

THE HETEROMORPH AMMONITE *HOPLOSCAPHITES* AFF. *H. NODOSUS* (OWEN, 1852) FROM THE UPPER CRETACEOUS (CAMPANIAN) OF NEW MEXICO AND ITS SIGNIFICANCE

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Three specimens of *Hoploscaphites* aff. *H. nodosus* (Owen, 1852) were recovered from the Pierre Shale in the Raton Basin of northeastern New Mexico. The shells were found at the same stratigraphic level as *Baculites jenseni*, hence they are dated as upper upper Campanian. *H. aff. H. nodosus* has previously been reported from the *Nostoceras* (*N. hyatti*) Zone in the Coon Creek Tongue of the Ripley Formation in Tennessee (Landman et al., 2010, p. 133, fig. 81). *N. (N.) hyatti* Stephenson is only known in the Western Interior from the *B. jenseni* Zone in the Pierre Shale near Walsenburg, Huerfano County, Colorado (Kennedy, 1993, p. 105). *H. aff. H. nodosus* has also been reported from the *B. reesidei*-*B. jenseni* zones in the Bearpaw Shale in Alberta, Canada and Montana, Nacotch Sand in Texas, and from the *B. reesidei* Zone in the Lake Creek Shale Member of the Pierre Shale in Kansas, Saratoga Chalk in Arkansas and the Larimer Sandstone Member of the Pierre Shale in Colorado (Landman et al., 2010, fig. 78, p. 125, 127, 133, 135).

The NMMNH specimens are closest to *Hoploscaphites nodosus*, but differ from that species in three respects: 1) they are too large for that species, with the largest specimen (macroconch) having a LMAX of about 117 mm, which would be larger if the phragmocone was complete, 2) the rib density of the specimens is about half that of *H. nodosus* with ribs on the venter of the mid-shaft measuring 3-3.5 per cm, and 3) the flanks are somewhat flattened on the body chamber. Forms assigned to *H. aff. H. nodosus* are larger, more coarsely ornamented and have flatter flanks than *H. nodosus* (Landman et al., 2010, p. 127, 135). The largest NMMNH specimen has the aperture and apertural lip completely preserved with an aptychus (lower jaw) preserved in close association in the shale covering the outside of the aperture.

The largest NMMNH specimen is significant because ammonite jaws usually occur as isolated elements, but jaws inside or closely associated with body chambers are relatively rare. The NMMNH specimens are also important because this is the first report of a lower jaw associated with *Hoploscaphites* aff. *H. nodosus* and the first report of this taxon from New Mexico.



Figure 3. Lateral view of a very large, fairly well preserved, incomplete macroconch of *Hoploscaphites* aff. *H. nodosus* (Owen, 1852), NMMNH P-81434 from locality 12575, with most of the phragmocone missing. The lower jaw (aptychus) is indicated by the arrow.



Figure 4. The jaw (indicated by arrow) is sitting in shale matrix just outside the aperture and is flush with the apertural lip.



Figure 5. Apertural view of partial shell with lower jaw (indicated by arrow) in association with aperture.



Figure 6. Close-up of lower jaw in association with aperture.

