



PRELIMINARY TAPHONOMY OF THE VERTEBRATE FOSSIL ASSEMBLAGE FROM THE REVUELTIAN (UPPER TRIASSIC: NORIAN) AGE GARITA CREEK SITE OF EAST-CENTRAL NEW MEXICO, USA

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ABSTRACT

A fossil collection from a site near Garita Creek, New Mexico is rich in macro- and micro-vertebrates, including bones, teeth, and coprolites. Sediment and small bags of picked fossils from the site were provided by Larry Martin and the Lauer Foundation for Paleontology, Science, and Education respectively. The sediment consisted of ~20 kg of picked screenwash material, referred to as “concentrate” hereafter. We used sieves to sort the concentrate into five sizes: ≥ 4 mm, 2-4 mm, 1-2 mm, 0.5-1 mm, and < 0.5 mm. We then picked and identified fossils as bone fragments, tooth fragments, and coprolites. The data presented here are for ≥ 4 mm and 2-4 mm fossils only.

In our sample of concentrate there are 7,112 fossils, of which 25.8% are bone fragments, 13.9% are tooth fragments, and 60.3% are coprolites. In a small sample of the fossil bags, there are 1,442 fossils, of which 59.2% are bone fragments, 35.2% are tooth fragments, and 5.6% are coprolites.

The concentrate was originally sorted by Larry and Betty Martin, whose picking methods may have been biased as the concentrate is dominated by coprolites, whereas the bags of fossils contain mostly bone and teeth. The Martins likely prioritized more diagnostic fossils for the bags. Since the combined collections contain 51.1% coprolites, 31.4% bone, and 17.5% teeth, we hypothesize that new collections from the site would have proportionately fewer coprolites than in the concentrate, and proportionately fewer bones and teeth than the fossil bags.



From the top left-hand corner, clockwise: Shams sifting screenwash material, James counting the fossils he picked, Spencer (in background) setting up a fossil under the microscope in hope of identifying it while Luke (foreground) tries to identify a fossil he picked from the concentrate, Isaac shooting a diagnostic fossil on the Keyence® 3D microscope, Joel logging data on the fossils he sorted onto a spreadsheet, and Isaac examining fossils from the concentrate. Photos by M. Toran.

METHODS

Two modes of collection:

1. The Martins' ~20 kg screenwash material – “concentrate”
2. The Lauer Foundation's bags of “picked fossils”

We used sieves to sort the concentrate into five sizes: ≥ 4 mm, 2-4 mm, 1-2 mm, 0.5-1 mm, and < 0.5 mm.

We sorted the fossils from the picked bags into three sizes: ≥ 4 mm, 2-4 mm, and ≤ 2 mm



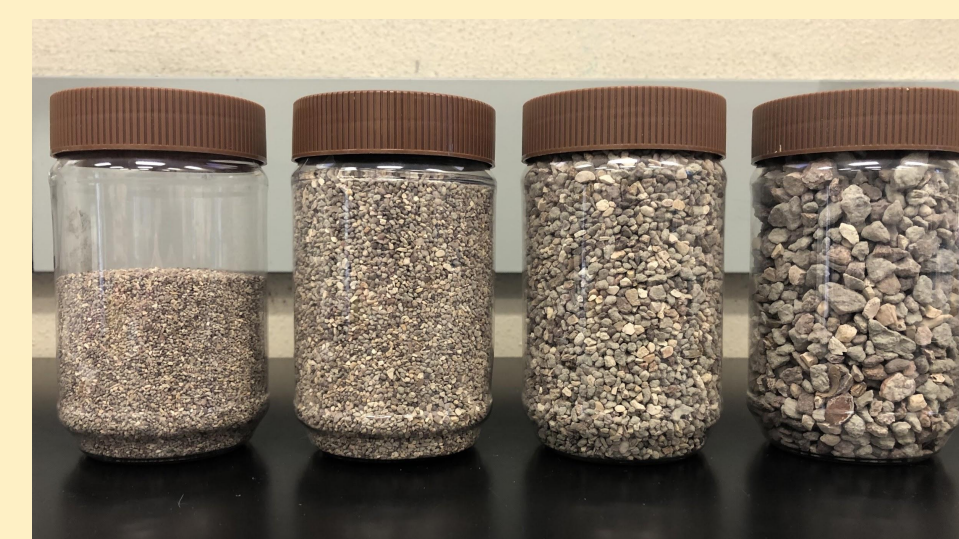
The “picked bags.” Each bag has hundreds of fossils that had been picked from the original screenwash concentrate.



