

# A NEW *DENAZINEMYS* (BAENID TURTLE) SPECIMEN FROM THE UPPER CRETACEOUS WAHWEAP FORMATION

## Introduction

- Prepared and investigated a fossil turtle from the group Baenidae.
- The specimen was found in the Wahweap Formation of Grand Staircase-Escalante National Monument, southern Utah in May 2011.
- The Wahweap Formation was deposited in the Late Cretaceous (Jinnah et al, 2009; Jinnah & Roberts, 2011)
- In Utah, Late Cretaceous rocks haven't been explored as much as in other places. We are finding many vertebrate fossils that are different species from those found at the same time period in other parts of western North America.

## Geologic Setting

- The specimen was found in the Star Seep area, Garfield County, in the Wahweap Formation on the Kaiparowits Plateau, Grand Staircase-Escalante National Monument.
- The Wahweap Formation is:
  - 81-76 million years old, during Late Cretaceous Period (Jinnah et al, 2009)
  - 360-458 meters thick (Jinnah et al, 2009; Jinnah and Roberts, 2011)
  - Sediments are deposited largely by streams and rivers (Jinnah and Roberts, 2011)
- The Star Seep area is in the upper portion of the middle member of the Wahweap Formation (Irmis, personal communication)
- The middle member is:
  - 100-120 meters thick, and made mostly of mudrock that weathers into slopes, but also siltstone and sandstone, which were deposited on the floodplain (Jinnah et al, 2009; Jinnah & Roberts, 2011)

