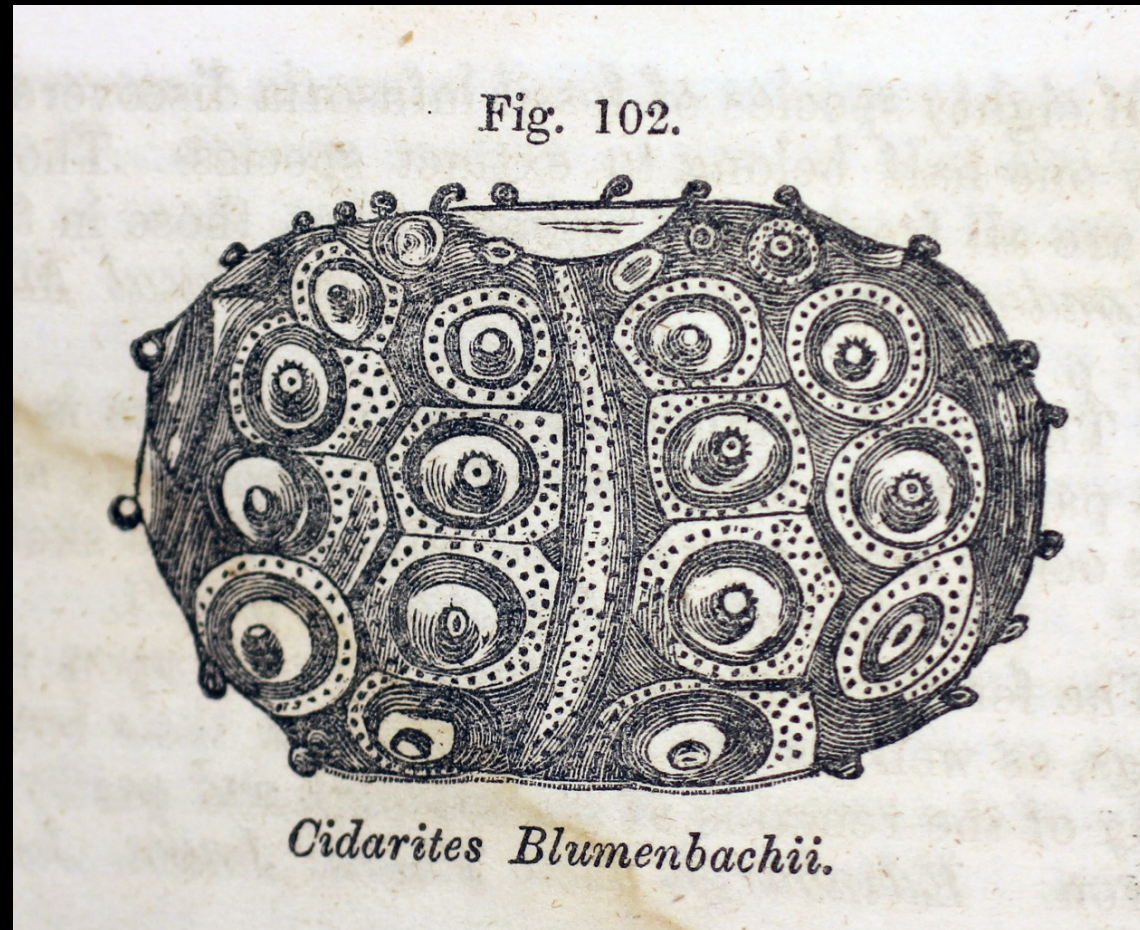
**No special software  
needed**

**Low Cost**

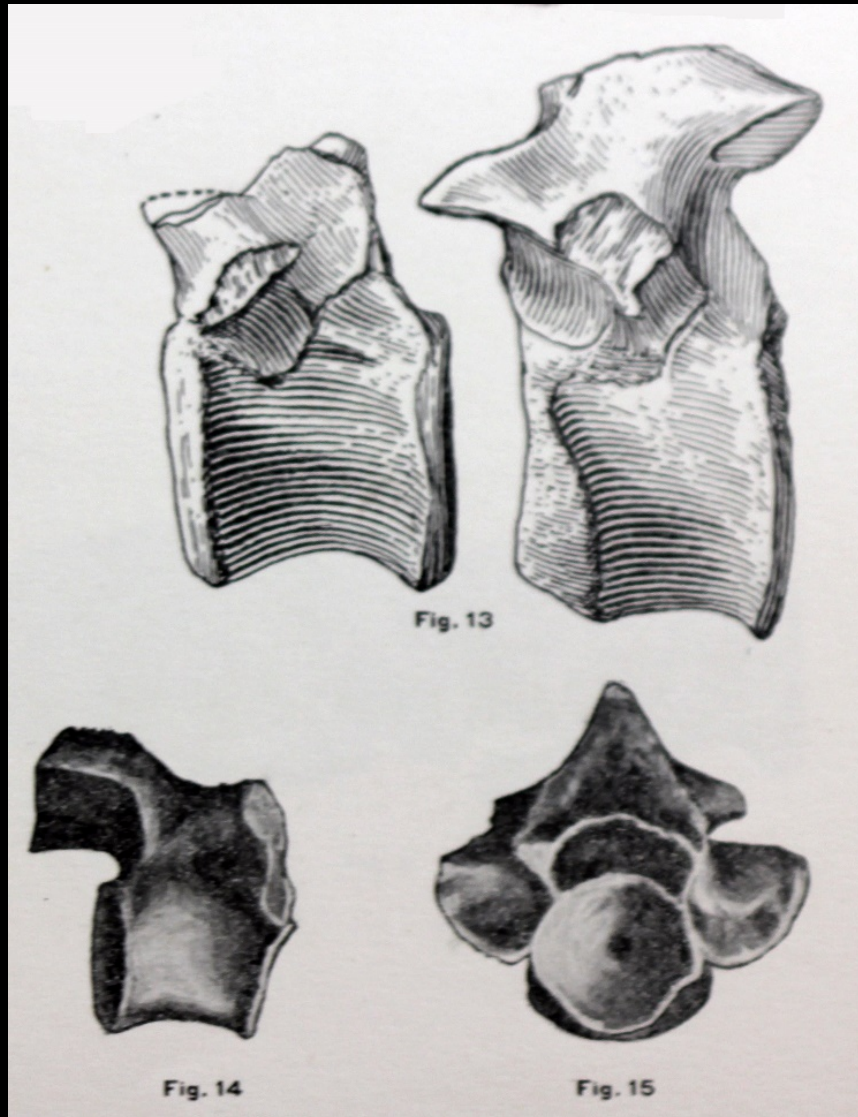
**Rapid Deployment**

# Evolution of 2D Images

From simple line drawings...



