

Redescription of the rare Late Cretaceous ammonite *Chesapeakiceras nodatum*, from the Chesapeake and Delaware Canal, USA

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ABSTRACT.—The heteromorphic ammonite *Chesapeakiceras nodatum* Kennedy and Cobban, 1993, has been known only from the late Santonian to early Campanian Merchantville Formation of the Atlantic Coastal Plain of the United States. Prior to this report, only three fragmentary specimens have been recovered from the Chesapeake and Delaware Canal in the state of Delaware, U.S.A. Here we describe a fourth specimen, NJSM GP23099, that is the most complete known fragment of *C. nodatum* and is the only existing specimen that has been recovered “*in situ*”. This demonstrates that the stratigraphic range of *C. nodatum* extends into the upper Merchantville Formation.

Key words: Mollusca; Late Cretaceous, ammonite, *Chesapeakiceras*, C&D canal.

INTRODUCTION

Despite years of extensive study of the Late Cretaceous sediments of the Atlantic Coastal Plain of the United States, the heteromorphic ammonite *Chesapeakiceras nodatum* remains exceedingly rare (e.g. Reeside, 1962; Owens and Sohl, 1969; Pickett, 1970; Gallagher, 1993; Kennedy and Cobban, 1993; Lauginiger et al., 2014).

Chesapeakiceras nodatum was first described by Kennedy and Cobban (1993) as *Chesapeakella nodatum* based on only two fragmentary specimens (USNM 445236, USNM 445237) collected along the Chesapeake and Delaware (C&D) Canal, from spoil piles containing dredged sediments from the lower portion of the Merchantville Formation (Campbell, 1993; Kennedy and Cobban, 1993; 1998). Kennedy and Cobban (1998) reassigned the genus name to *Chesapeakiceras* due to the preexisting assignment of the name in Campbell (1993). A third specimen (MAPS A2036a) was later recovered from a similar spoil pile of Merchantville sediment along the

C&D canal. These three specimens are small fragments with an average length of 2.8cm, and are preserved as weathered dark-brown siderite steinkerns (Figure 1e – g).

In this report, we describe a fourth specimen of *Chesapeakiceras nodatum* (NJSM GP23099), which is the largest and most complete specimen known to date. Unlike the occurrence of the previous three specimens, NJSM GP23099 was recovered *in situ* from the Merchantville Formation, as exposed at the Deep Cut locality of the C&D canal near the town of Summit, Delaware (Figure 2). Numerous geological and palaeontological studies have determined the Merchantville Formation to have been deposited during the late Santonian to early Campanian (e.g., Richards et al., 1962; Minard, 1965; Gray and Groot, 1966; Petters, 1976; Owens and Sohl, 1969; Owens et al., 1970; Pickett, 1970; 1987; Lauginiger and Hartstein, 1983; Lauginiger, 1988; Aurisano, 1989; Kennedy and Cobban, 1993; Lauginiger et al., 2014). NJSM GP23099 was collected by E. Lauginiger and is now deposited in the collections of the New Jersey State Museum.

ABBREVIATIONS

USNM	United States National Museum of Natural History
NJSM	New Jersey State Museum
MAPS	Monmouth Amateur Paleontologists' Society

SYSTEMATIC PALEONTOLOGY

- Phylum MOLLUSCA Linnaeus, 1758
 Class CEPHALOPODA Leach, 1817
 Order AMMONOIDEA Zittel, 1884
 Suborder ANCYLOCERATINA Wiedmann, 1966
 Superfamily TURRILITACEAE Gill, 1871
 Family DIPLOMOCERATIDAE Spath, 1926
 Subfamily DIPLOMOCERATINAE Spath, 1926
 Genus *Chesapeakiceras* Kennedy & Cobban, 1998
Chesapeakiceras nodatum Kennedy & Cobban, 1993
 (Figure 1a-d)

Referred Specimen.—NJSM GP23099

Description.—Specimen NJSM GP23099 is a single partial whorl measuring 70 mm in length along the venter, from one end of the fragment to the other. The slight curvature of the whorl on a flat plain suggest that the specimen is the fragment of cyrtocone shell, which is consistent with the other existing specimens of *C. nodatum*. It is preserved as a micaceous clay-silt steinkern, with minor traces of glauconite. The lateral surface is cemented to the steinkern of the gastropod *Gyrodes supraplicatus* (Conrad, 1858), which is similarly preserved. The whorl section is fastigate in shape and the nodes and ribs are fairly well defined. The specimen contains 15 moderately to coarsely defined ribs that are rectiradiate and slightly convex. Rib Spacing is distant, with approximately 5 mm between each rib, although those on the dorsum are obstructed from view due to cementation of the specimen *G. supraplicatus*. A single row of transversely elongated siphonal nodes is present along the venter of the whorl. The majority of the nodes are well preserved, while others have been eroded. The ribs appear to be looped through the nodes.

