

# A NEW PARTIAL SKELETON OF *LEPTOCERATOPS GRACILIS* FROM THE LANCE FORMATION OF WYOMING, U.S.A.

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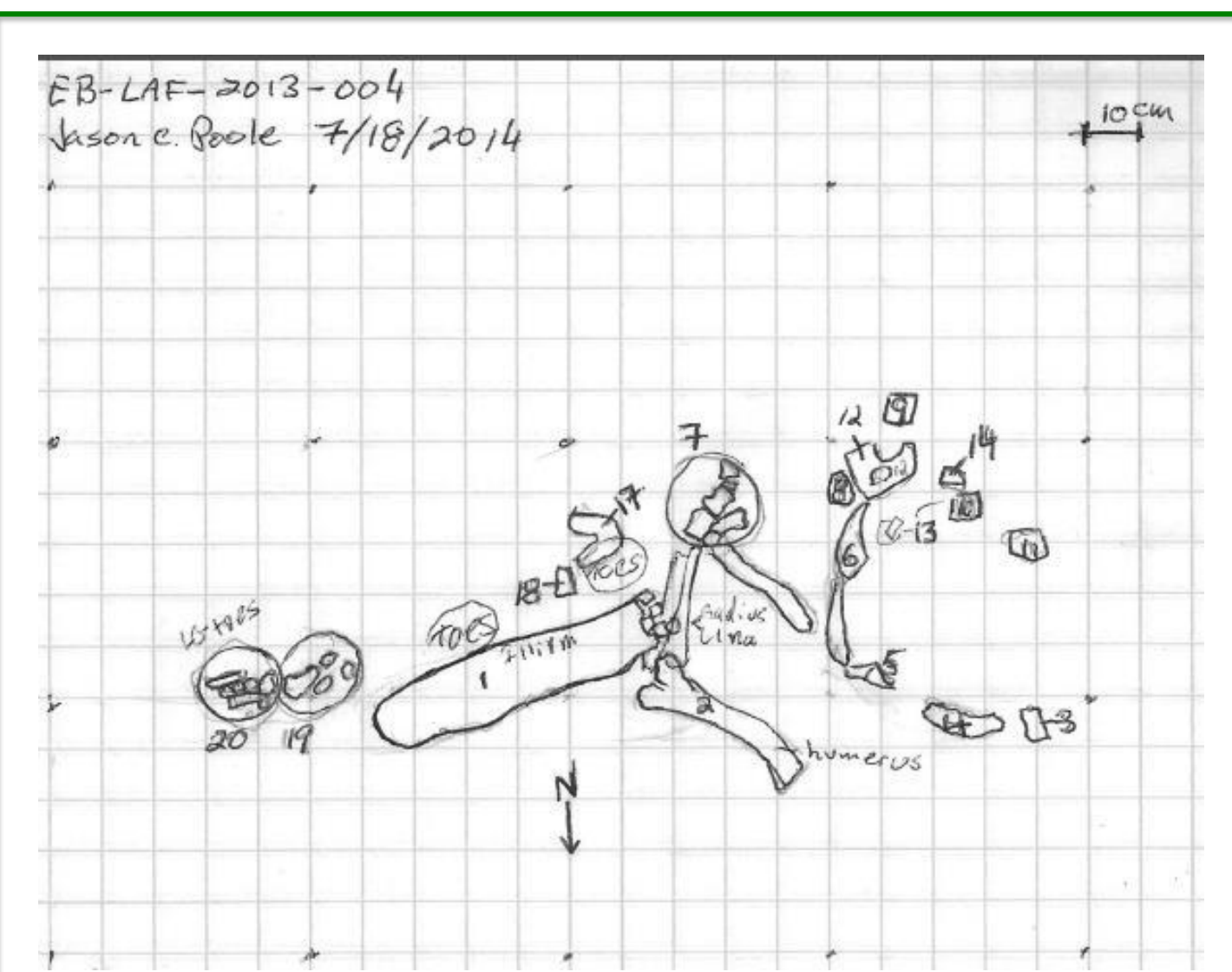


Figure 1. Field sketch by Jason Poole of NJSM 24228 *in situ*.