To more technical line drawings...



The **LUCID-ART** Camera Lucida

Buy Now

Makes anyone an artist and any artist a Master!™

The advertisement features a detailed illustration of the LUCID-ART Camera Lucida, a mechanical device used for projecting and tracing images. The device consists of a long, adjustable arm with a lens at one end and a drawing surface at the other. A small inset shows a close-up of the lens mechanism. The text is arranged around the illustration, with 'The LUCID-ART' in a large, blue, serif font, 'Camera Lucida' in a smaller, black, serif font, and 'Buy Now' in a red circle. The slogan 'Makes anyone an artist and any artist a Master!™' is at the bottom.



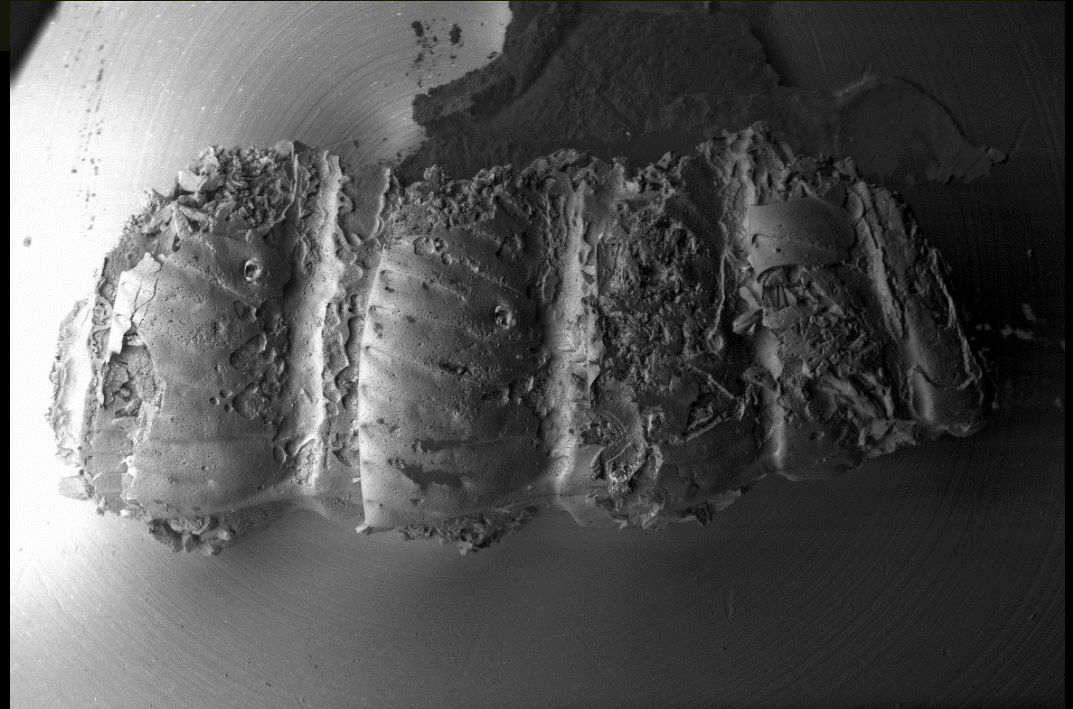
# To film photography...



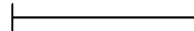
To digital and...



SEM images...