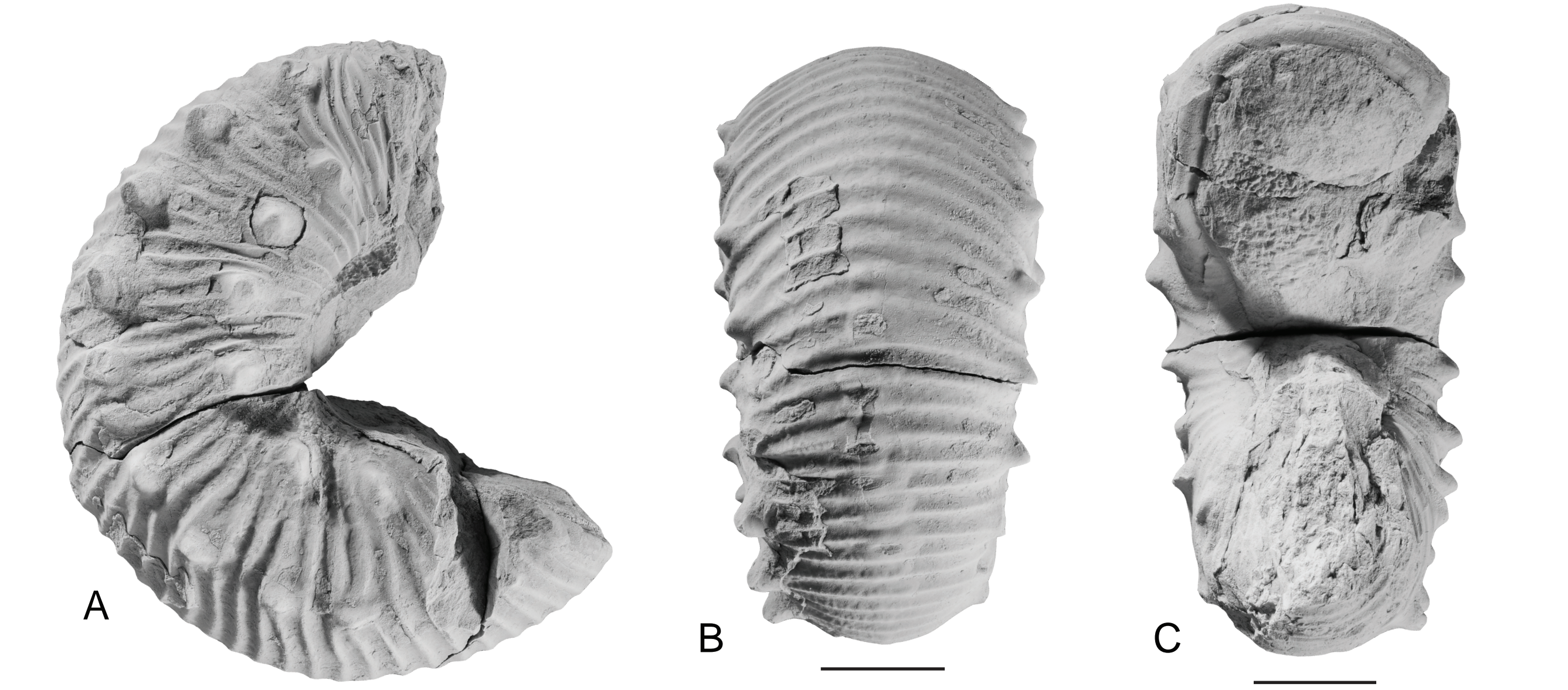


Figure 8. A-C, incomplete microconch of *Hoploscaphites* aff. *H. nodosus* (Owen, 1852), A, lateral, B, ventral and C, apertural views, NMMNH P-81421 from locality 12575. Upper upper Campanian *Baculites jenseni* Zone of New Mexico. LMAX = 94.2 mm. Scales equal 2 cm.