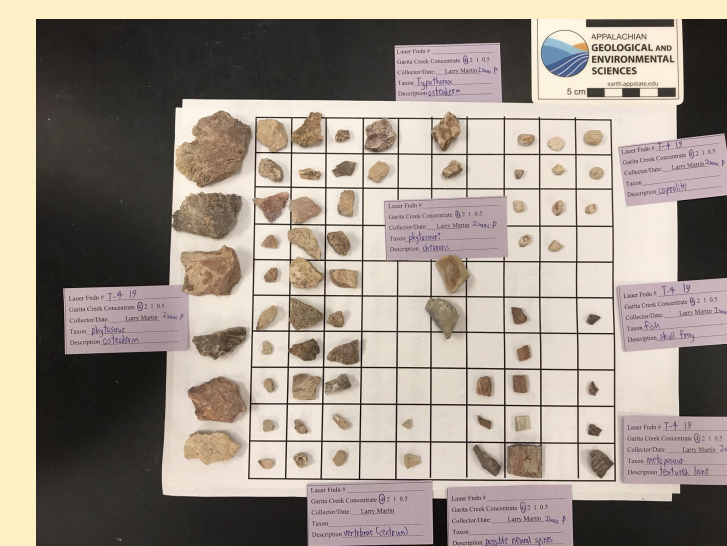
The concentrate (2-4 mm size) as it passes through Luke's stack of sieves.



One of the sieve stacks used for sorting the fossils



Screenwash material in jars, separated based on size (from left to right in order: 0.5-1 mm, 1-2 mm, 2-4 mm, and ≥ 4 mm).