Figure 2. Left pterygoid from NJSM 24228.

## Cranial Elements

(Fig. 2-3)

Caudocranial components include the occipital condyle (circumference = 11.6cm) and basioccipital with one right intact and well-preserved basiptyergoid process. The left pterygoid and numerous additional unidentifiable skull fragments were also recovered.

- Partial Rostrum
- Pterygoid (L)
- Skull Fragments (UI)
- Occipitus of the skull including:
  - Basioccipital
  - Basiptyergoid Process (R)
  - Occipital Condyle

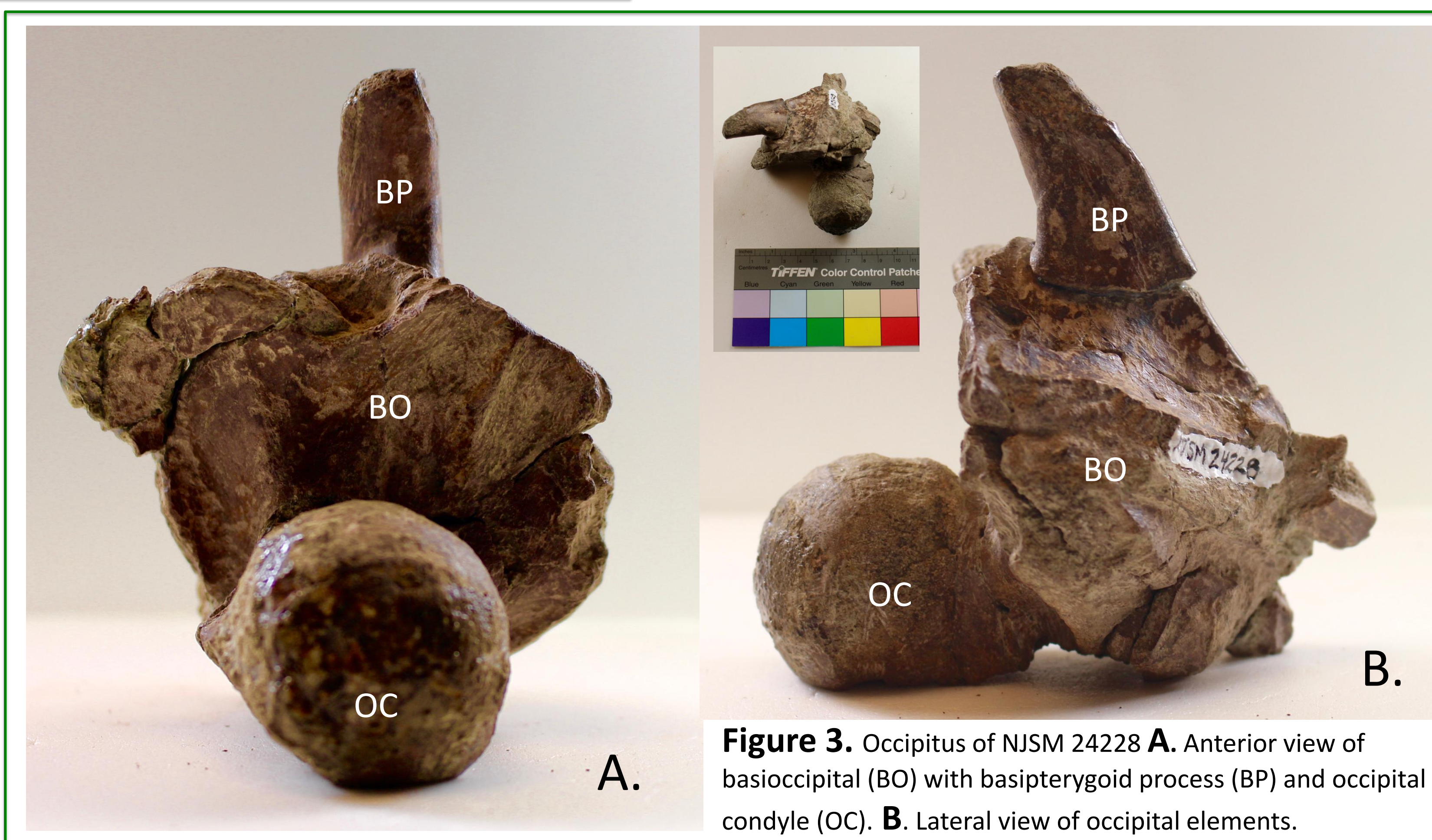


Figure 3. Occipitus of NJSM 24228 **A.** Anterior view of basioccipital (BO) with basiptyergoid process (BP) and occipital condyle (OC). **B.** Lateral view of occipital elements.

## Mandibular Elements

(Fig. 4-7)

Mandibular elements include a partial and highly fragmented right prementary and incomplete dentary with no visible dentition. Additionally, the surangular and angular were partially preserved, as was an incomplete and truncated rostral component.

Additionally collected was a series of seven distinguishable dental crowns (some with partial roots), three of which present with definite occluso-lingual wear facets, and one partially complete unbifurcated root (diagnostic feature) with an exposed single root canal.

- Prementary
- Dentary
- Angular
- Surangular
- Dentition
  - 7 intact crowns
  - 1 Partial bisected root