In a prior study, Lauginiger et al. (2014) referred NJSM GP23099 to *Cirroceras conradi* (Morton, 1841). However, reanalysis of the specimen reveal morphological features that are instead indicative of *Chesapeakiceras nodatum*. The presence of a single row of transversely elongate siphonal nodes that trail along the venter differentiates *Chesapeakiceras nodatum* from all other genera of Diplomoceratinae and ammonites in the Merchantville Formation (Kennedy and Cobban, 1993). *Cirroceras conradi* displays two distinct rows of tubercles along the ventrolateral edge. This nodal arrangement is not seen on

any of the existing specimens of *Chesapeakiceras nodatum* and in particular, is not present on the specimen described here (Cobban, 1970). Furthermore, *Chesapeakiceras nodatum* appears to coil in a flat plane, whereas *Cirroceras conradi* displays a helical form.

DISCUSSION AND CONCLUSION

The three original specimens (holotype USNM 445236, and paratypes USNM 445237 and MAPS A2036a) were collected from the glauconitic-rich spoil piles, a lithology highly indicative of the basal Merchantville Formation, which previously restricted the species to this interval. Specimen NJSM GP23099 was collected *in situ* from the fine-grained quartz sand and mica silt rich sediments of the upper Merchantville Formation above beach-level, extending the known range of this species to the upper portion of this unit. Regardless, *C. nodatum* remains a highly stratigraphically and geographically restricted species, limited to the late Santonian to early Campanian Merchantville Formation of the C&D canal. It's restriction to this unit also suggests that *C. nodatum* inhabited near-shore, neritic marine environments (Kennedy and Cobban, 1993).

Despite the recent discovery of NJSM GP23099, *C. nodatum* remains an extraordinarily rare species. It is hoped that continued collecting within the Merchantville Formation and other contemporaneous units, and careful reevaluation of museum collections, will reveal additional specimens of *C. nodatum*. Only then will we have a more complete picture and much needed insight into the morphology and life habits of this exceedingly rare ammonite.

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LITERATURE CITED

- Aurisano, R. 1989: Upper Cretaceous dinoflagellate biostratigraphy of the subsurface Atlantic Coastal Plain of New Jersey and Delaware, U.S.A. *Palynology*, 13:143–179.
 Campbell, L. 1993. Pliocene molluscs from the Yorktown and Chowan River Formations in Virginia. Virginia Division of Mineral Resources Publication, 127:259 p., 43 Pls.