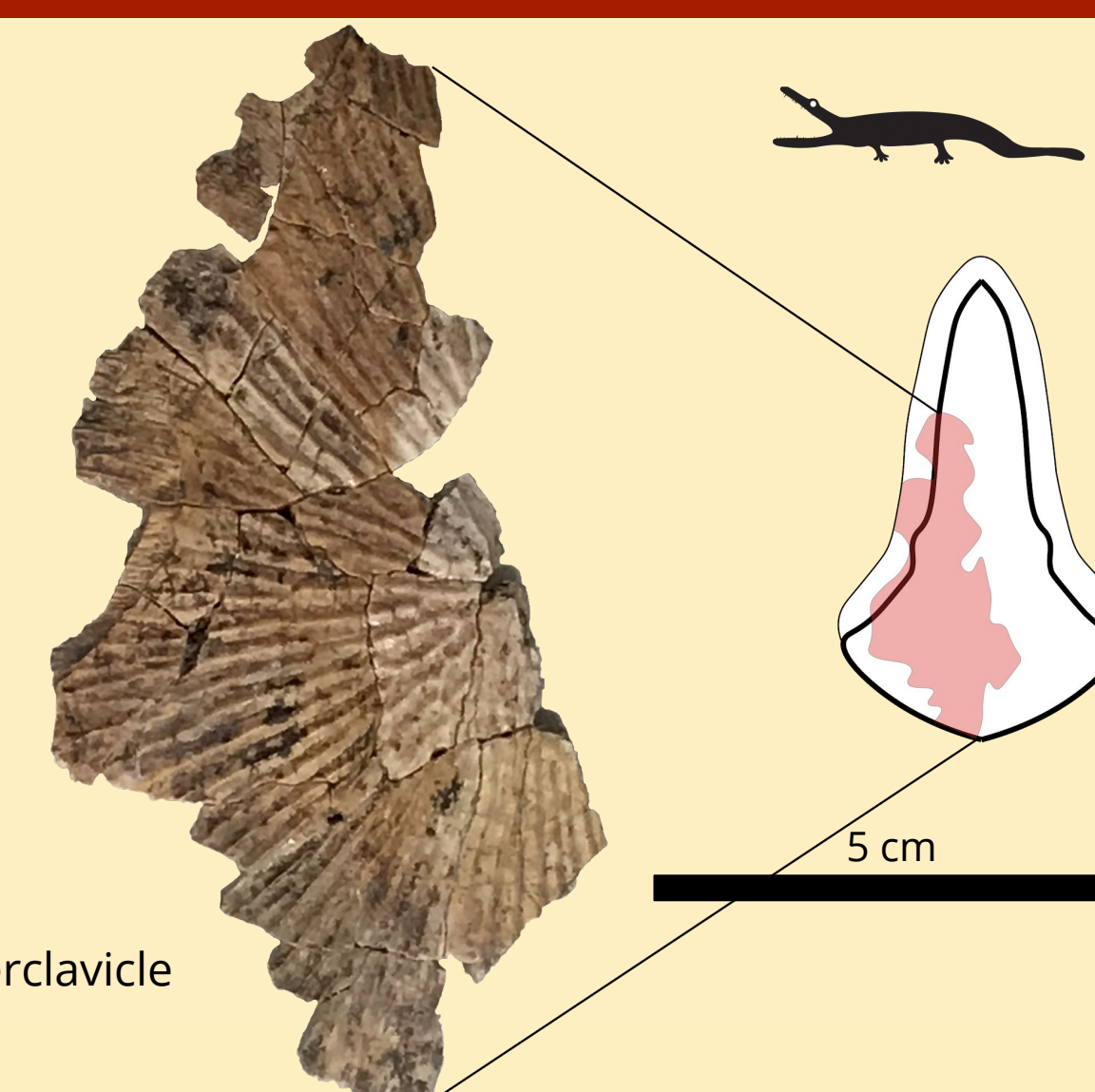
Fossils laid out on grids to count



Fossils sorted and identified by Joel

FOSSIL “FITS”

We have found many fits in the “picked fossils,” suggesting that each bag of fossils represents a discrete batch of sediment, and that careful collection could result in many more complete elements.



33 fragments of a temnospondyl interclavicle pieced together by Isaac

RESULTS

We have sorted a total of **7,246** fossils from the concentrate, out of which 1,863 (25.71%) are bones, bone fragments, including osteoderms; 1,080 (14.90%) are teeth and tooth fragments; and 4,303 (59.38%) are coprolites. From a small sample of the picked bags, we have counted and sorted a total of **1,991** fossils, of which 1,012 (50.83%) are bones, bone fragments, and osteoderms; 892 (44.80%) are teeth and tooth fragments; 87 (4.37%) are coprolites.