Figure 4. Seven identifiable dental crowns of NJSM 24228

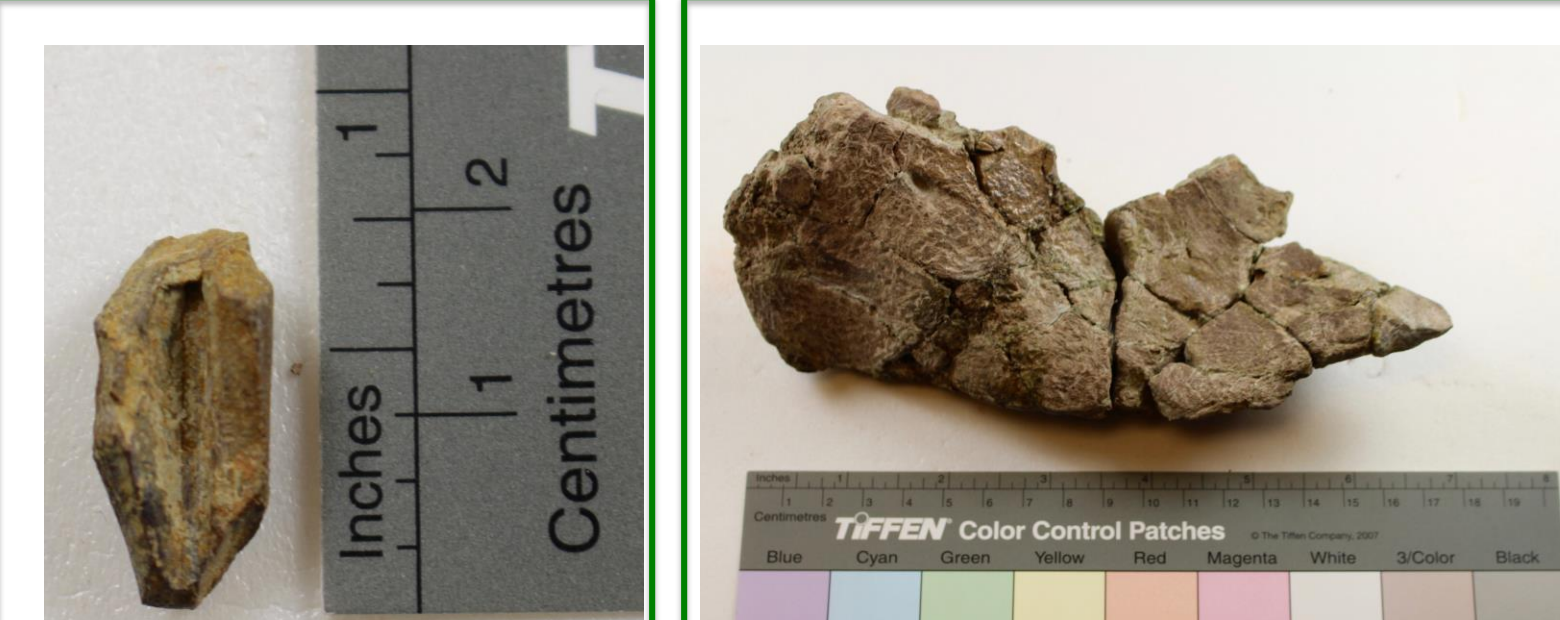


Figure 5. NJSM 24228, one bisected dental crown exposing one root canal.

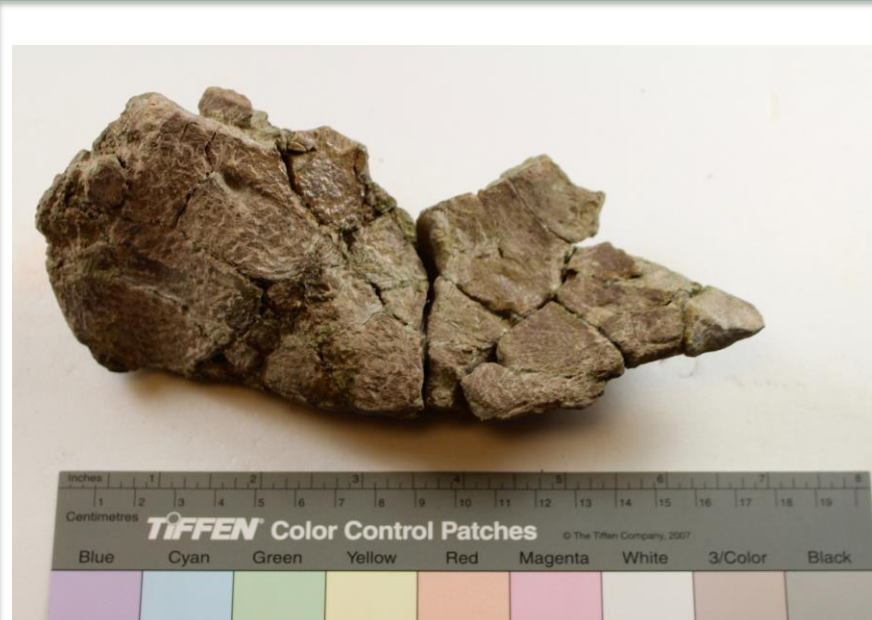


Figure 6. NJSM 24228, lingual view of partial dentary.

## ABSTRACT

*Leptoceratops* is a primitive ceratopsian dinosaur known only from the latest Cretaceous units of Montana, Wyoming, and Alberta, Canada. This genus includes only one species, *L. gracilis*, and is characterized by its small stature, diminutive frill, and lack of horns. *Leptoceratops* remains rare, as only eight confirmed specimens are currently reported, three of which lack postcranial material.

Here we describe NJSM 24228, a new partial skeleton of *L. gracilis* discovered within the Lance Formation in the northern Bighorn Basin in Park County, Wyoming. All recovered elements were closely associated and include facial and cranial material, the occipital condyle with a basiptyergoid process, a partial prementary, fragmented rostrum, and costal elements. Additionally, a humerus, radius, and partially articulated manual and pedal elements are particularly complete and well-preserved. The specimen is identified as *L. gracilis* based on a diagnostic series of teeth with unbifurcated roots, as well as a deep, truncated rostrum and elongate prementary.