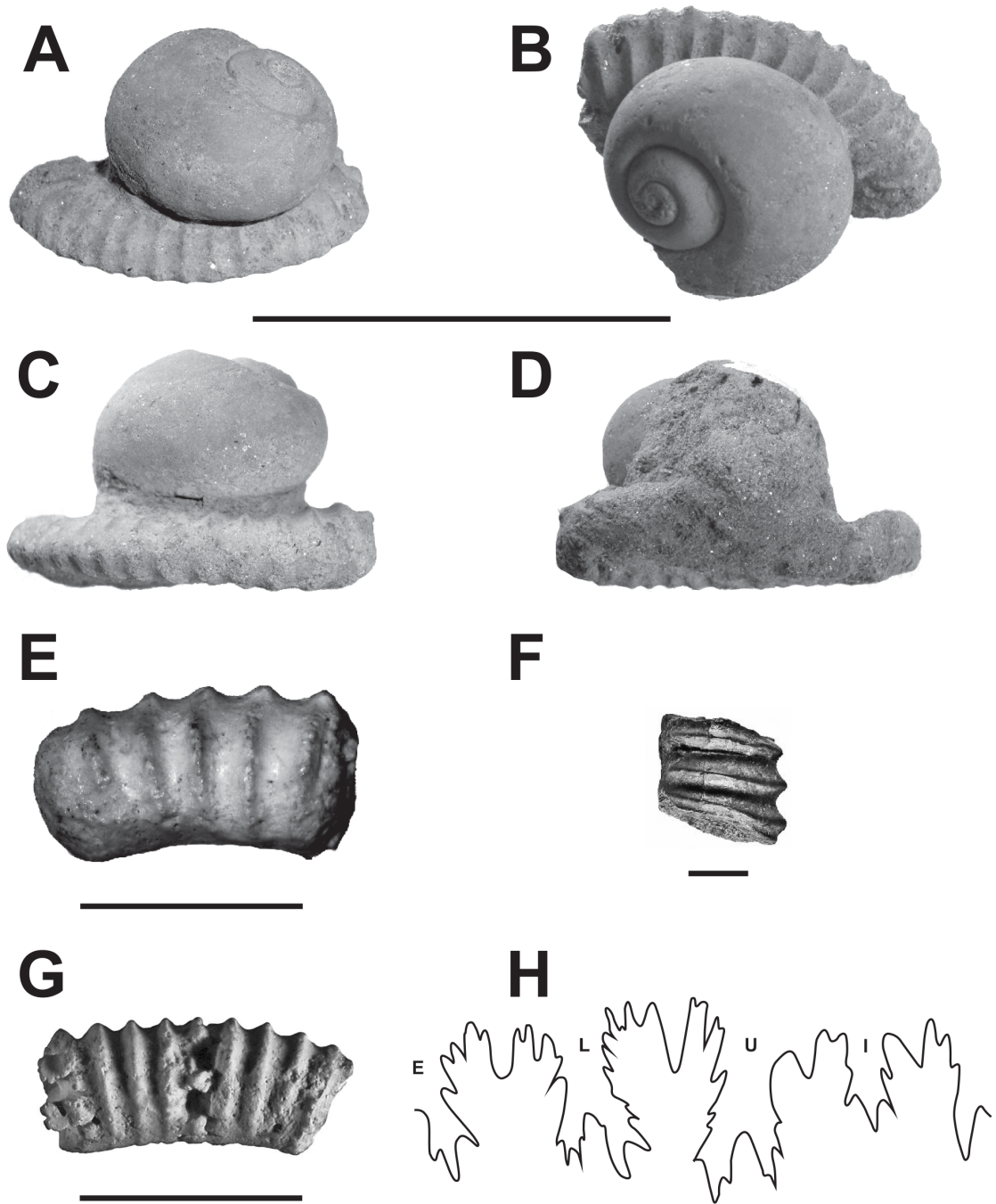


Fig. 1. Entire hypodigm of *Chesapeakiceras nodatum*. A-D. NJSMP23099 with the cemented *Gyrodes supraplicatus* (A. ventral/lateral view, B. lateral view, C. ventral view, D. dorsal view), scale bar equals 7cm. E. USNM 445237, scale bar equals 2cm. F. MAPS A2036a, scale bar equals 1cm. G. holotype USNM 445236, scale bar equals 2cm. H. Suture patterns *Chesapeakiceras nodatum*, USNM 445236. Line drawing of the suture pattern of *C. nodatum* modified from Kennedy and Cobban (1993). E= external lobe, L= lateral lobe, U= umbilical lobe, I= internal lobe.

- Cobban, W. 1970. Occurrence of the Late Cretaceous ammonites *Didymoceras stevensoni* (Whitfield) and *Exiteloceras jenneyi* (Whitfield) in Delaware. Geological Survey research 1970, Chapter D: U.S. Geological Survey Professional Paper 700:D71–D76.
- Conrad, T. 1858. Observations on a group of fossil shells, found in Tippah County, Mississippi, with descriptions of fifty-six new species. *Journal of the Academy of Natural Sciences of Philadelphia (Second Series)*, 3:323–335.
- Gallagher, B. 1993. The Cretaceous/Tertiary mass extinction event in the northern Atlantic coastal plain. *The Mosasaur*, 5:75–154.
- Gray, T., and J. Groot, J. 1966. Pollen and spores from the marine Upper Cretaceous formations of Delaware and New Jersey. *Palaeontographica (B) No.* 117:114–134.
- Kennedy, W. and W. Cobban. 1993. Lower Campanian (Upper Cretaceous) ammonites from the Merchantville Formation of New Jersey, Maryland, and Delaware. *Journal of Paleontology*, 67:828–849.
- Kennedy, W., and W. Cobban. 1998. *Chesapeakiceras*, new name for *Chesapeakella* Kennedy and Cobban, 1993 (September 14), not *Chesapeakella* Campbell, 1993 (June 13). *Journal of Paleontology*, 72:403.
- Lauginiger, E., D. Parris, and R. Pelligrini. 2014. The Chesapeake and Delaware Canal: Two centuries of paleontology on a public tract. *Dakoterra*, 6:170–180.
- Lauginiger, E. 1988. Cretaceous fossils from the Chesapeake and Delaware Canal: A guide for students and collectors. Delaware Geological Survey, Special Publication No. 18, 57p.
- Lauginiger, E., and E. Hartstein. 1983. A guide to the fossil sharks, skates, and rays from the Chesapeake and Delaware Canal area, Delaware. Delaware Geological Survey Open File Report 21, 65 pp.
- Minard, J. 1965. Geology of the Woodstown quadrangle, New Jersey. U.S. Geologic Survey Geological Quadrangle Map GQ-404.
- Morton, S. 1841. Description of some new species of organic remains of the Cretaceous Group of the United States: with tabular view of the fossils hitherto discovered in this formation. *Journal of the Academy of Natural Sciences of Philadelphia (First Series)* 8:207–227.
- Owens, J., and N. Sohl. 1969. Shelf and Deltaic Paleoenvironments in the Cretaceous-Tertiary Formations of the New Jersey Coastal Plain p. 235–278. In S. Subitzky (ed.), *Geology of Selected Areas in New Jersey and Eastern Pennsylvania and Guidebook of Excursions*, Rutgers University Press.
- Owens, J., J. Minard, N. Sohl, and J. Mello. 1970. Stratigraphy of the outcropping post-Magothy Upper Cretaceous formations in southern New Jersey and northern Delmarva Peninsula, Delaware and Maryland: U. S. Geological Survey Professional Paper 674, 60 p.
- Petters, S. 1976. Upper Cretaceous subsurface stratigraphy of the Atlantic coastal plain of New Jersey. *American Association of Petroleum Geologists Bulletin*, 60:87–107.