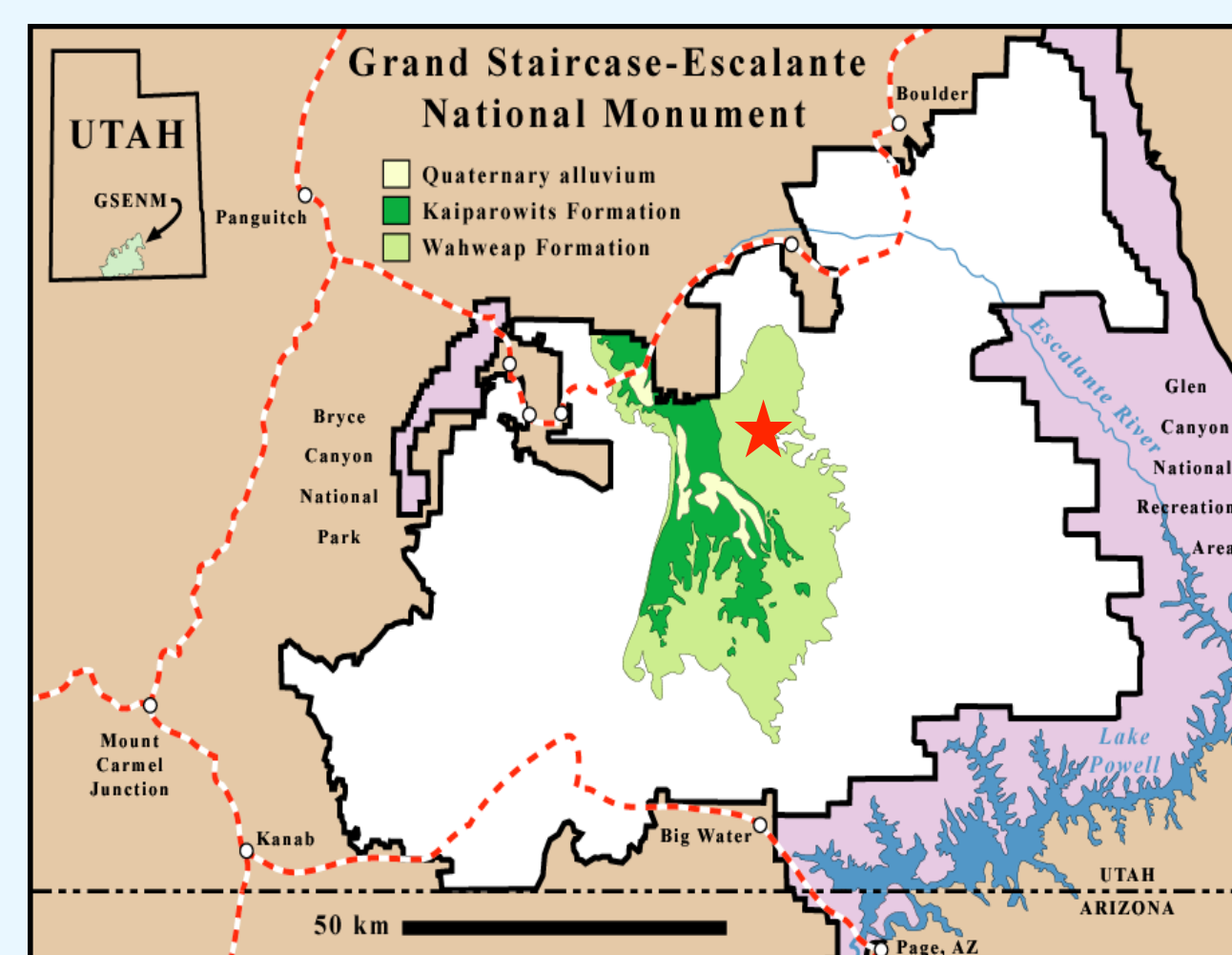


Figure 1: A map of Grand Staircase-Escalante National Monument with a star where my specimen was found.

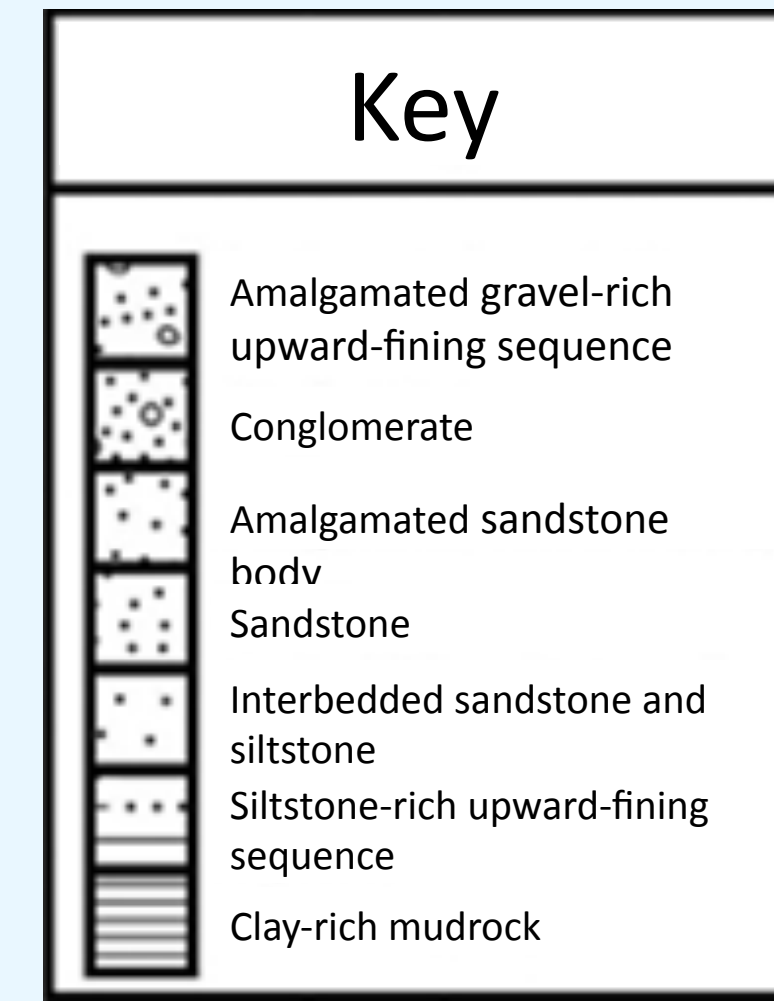
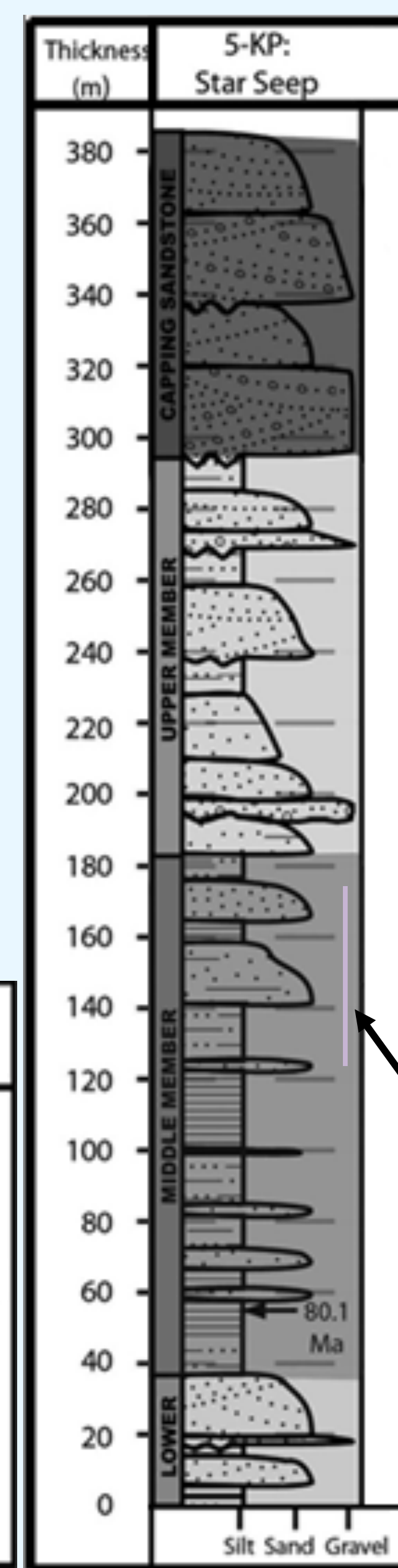