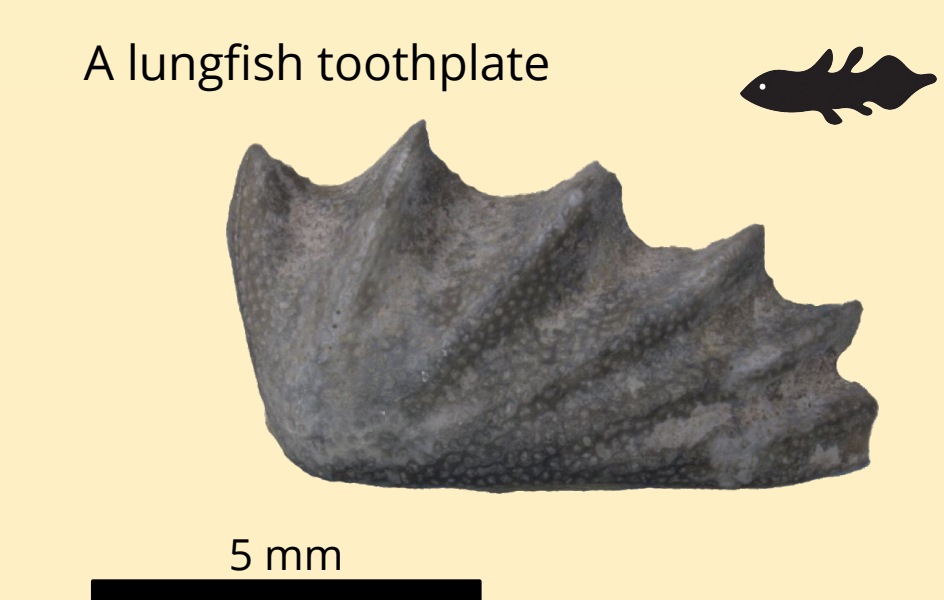
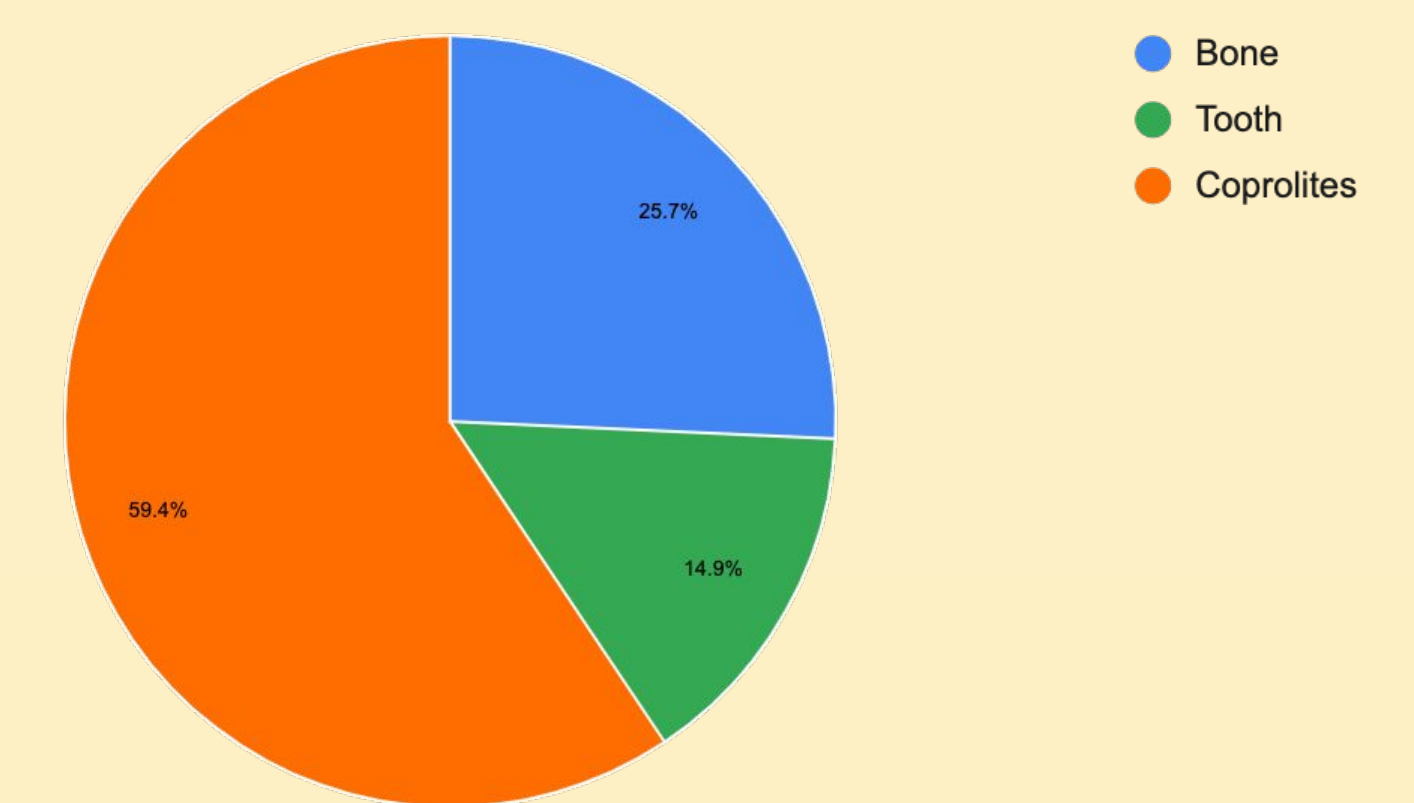
There is a grand total of **9,237** fossils from both the concentrate and the picked bags, out of which a total of 2,875 (**31.12%**) are bones, bone fragments, and osteoderms; 1,972 (**21.35%**) are teeth and tooth fragments; 4,390 (**47.53%**) are coprolites.

A significant portion (47.53%) of the fossils are surprisingly coprolites.