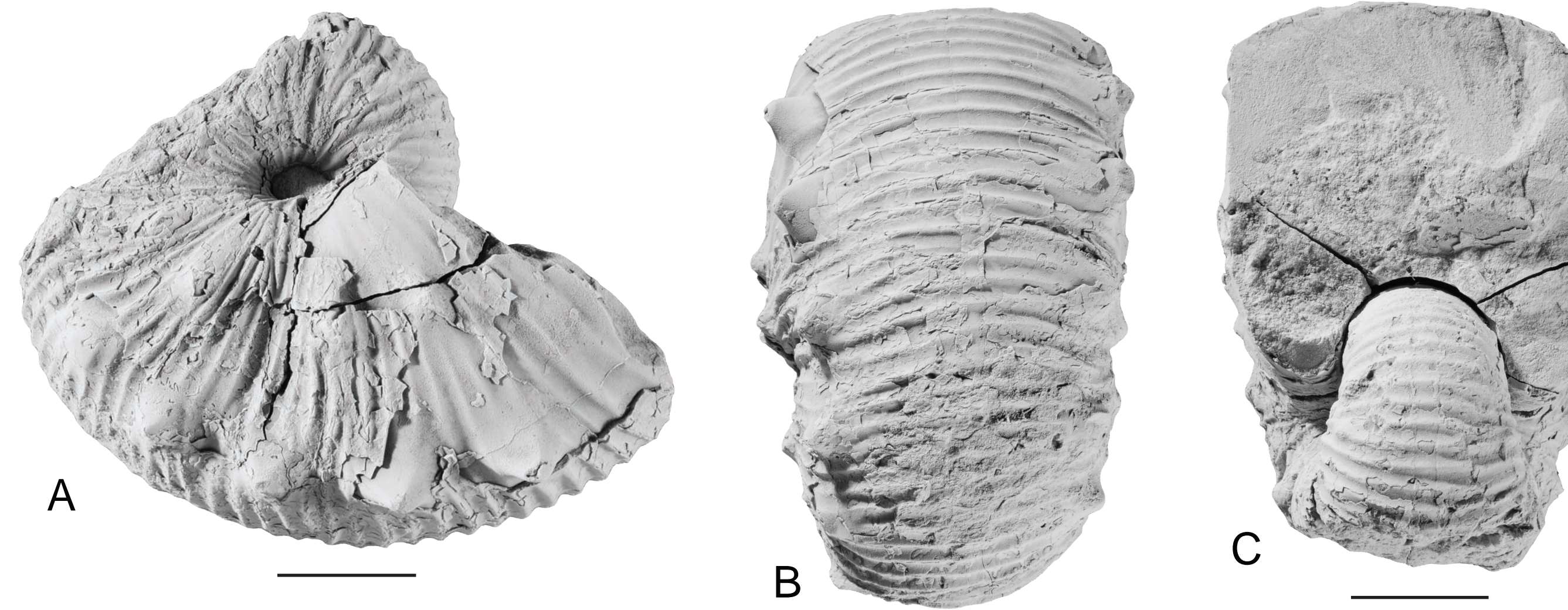


Figure 9. A-C, incomplete microconch of *Hoploscaphites* aff. *H. nodosus* (Owen, 1852), A, lateral, B, ventral and C, apertural views, NMMNH P-81160 from locality 12483. Upper upper Campanian *Baculites jenseni* Zone of New Mexico. LMAX = 85.3 mm. Scales equal 2 cm.



Figure 10. Macroconch of *Hoploscaphites nodosus* (Owen, 1852) from the *Baculites cuneatus* Zone of South Dakota (modified from Landman et al., 2010, fig. 49) (LMAX = 89.1 mm; not to scale). Compare to figures of *Hoploscaphites* aff. *H. nodosus*.



Figure 7. Ventral view of incomplete macroconch of *Hoploscaphites* aff. *H. nodosus* illustrated in figures to left. LMAX = 117.5 mm.