Figure 2: Star Seep stratigraphy and key (Jinnah & Roberts, 2011).



## Fossil Preparation

- Brushed away the matrix (dirt)
- Cleaned off the bones fragments using water and a toothbrush, as well as lightly removing dirt with a scalpel
- Removed rock from around in-situ shell
- Glued and consolidated using B-15 in Acetone, B-72 in Acetone, cyanoacrylate, and epoxy resin

## Specimen Preservation

Nearly all of the material is from the shell, including:

- A nearly complete plastron
- Numerous carapace fragments
- Part of the distal humerus

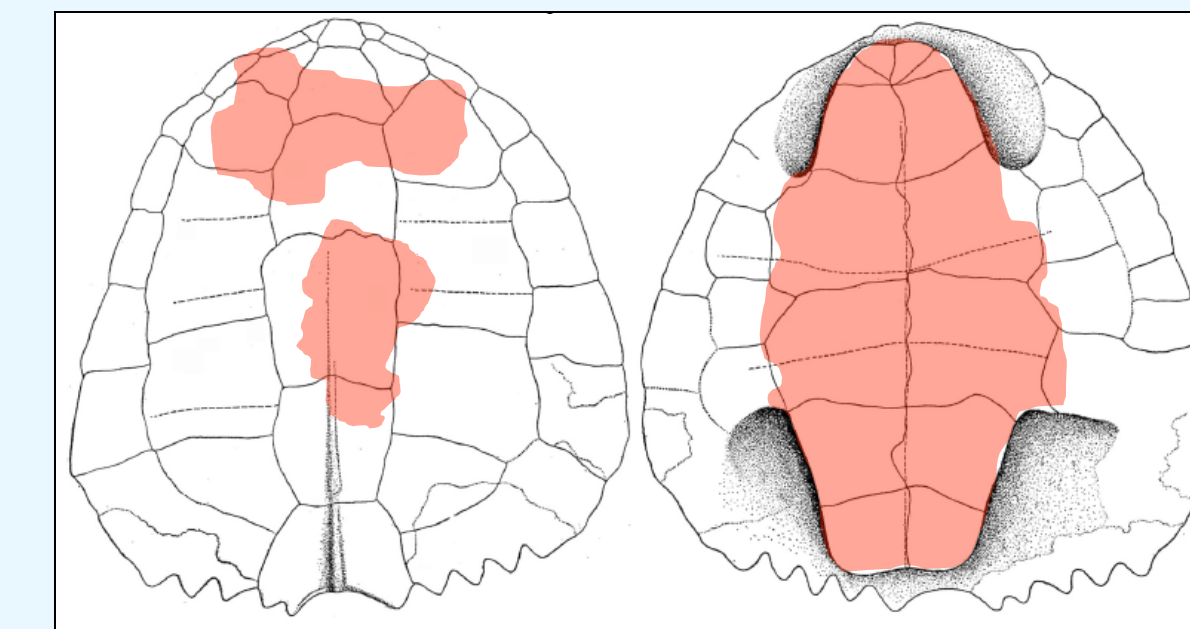


Figure 4: Approximate locations of shell pieces (using a *Denazinemys nodosa* as a reference) (Lucas and Sullivan, 2006).