These well-preserved remains provide an important opportunity for insight into this rare neoceratopsian. In addition to helping us answer crucial questions regarding the anatomy and phylogenetic position of *L. gracilis* within the Ceratopsidae, NJSM 24228 has much more to tell us about the paleogeography and paleoecology of the genus. This is only the second specimen of *L. gracilis* reported from the Lance Formation and the first to be recovered from silty shale matrix indicative of overbank deposits.

## Discovery & Locality

(Fig. 11)

In 2014, NJSM 24228 was found in Lancian, Late Cretaceous deposits of the Northern region of the Bighorn Basin in Park County, Wyoming. The skeletal components were closely associated upon discovery. This matrix composition is representative of overbank deposits, suggesting the occurrence of a perimortem flood. There is currently a total of 8 confirmed *L. gracilis* specimens and NJSM 24228 is the first and only individual that has been discovered within a silty shale matrix.

Known *L. gracilis* specimens and their lithologies:

<b>UWGM 200</b> -Hell Creek Formation (uppermost Maastrichtian) of Carter County, MT -medium grained, cross-bedded sandstone unit containing unionid bivalve shells that were replaced with siderite (Ott, 2002)	<b>UWGM 201</b> -Hell Creek Formation (uppermost Maastrichtian) of Carter County, MT -thick, medium-grained, cross-bedded sandstone unit, approx. 75 m below K-T boundary (Ott, 2002)	<b>AMNH 2571</b> -Pinyon Conglomerate of western Wyoming -lenticular, brown, green, sandy, carbonaceous conglomerate containing fragments of limestone, quartzite, and claystone in a tightly-cemented medium-grained sandstone matrix (McKenna and Love, 1970)	<b>AMNH 5205</b> -Scollard Formation (Edmonton Group) of Alberta, Canada, Maastrichtian -Claystone and sandstone (Brown, 1914)	<b>NMC 887, 888, and 889</b> Three of the most complete <i>L. gracilis</i> specimens (NMC 887, 888, and 889) are reported from the Scollard Formation of Alberta, Canada, however the exact lithology has not been reported. A future examination of the field journals kept by Sternberg and his crew members may reveal these specifics and allow for a more thorough understanding of the geologic distribution of this species. (Sternberg, 1951)
<b>PU 18133</b> -Lance Formation (or potentially equivalent) -mudstone and sandstone (Ostrom, 1978)				



Figure 7. NJSM 24228, buccal view of partial prementary.

## Post-Cranial Elements

(Fig. 8-10)

Post-Cranial elements include one left humerus, one right radius, various costal elements, and partially articulated, particularly well-preserved manual and pedal elements.

- Humerus (L)
- Radius (R)
- Costal Elements
- Manual & Pedal Elements



Figure 8. Pieced and intact costal elements from NJSM 24228.