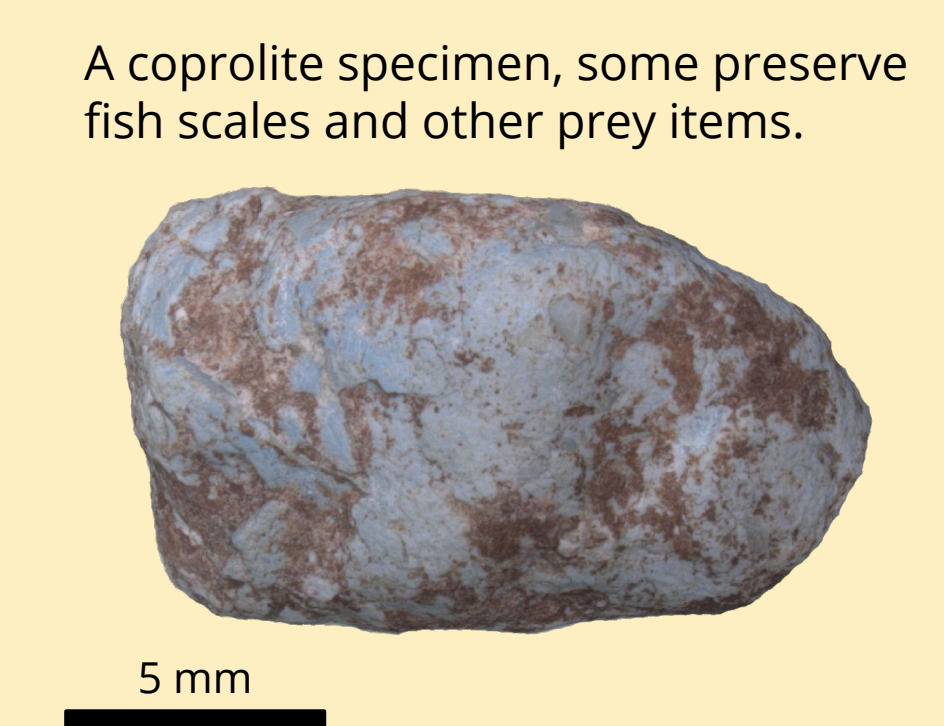
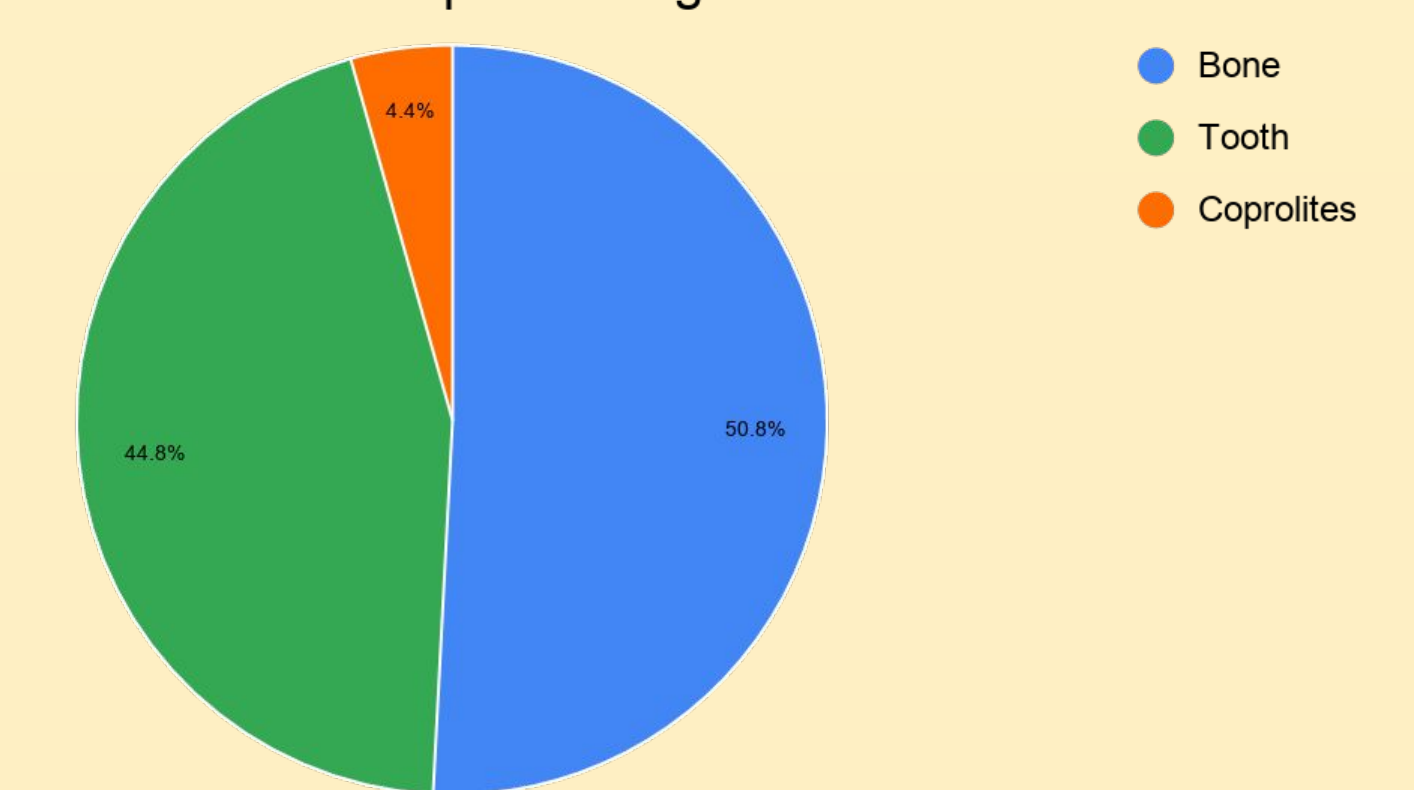
A dinosauromorph bone (femoral head)