1mm



Mag = 47 X

User Name = ROGER

Cycle Time = 4.5 Mins

Brightness = 47.6 %

Contrast = 52.4 %

Signal A = QBSD

EHT = 14.00 kV

WD = 11 mm

Date : 18 Dec 2006

Time : 9:05:54

Photo No. = 3053



# 2D Imaging has been the mainstay of Paleontology.

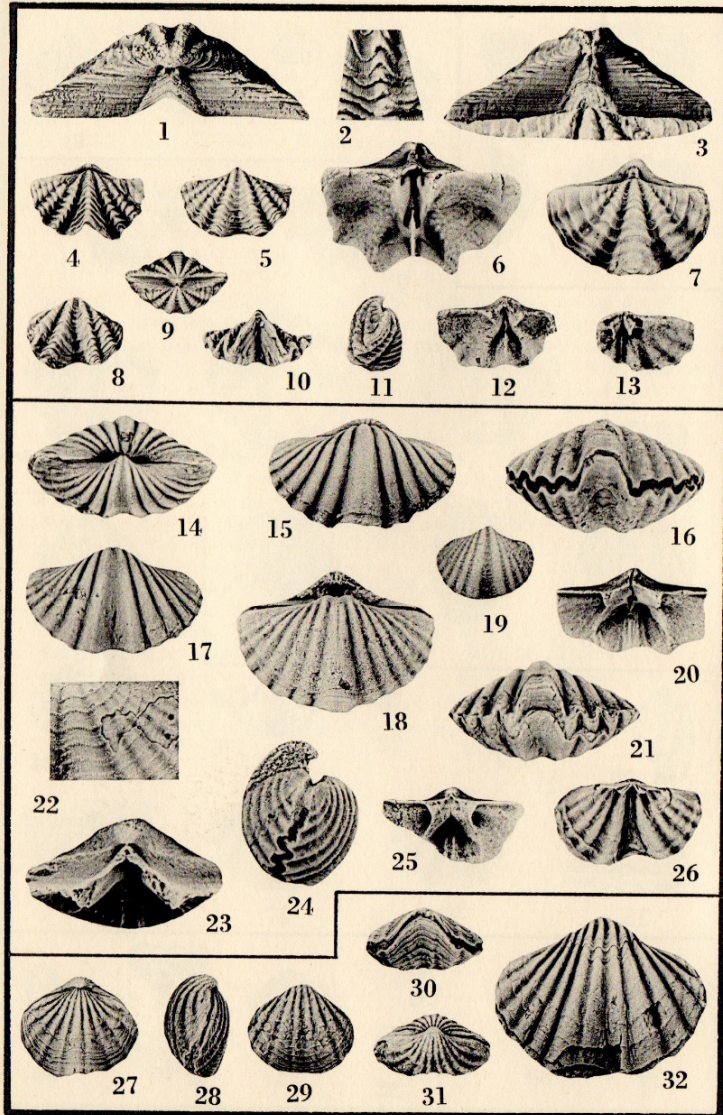


PLATE VIII

FIGURES 1-13. *Kozlowskiella* (*Megakozlowskiella*) *velata* Amsden, n. sp. 1. posterior view of a pedicle valve showing palintrope and "deltidium", x 3, [collected by R. D. Alexander, Haragan formation near old Hunton townsite; T. W. Amsden locality CL-H to O] (OU-1052); 2. enlarged surface view, x 3, Coll. M1-K (OU-1049); 3. posterior view of a pedicle valve showing palintrope and "deltidium", x 3, same collection as fig. 1 (OU-1053); 4, 10, 11. brachial, anterior and lateral views of the holotype, x 1, Coll. M2-M (OU-1045); 5. pedicle view, x 1, Coll. M2-M (OU-1046); 6. pedicle interior, x 2, Coll. M1-H (OU-1047); 7. brachial view, x 2, Coll. M1-J (OU-1048); 8. pedicle view, x 1, Coll. M2-M (OU-1050); 9. posterior view, x 1, M2-J (OU-1051); 12. pedicle interior, x 1, Coll. P9-K (OU-1054); 13. brachial interior, x 1, Coll. P9-K (OU-1054).

See Plate XII-F for a comparison with the Henryhouse species, *Delthyris kozlowski*.

FIGURES 14-26. *Howellella cycloptera* (Hall). 14, 15, 17, 21. posterior, brachial, pedicle, and anterior views, x 1, Coll. P2-A (OU-1094); 16, 18, 24. anterior, brachial and lateral views, x 1, Coll. C1-M (OU-1096); 19, 22. pedicle view (x 1) and enlarged surface view (x 3), Coll. P9-P [Bois d'Arc formation—Cravatt member?] (OU-1091); 20. pedicle interior, x 1, Coll. P11-A [Bois d'Arc formation—Fittstown member] (OU-1090); 23. pedicle delthyrium, x 3, P11-A [Bois d'Arc formation—Cravatt member] (OU-1093); 25. pedicle interior, x 2, Coll. P11-A [Bois d'Arc formation—Fittstown member] (OU-1092); 26. brachial interior, x 1, Coll. P2-A (OU-1095).

FIGURES 27-31. *Trematospira* cf. *T. hippolyte* (Billings). 27-31. brachial, lateral, pedicle, anterior and posterior views, x 1 [collected by R. D. Alexander, Haragan formation, near old Hunton townsite; T. W. Amsden locality C1-H to O] (OU-1065).

FIGURE 32. *Trematospira* sp. 32. pedicle view, x 2, same collection as figs. 27-31 (OU-1064).