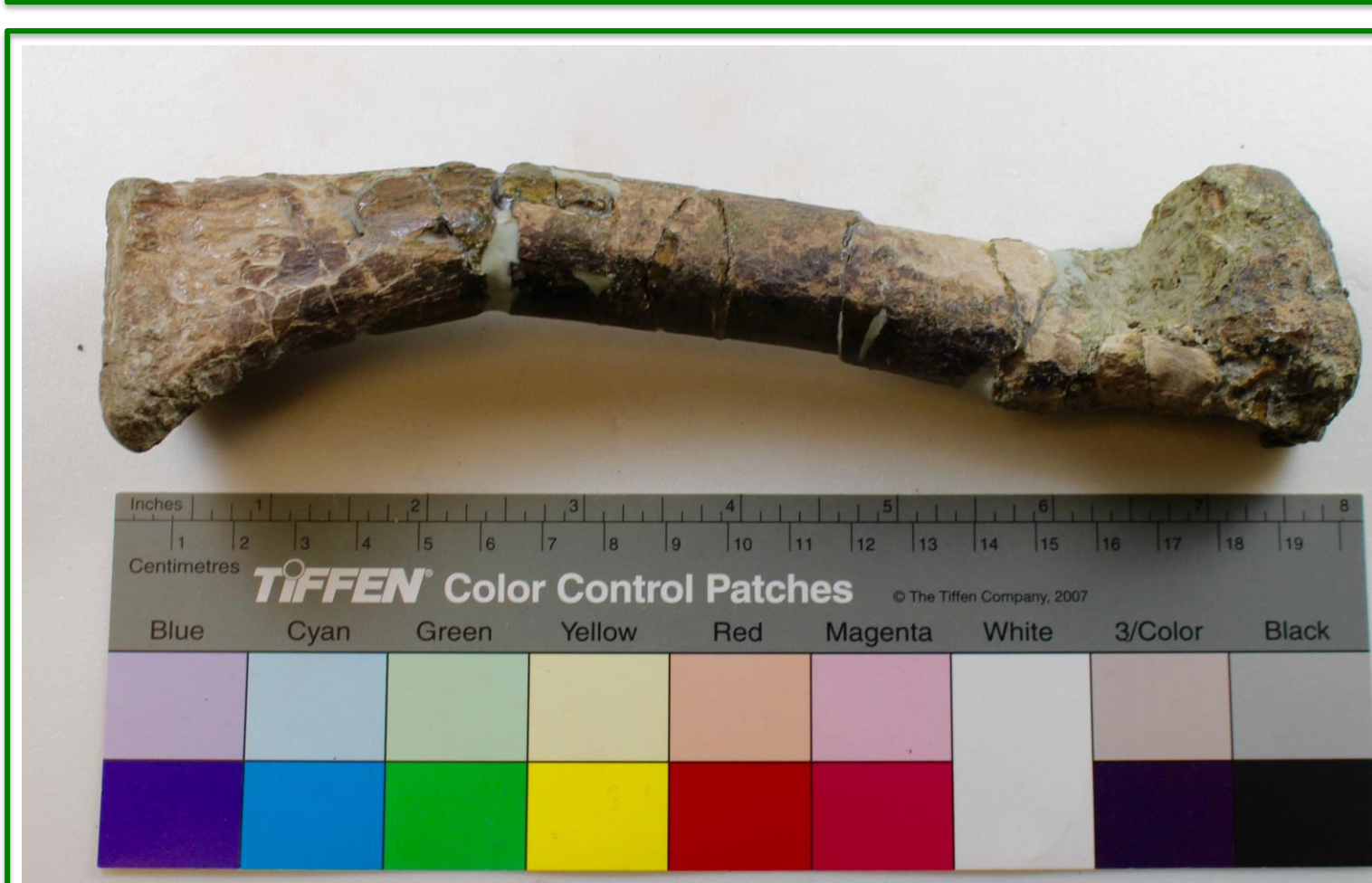


Figure 9. NJSM 24228, medial view of right radius.



Figure 11. Bighorn Basin Dinosaur Project field crew in 2014, excavating NJSM 24228.



Figure 10. NJSM 24228, caudal view of left humerus.