Percentage of bone, tooth, and coprolites in collected from the concentrate



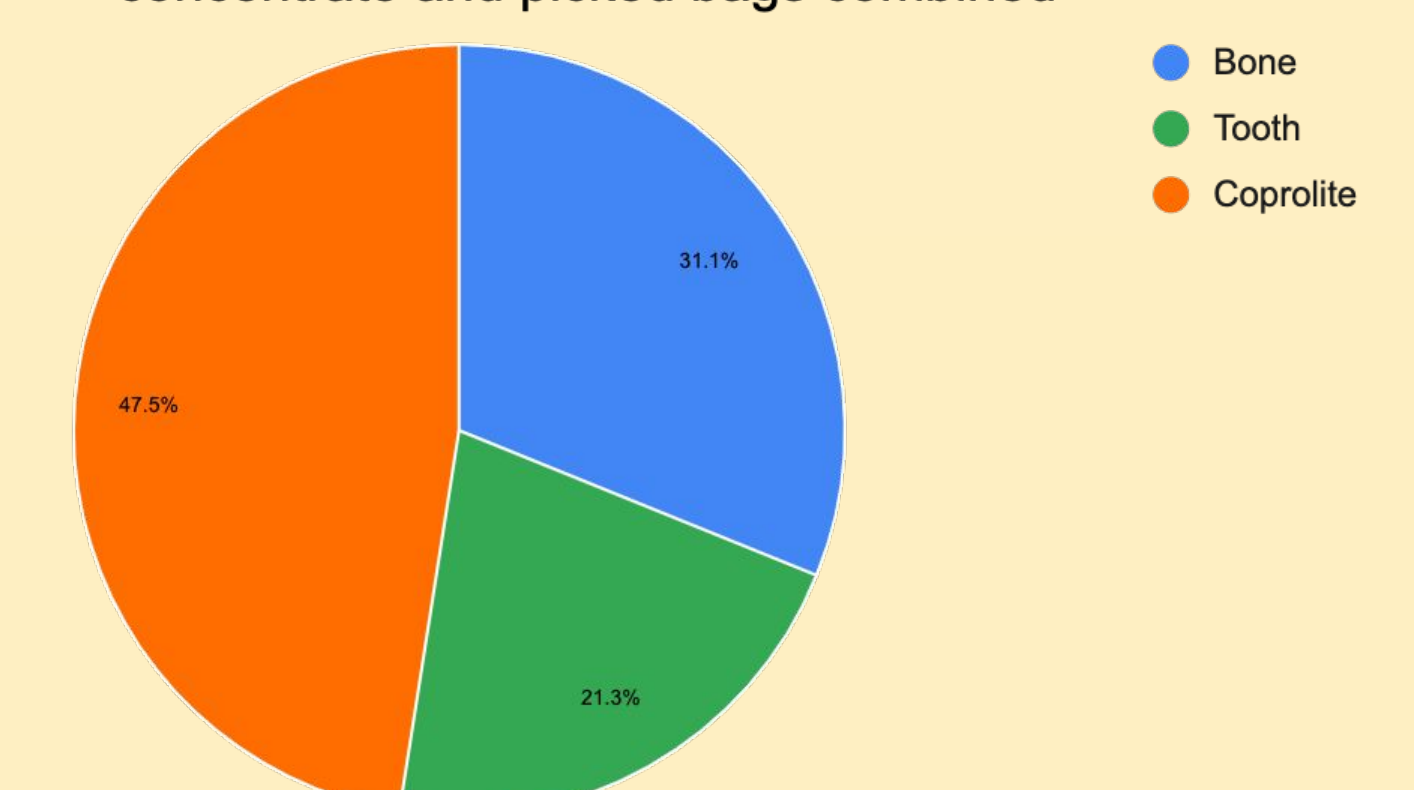
A lungfish toothplate

Percentage of bone, tooth, and coprolites in our sample of the “picked bags”



A coprolite specimen, some preserve fish scales and other prey items.

Percentage of bone, tooth, and coprolites in both the concentrate and picked bags combined



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