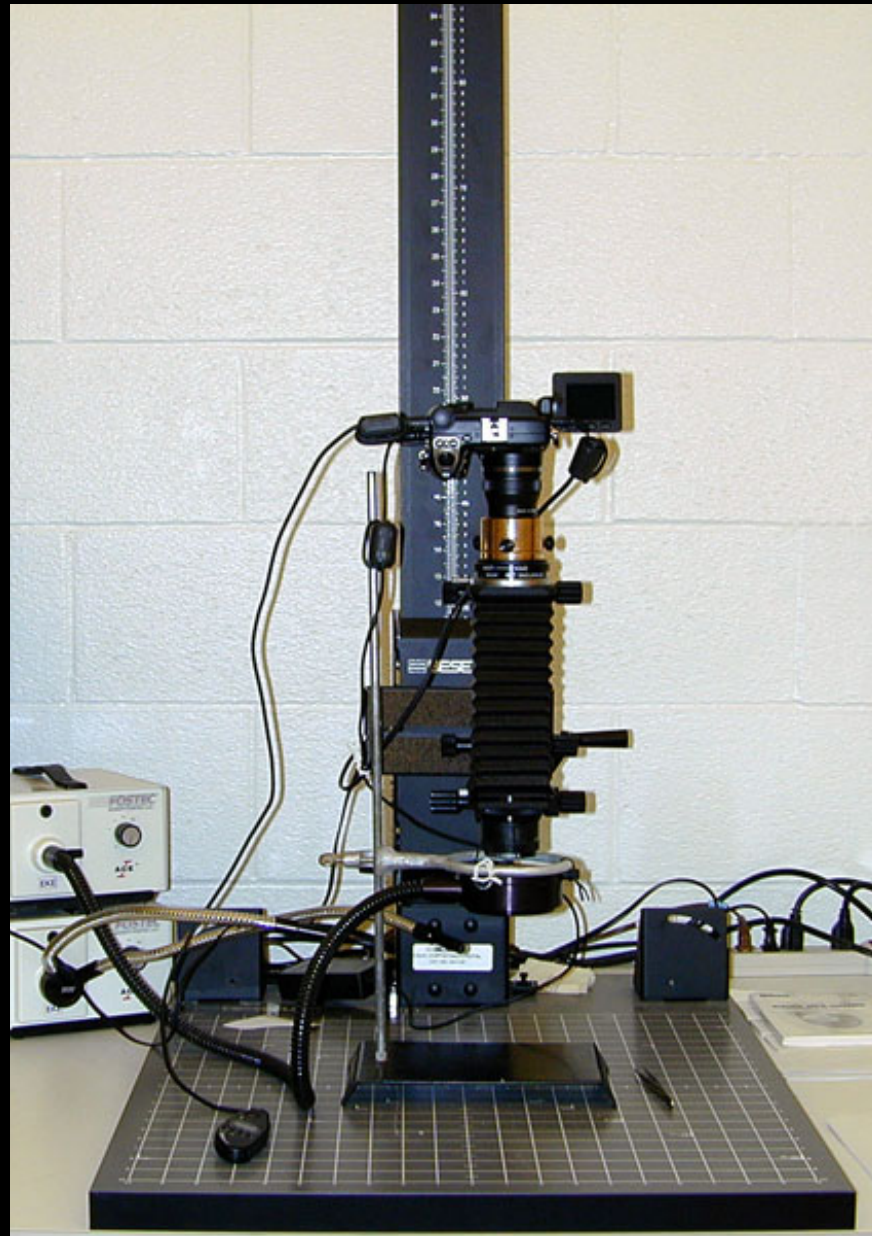


**Some objects are only suited for 2D imaging...**

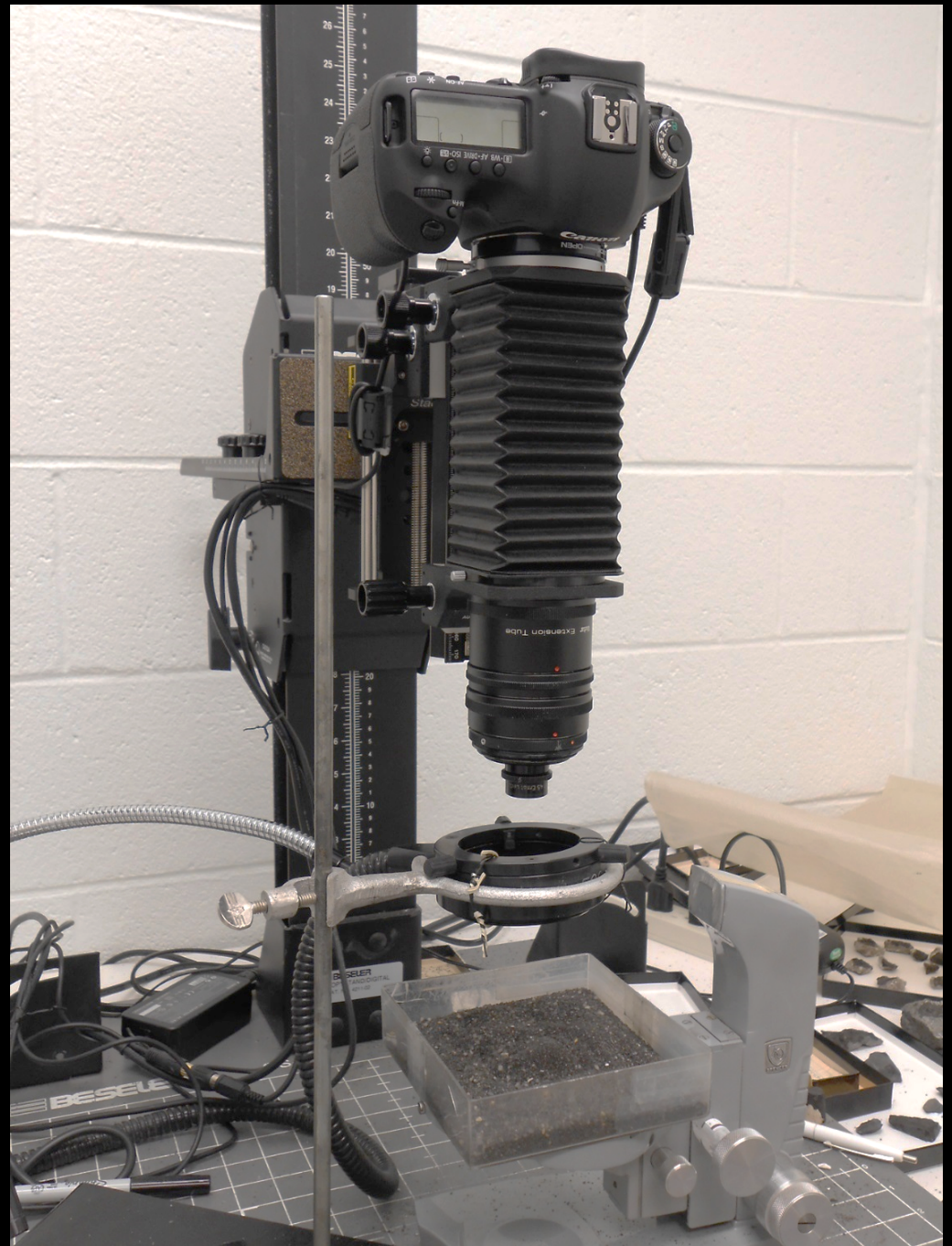




**With the onset of digital imaging in the later 1990's, a clear path was formed as increases in resolution, speed, and quality occurred.**