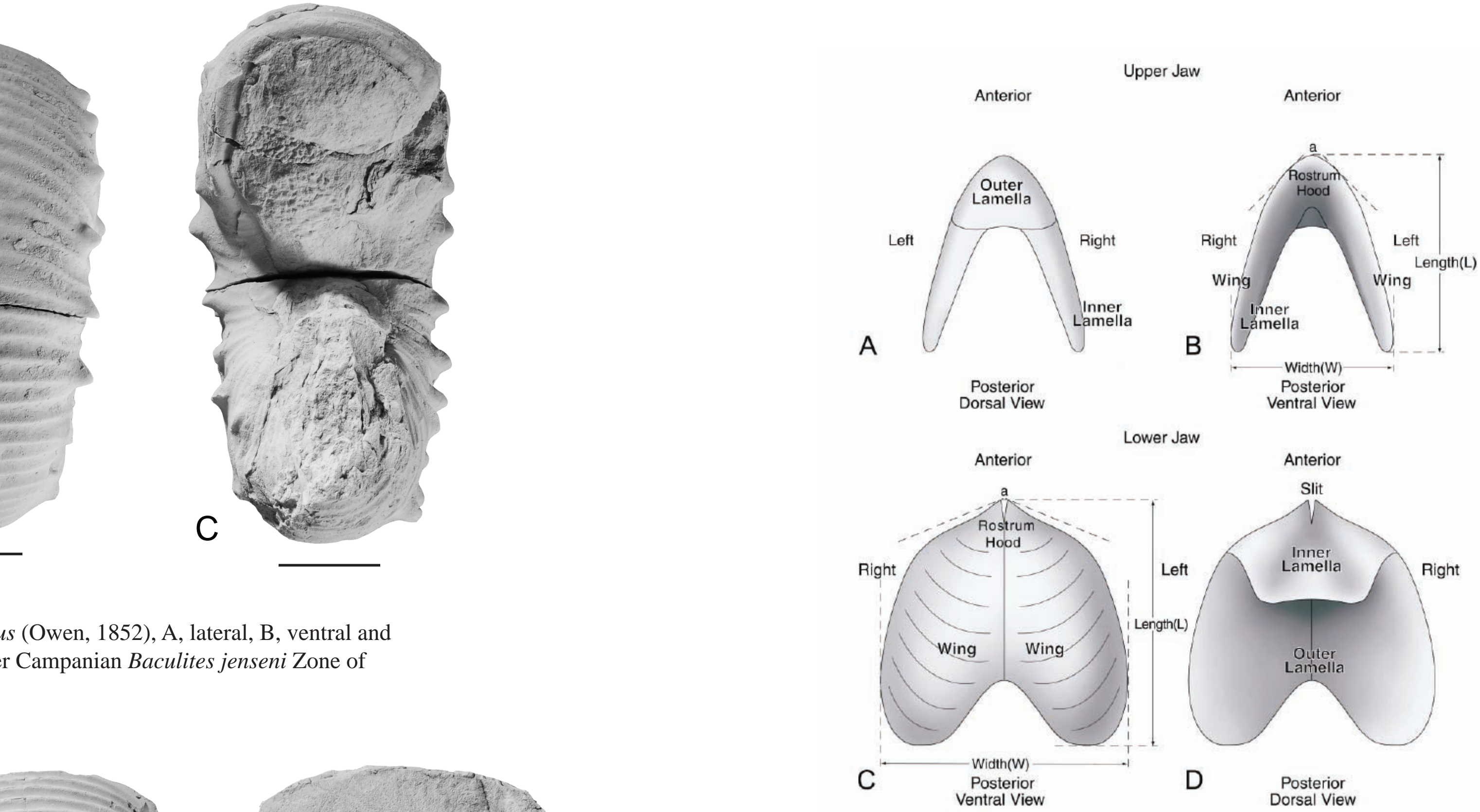


Figure 13. Diagram of upper and lower ammonite jaws illustrating terminology and measurements. A, dorsal view of upper jaw, B, ventral view of upper jaw, C, ventral view of lower jaw, D, dorsal view of lower jaw. Abbreviation: a = apical angle (modified from Landman et al., 2006, fig. 2).