## My Specimen



Figure 5: Bottom side of plastron.



Figure 6: Top side of plastron.



Figure 7: Top side of piece of carapace.



Figure 8: Bottom side of piece of carapace.



Figure 9: Top side of a different piece of carapace.

## Specimen Identification

Plastron:

- Front is rectangular, but rounded at the end
- Plastron is thickened between buttresses
- Back lobe of the plastron is thicker than the surrounding area; as in *Denazinemys* and *Boremys*, (Lyson et al., 2011)
- Sutures are fused indicating maturity (Hutchison, 1984)
- The back lateral margin is exceptionally thick, comparable to *Denazinemys nodosa* and *Boremys* (Lyson et al., 2011)

Carapace:

- The two largest fragments are from the center of carapace and the front of the carapace
- We know that the fragment in figures 7 and 8 is from the center front of the carapace because there is evidence of the neck shield
- The top side of the fragments are highly weathered, so the sulci aren't visible, but it is evident that there was prominent knobby ornamentation on the carapace
- The oblong paired knob ornamentation on the center of the carapace is diagnostic for *Denazinemys* (Lucas and Sullivan, 2006)

## Other Similar Specimens



Figure 10: UMNH VP 19679 carapace (another *Denazinemys* specimen from the Wahweap Formation).



Figure 11: UMNH VP 19679 plastron (another *Denazinemys* specimen from the Wahweap Formation).



Figure 12: *Denazinemys nodosa* holotype, carapace side.



Figure 13: *Denazinemys nodosa* holotype, plastron side.

## Significance of specimen

- Every specimen found in the Wahweap Formation helps to learn about this 80 million year old ecosystem
- This specimen is identifiable as *Denazinemys*
- Based on the shape of the plastron and the ornamentation, this specimen is the same taxon as another specimen discovered from the Wahweap Formation (UMNH VP 19679)
- Both the new specimen and UMNH VP 19679 are closely related to *Denazinemys nodosa*
- These specimen are identifiable as *Denazinemys* based on the pattern of scutes (scales) and ornamentation on the carapace, and the serrated back end of the carapace
- These specimen are a previously undescribed species of *Denazinemys* because the ornamentation on the carapace is not as tightly packed as in *Denazinemys nodosa*, the shape of the shell is different, and on the carapace there is an upturned margin that is not on *nodosa*
- My specimen is one of the oldest representatives of its genus (*Denazinemys*)

## Conclusion

- My specimen is identifiable as *Denazinemys* based on the pattern of scutes, the ornamentation, and the serrated back end of the carapace
- My specimen and UMNH VP 19679 likely belong to a new species of *Denazinemys* based on the way the ornamentation is packed, the shape of the shell, and the upturned margin on the carapace
- There are 2 species of *Denazinemys*-one found at the Wahweap Formation, and one found in the Kaiparowits Formation

## Acknowledgements

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**References Cited**  
Hutchison, J. H. 1984. Determinate growth in the Baenidae (Testudines): taxonomic, ecological, and stratigraphic significance. *Journal of Vertebrate Paleontology* 3(3):148-151.  
Jinnah, Z. A., and E. M. Roberts. 2011. Facies associations, paleoenvironment, and base-level changes in the Upper Cretaceous Wahweap Formation, Utah, U.S.A. *Journal of Sedimentary Research* 81:266-283.  
Jinnah, Z. A., E. M. Roberts, A. L. Delno, J. S. Larsen, P. K. Link, and C. M. Fanning. 2009. New <sup>40</sup>Ar-<sup>39</sup>Ar and detrital zircon U-Pb ages for the Upper Cretaceous Wahweap and Kaiparowits formations on the Kaiparowits Plateau, Utah: implications for regional correlation, provenance, and biostratigraphy. *Cretaceous Research* 30: 287-299.  
Lucas, S. G., and R. M. Sullivan. 2006. *Denazinemys*, a new name for some Late Cretaceous turtles from the Upper Cretaceous of the San Juan Basin, New Mexico. *New Mexico Museum of Natural History & Science Bulletin* 35:223-228.  
Lyson, T. R., W. G. Joyce, G. E. Knauss, and D. A. Pearson. 2011. *Boremys* (Testudines, Baenidae) from the latest Cretaceous and early Paleocene of North Dakota: an 11-million-year range extension and an additional K/T Survivor. *Journal of Vertebrate Paleontology* 31(4):729-737.