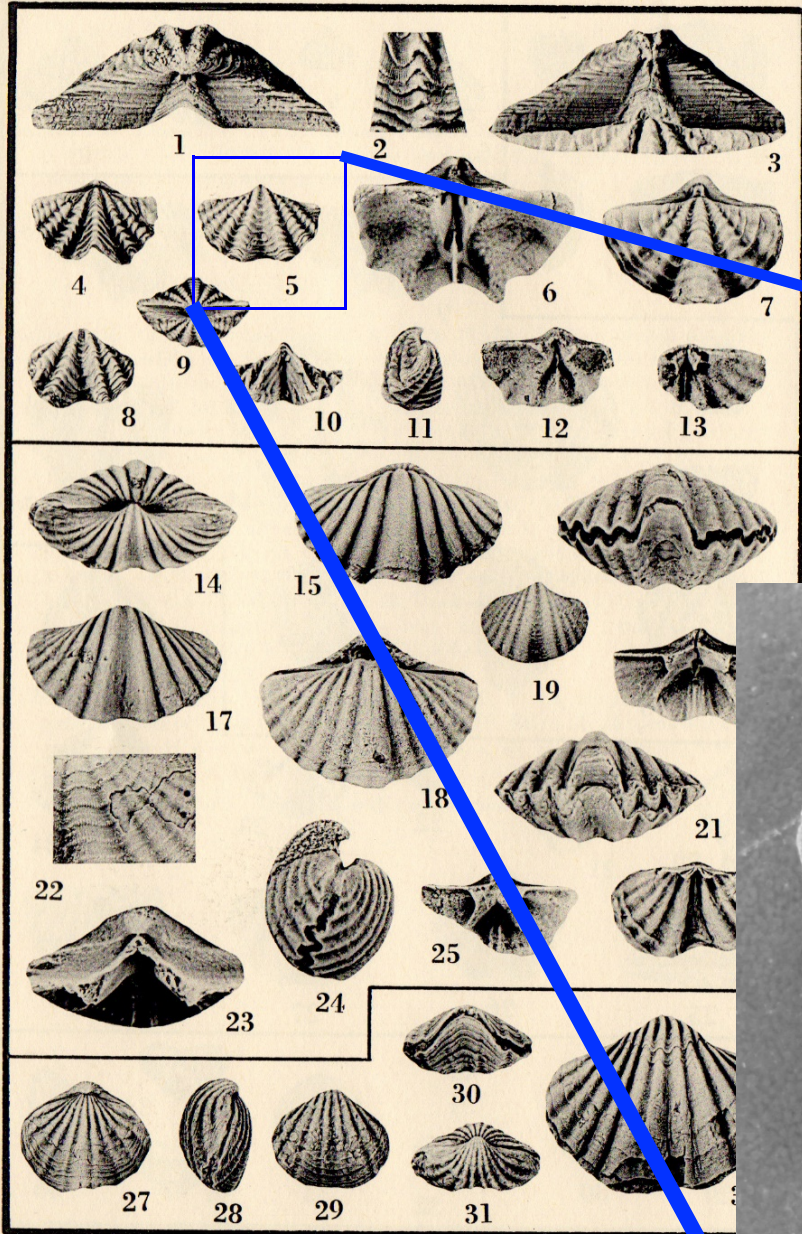


**Today's digital SLR's offer speed and efficiency at low to moderate cost. When coupled with quality lenses, they offer cost effective digital imaging for small to medium sized collections.**





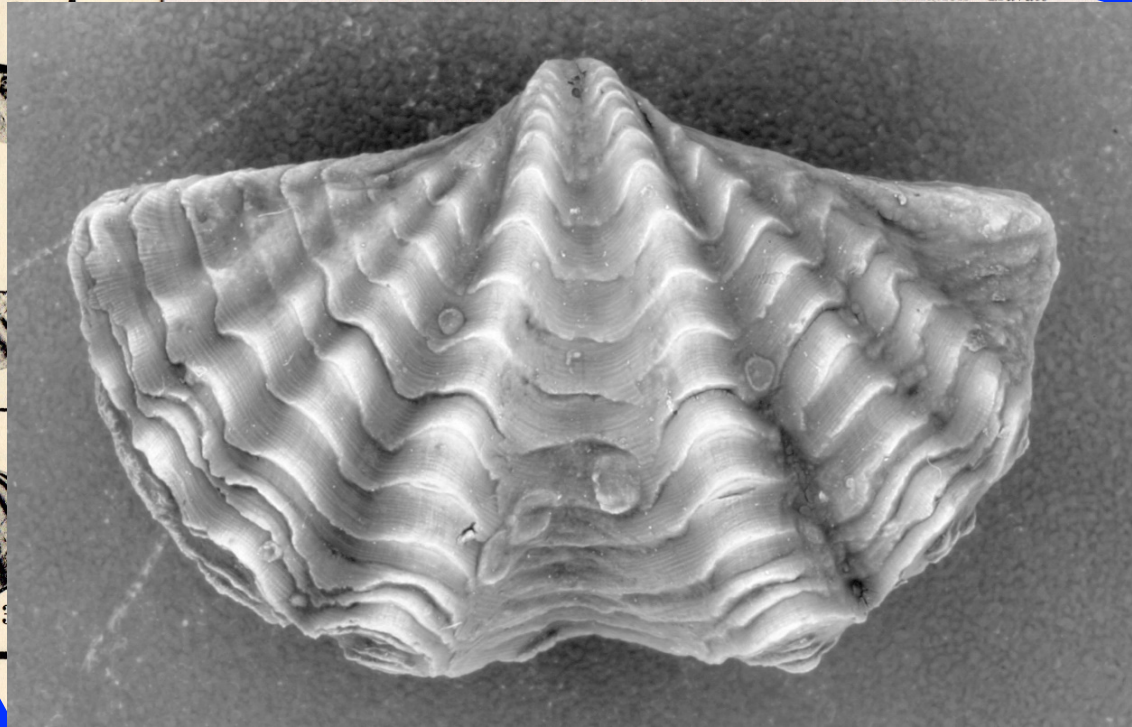
# This allows for the replication of specimens Images from the literature...



FIGURES 1-13. *Kozlowskiella (Megakozlowskiella) velata* Amsden, n. sp. 1. posterior view of a pedicle valve showing palintrope and "deltidium", x 3, [collected by R. D. Alexander, Haragan formation near old Hunton townsite; T. W. Amsden locality CL-H to O] (OU-1052); 2. enlarged surface view, x 3, Coll. M1-K (OU-1049); 3. posterior view of a pedicle valve showing palintrope and "deltidium", x 3, same collection as fig. 1 (OU-1053); 4, 10, 11. brachial, anterior and lateral views of the holotype, x 1, Coll. M2-M (OU-1045); 5. pedicle view, x 1, Coll. M2-M (OU-1046); 6. pedicle interior, x 2, Coll. M1-H (OU-1047); 7. brachial view, x 2, Coll. M1-J (OU-1048); 8. pedicle view, x 1, Coll. M2-M (OU-1050); 9. posterior view, x 1, M2-J (OU-1051); 12. pedicle interior, x 1, Coll. P9-K (OU-1054); 13. brachial interior, x 1, Coll. P9-K (OU-1054).

See Plate XII-F for a comparison with the Henryhouse species, *Delthyris kozlowskii*.