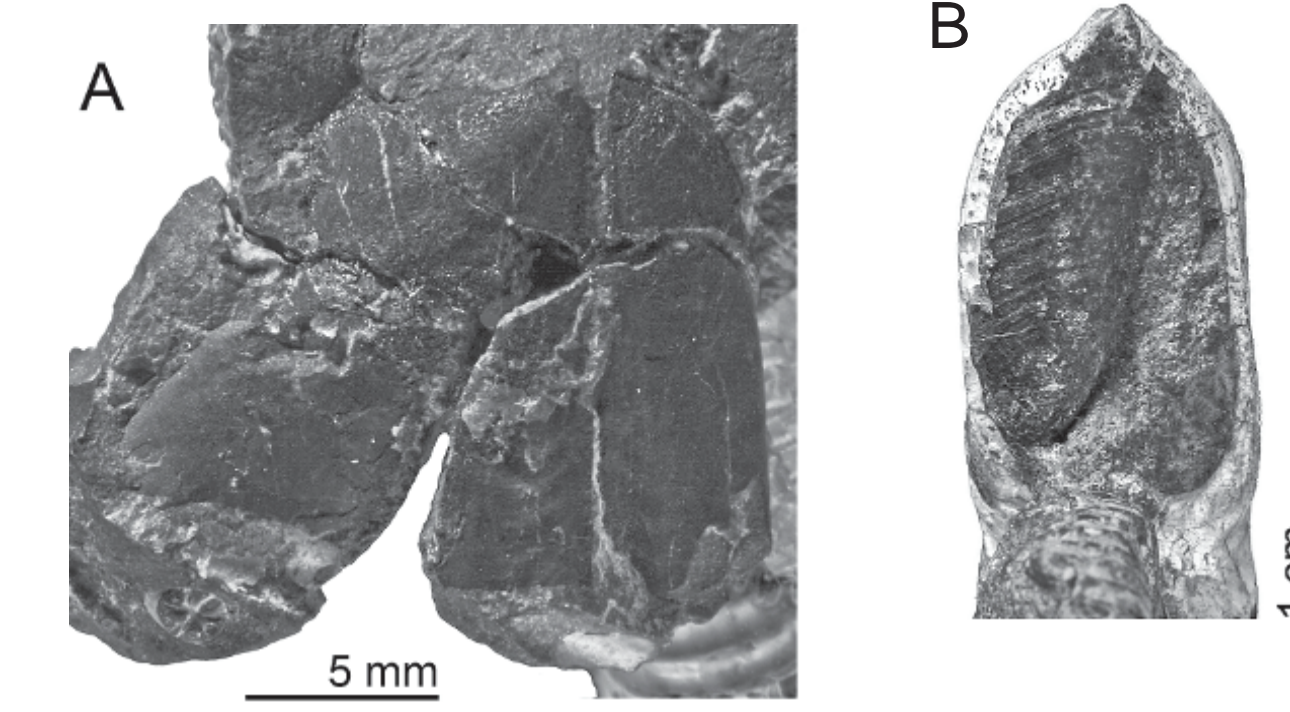


Figure 14. A-B, lower jaws of small microconchs of *Hoploscaphites brevis* (Meek, 1876). A, ventral view of the lower jaw, played out in the aperture, anterior direction of the jaw toward the top. *Baculites compressus* Zone, Pierre Shale, South Dakota; B, close up of the left side of the lower jaw in the aperture, anterior direction of the jaw toward the bottom. South Saskatchewan River Sask (modified from Landman et al., 2010, fig. 29). Compare to Fig. 6 of New Mexico specimen.

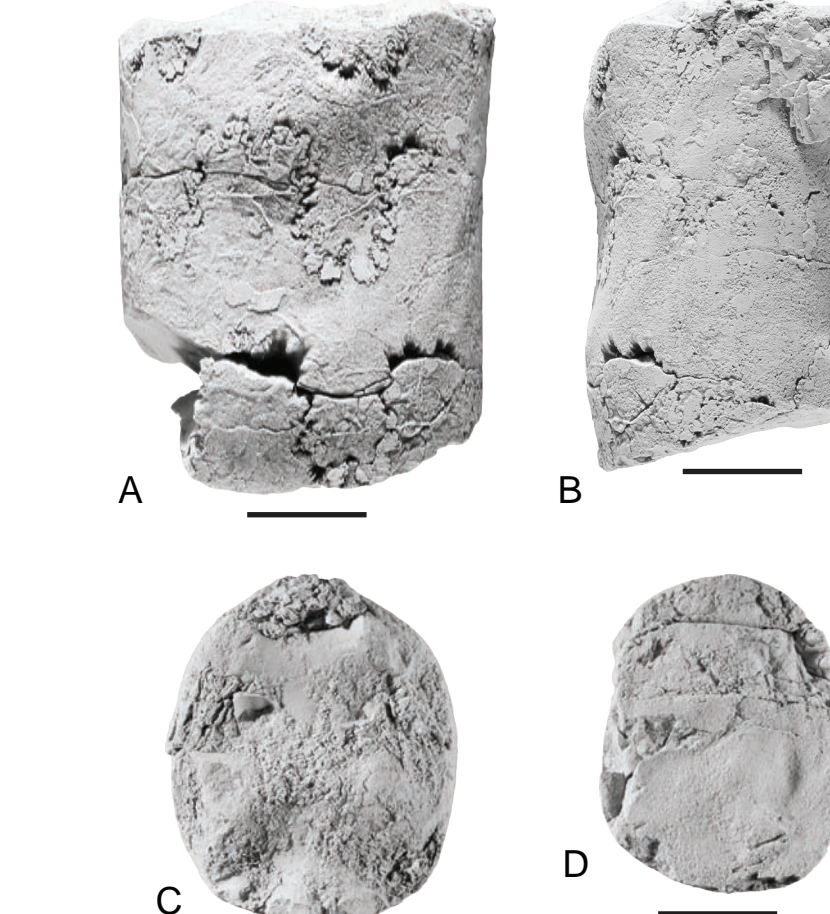


Figure 11. A-D, *Baculites baculus* Meek and Hayden, 1861, A, lateral, B, ventral, C and D, cross sectional views from locality 12576. Earliest Maastrichtian *Baculites baculus* Zone of New Mexico. Scales equal 2 cm.