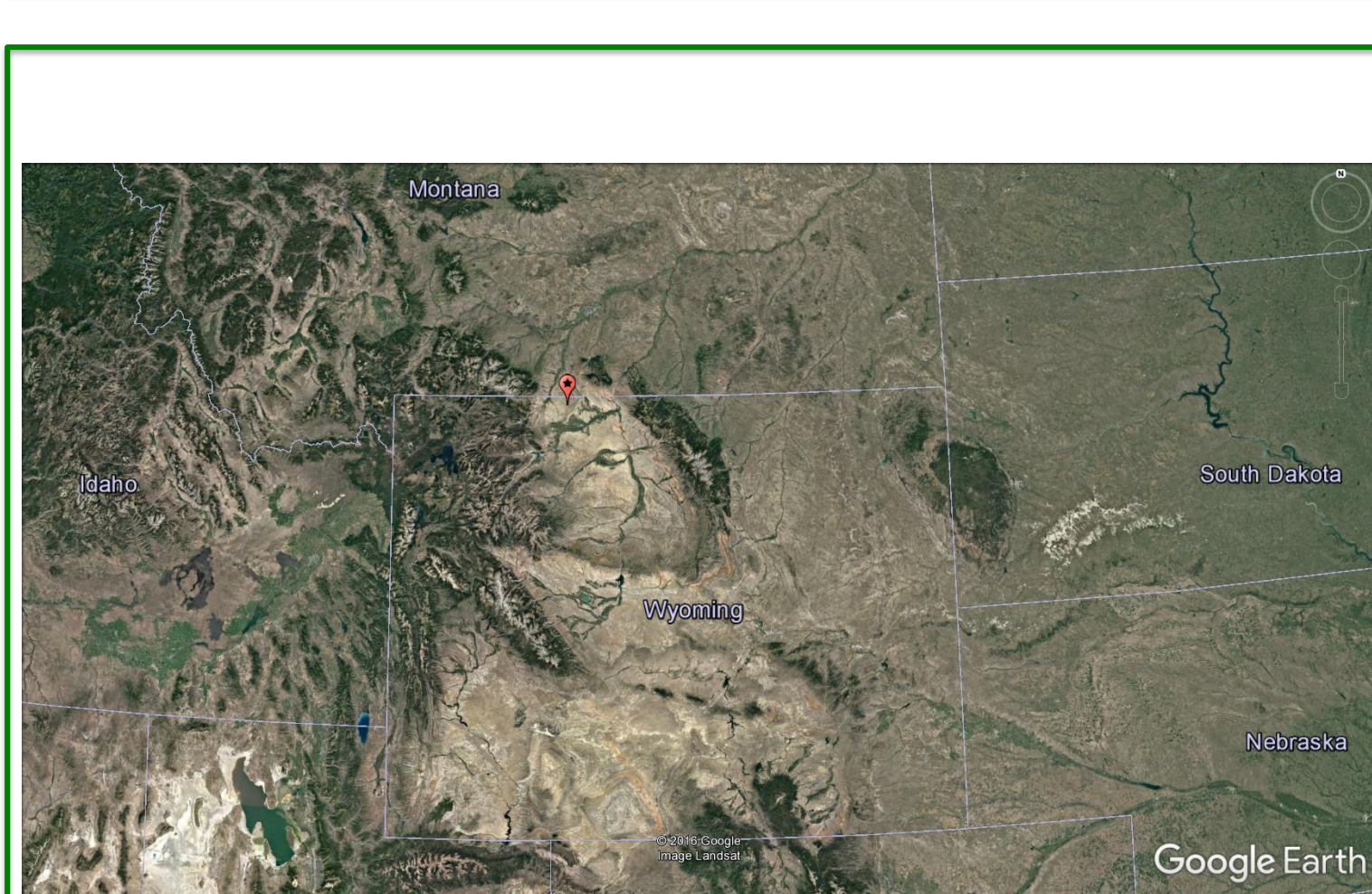


Figure 11. Location of discovery of NJSM 24228, in Park County, Wyoming.

## Conclusion

A new *L. gracilis* specimen, NJSM 24228, collected in 2013 and 2014 by the Bighorn Basin Dinosaur Project is one of only six specimens containing postcranial skeletal elements, and the first specimen to be collected from a matrix composed of silty shale. The specimen was identified as *L. gracilis* based on unbifurcated roots, truncated rostrum, and a partial elongate prementary. Additional skeletal material includes both complete and partial elements from the skull, thorax, and extremities.

NJSM 24228 is composed of both cranial and post-cranial elements, closely associated and partially articulated, and lacking indications of predation. In addition, the matrix in which the remains were found is highly suggestive of an overbank deposit. Therefore, a perimortem flood cannot be ruled out as a possible event that caused rapid burial or even the death of the animal.

## References

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## Acknowledgements

The authors would like to thank Dr. Ned Gilmore of the Academy of Natural Sciences in Philadelphia for his assistance. The discovery of the specimen by Linda Fitzgerald in 2013 deserves recognition as well, as do the 2013 & 2014 Bighorn Basin Dinosaur Project field teams for the excavation of NJSM 24228.