FIGURES 14-26. *Howellella cycloptera* (Hall). 14, 15, 17, 21. posterior, brachial, pedicle, and anterior views, x 1, Coll. P2-A (OU-1094); 16, 18, 20. anterior, brachial and lateral views, x 1, Coll. C1-M (OU-1096); 19, 22. pedicle view (x 1) and enlarged surface view (x 3), Coll. P9-P [Bois d'Arc formation—Cravatt



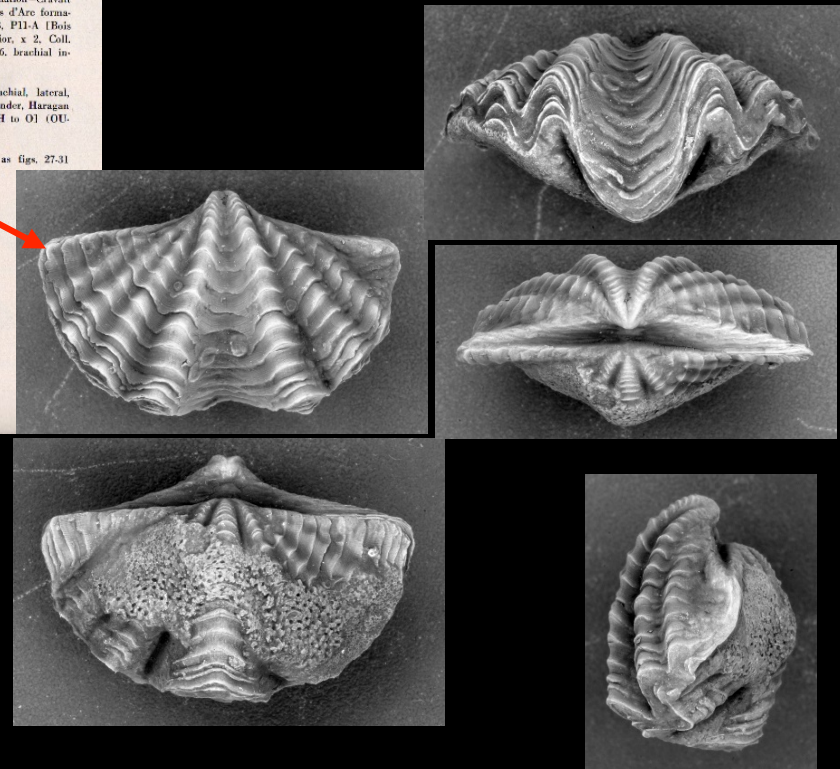
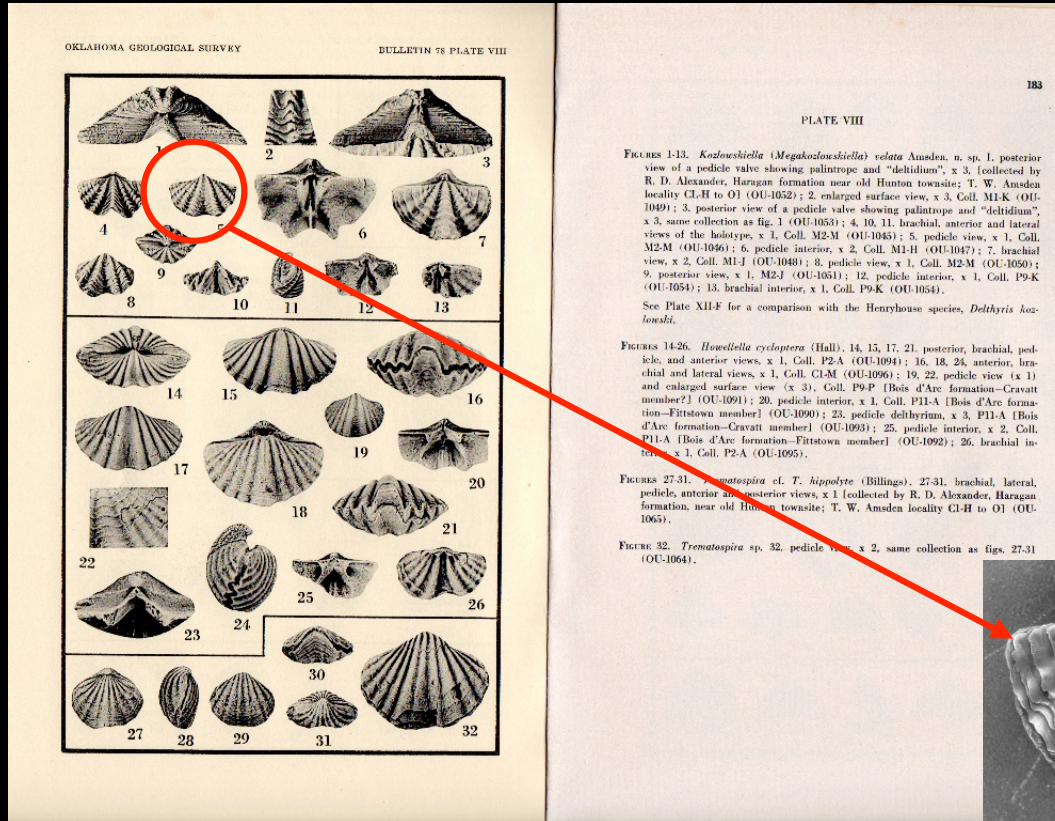