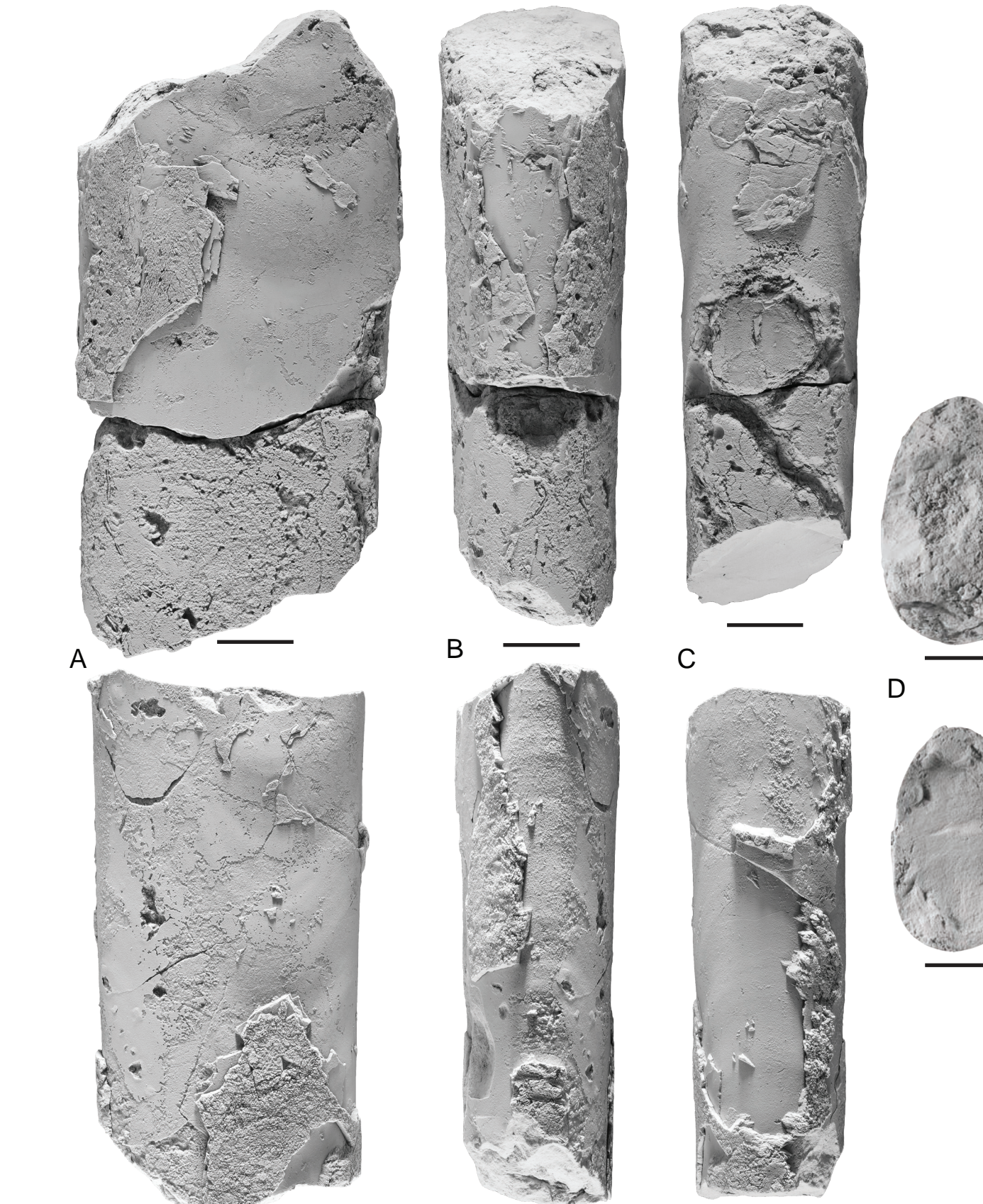


Figure 12. A-D, *Baculites jenseni* Cobban, 1962, A, lateral, B, ventral, C, dorsal and D, cross sectional views in two parts, NMMNH P-81164 from locality 12579. Upper upper Campanian *Baculites jenseni* Zone of New Mexico. Scales equal 2 cm.