## Turtle Shell Anatomy

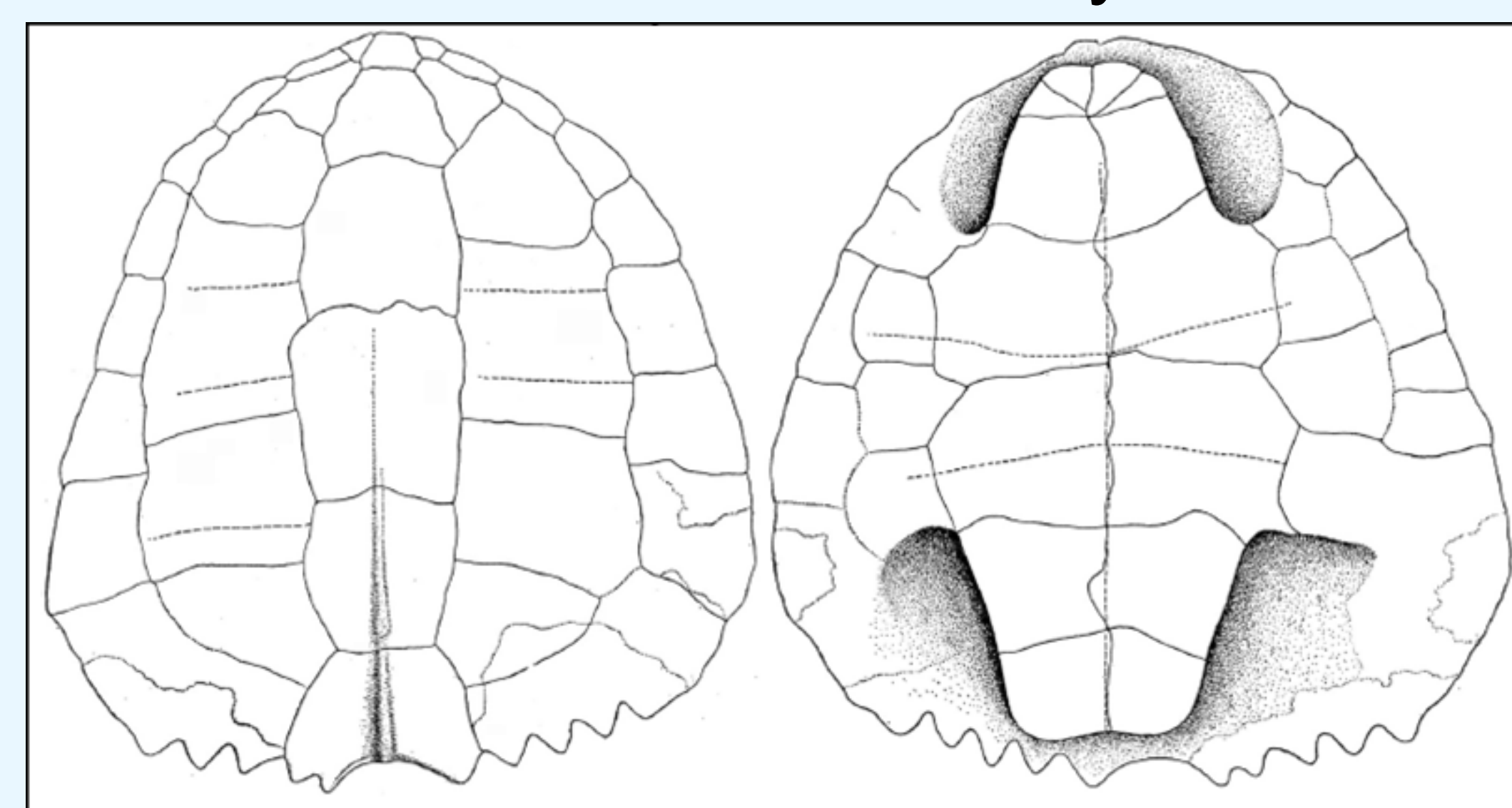


Figure 3: Turtle shell anatomy. Type specimen of *Denazinemys* in figures 12-13 (Lucas and Sullivan, 2006).

Left: carapace (top of shell); Right: plastron (bottom of shell)

Front of shell (towards head)