**Enabling the image capture of large numbers of specimens in a relatively short amount of time.**

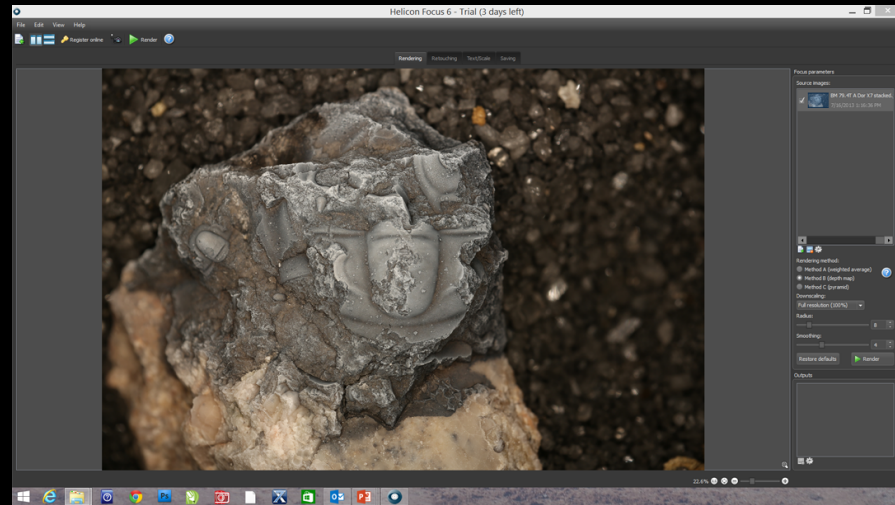


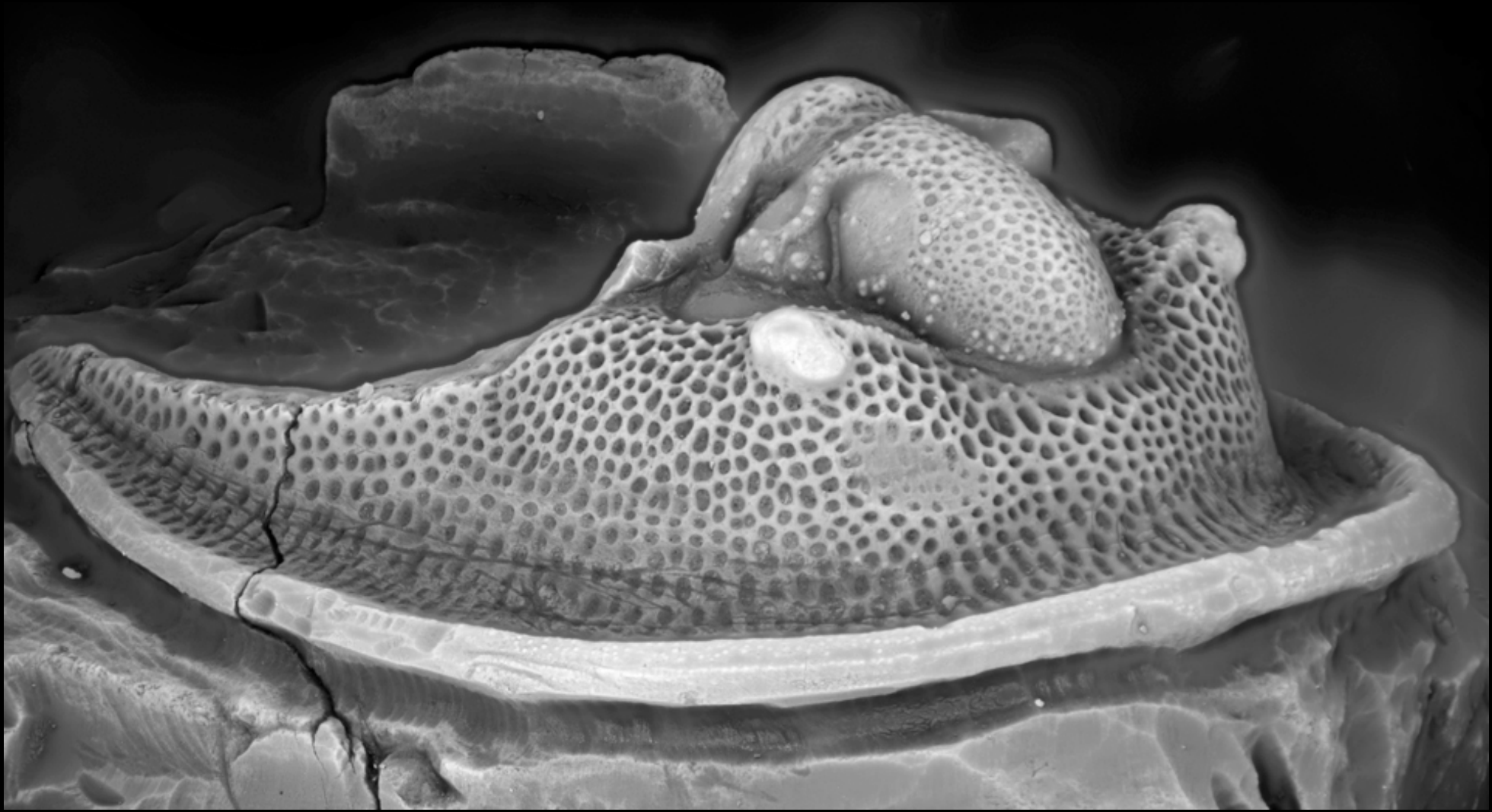


# Digital imaging also makes it less painful to add standard views to previously published specimens, potentially increasing the research value of those specimens.



**Recent software and hardware advances in “stacking” images has further revolutionized digital imaging.**

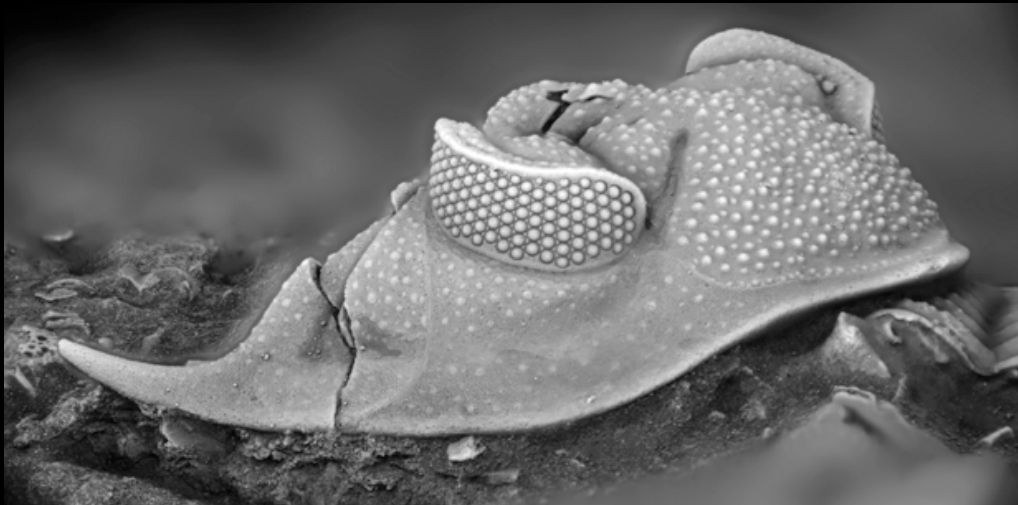
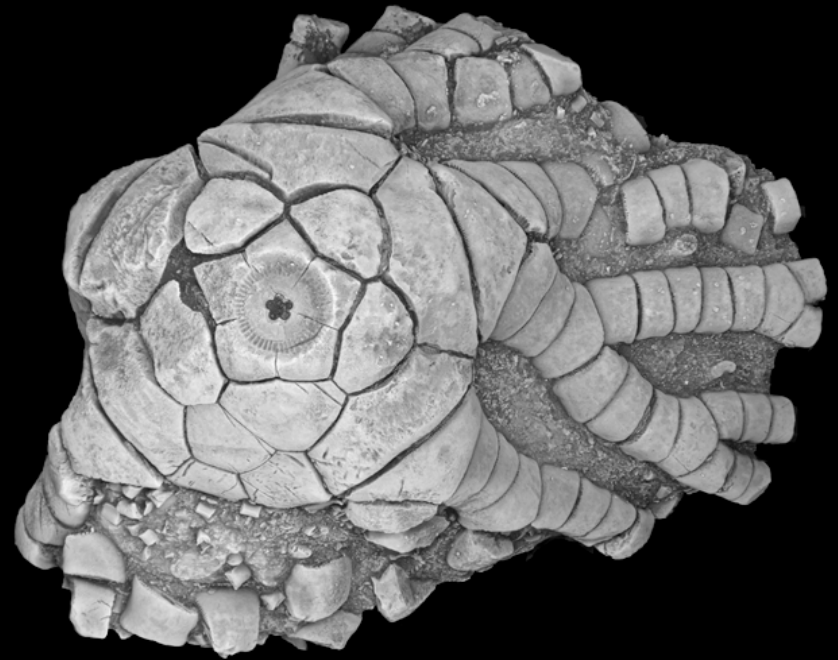