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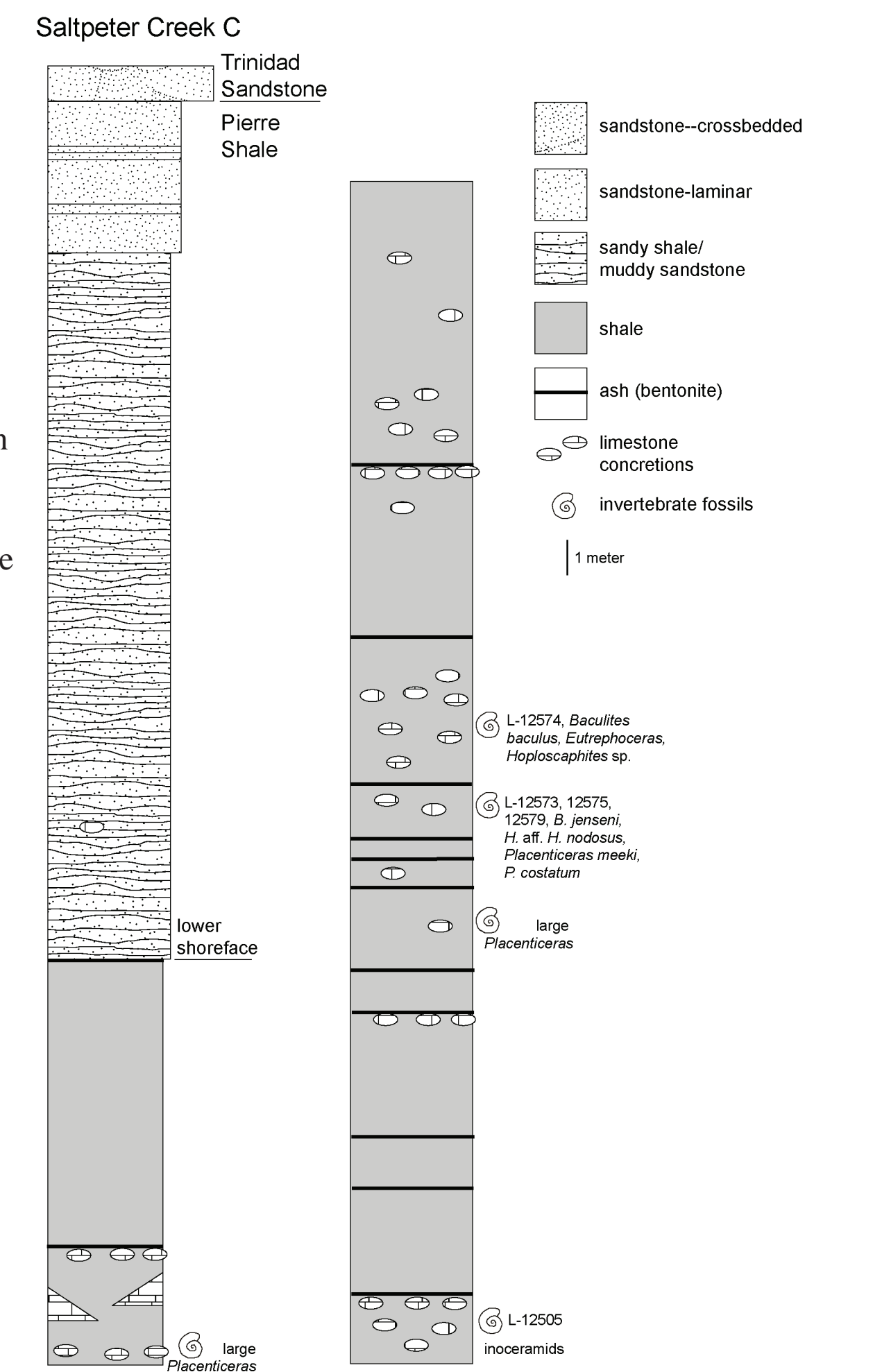


Figure 2. Western Interior biostratigraphic ammonite zones present in the measured section in Fig. 1 (red asterisks). Table modified from Slattery et al. (2015, fig. 5; 2018, fig. 3).