**Artificially increasing the depth-of-field to otherwise unachievable levels, rivaling SEM images.**

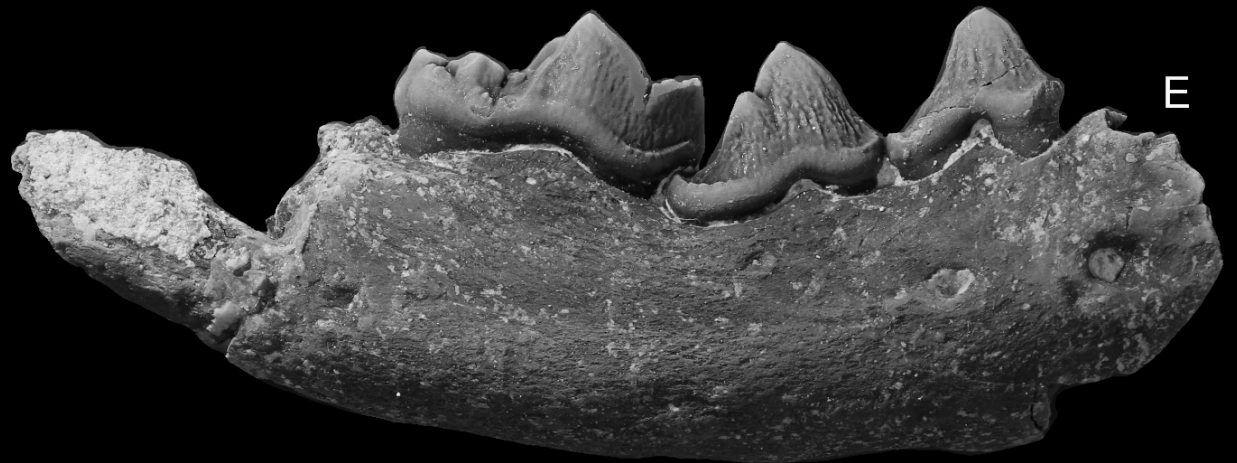


**At the SNOMNH, we are using stacked images for all type and previously figured specimens, and images for all new research specimens are stacked.**

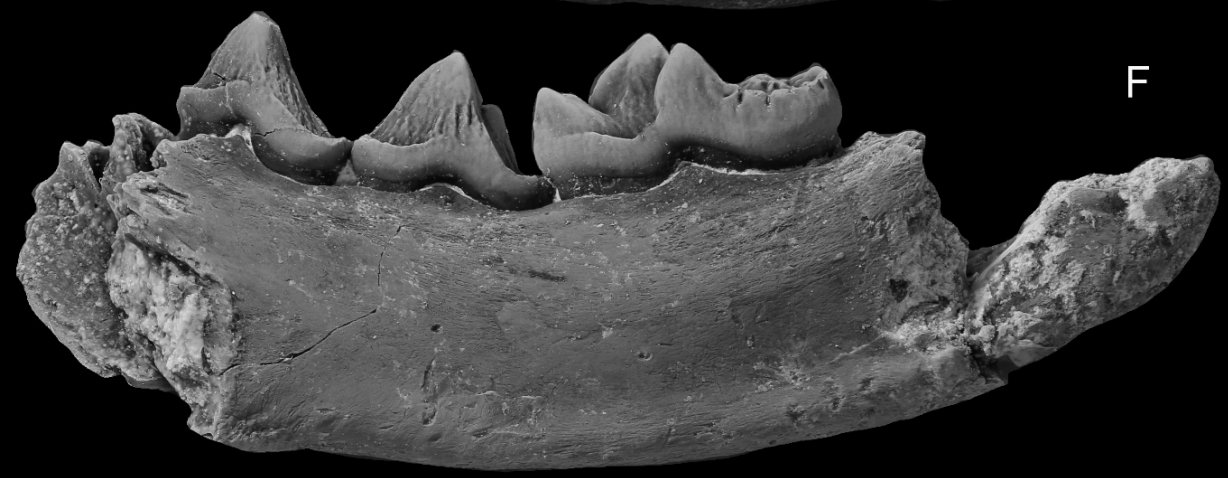




**Even those from  
Vertebrate Paleontology...**



E



F

**Including  
stereo  
pairs.**



G



H



**One additional option is now being realized with stacked images of fossils...**

FORMED IN  
STONE

THE  
NATURAL  
BEAUTY  
OF  
FOSSILS



**Art!**  
**(through**  
**exhibits,**  
**70x48 inch**  
**images)**

**Opening**  
**July 4,**  
**2014**