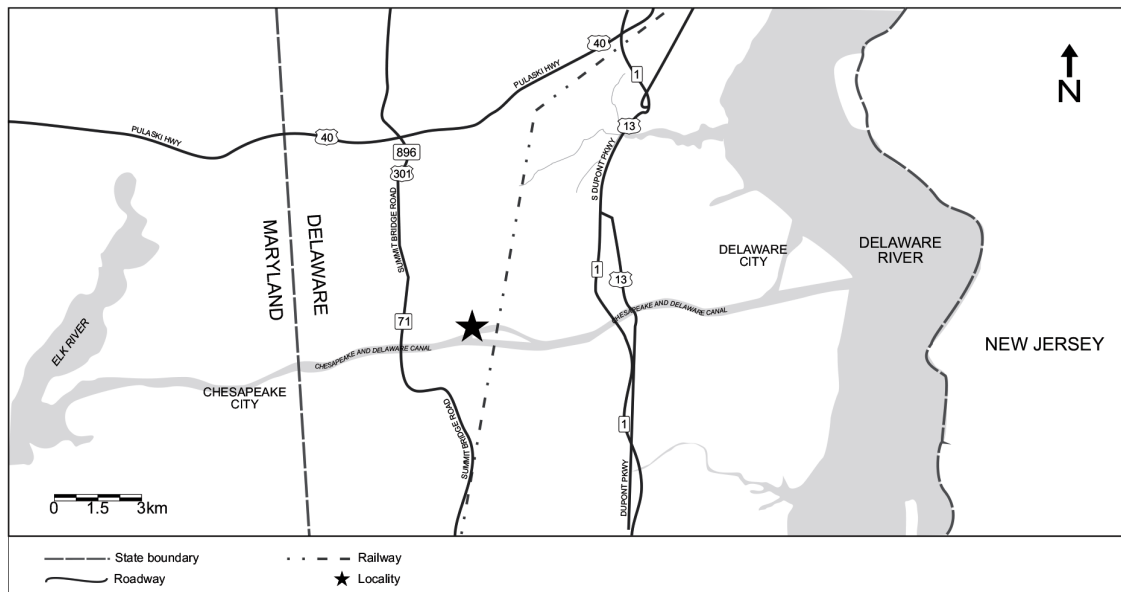


Fig. 2. Map showing the Deep Cut locality along the Chesapeake and Delaware Canal.

- Pickett, T. 1970, Geology of the Chesapeake and Delaware Canal area: Delaware Geological Survey, Geologic Map Series No.1, scale 1:24,000.
- Pickett, T. 1987. Upper Cretaceous and Quaternary stratigraphy of the Chesapeake and Delaware Canal: Geological Society of America Centennial Field Guide-Northeastern Section, p. 23-24.
- Reeside, J., Jr. 1962. Cretaceous ammonites of New Jersey p. 113–137. In H.G. Richards (ed.), The Cretaceous Fossils of New Jersey, Part 2. New Jersey Geological Survey Paleontology Series Bulletin 61.
- Richards, H., R. Ramsdell, A. Miller, H. Garner, J. Reeside Jr., A. Jeletzky, H. Roberts, and H. Miller Jr. 1962. The Cretaceous Fossils of New Jersey, Part II. Bulletin 61, Bureau of Geology and Topography, Department of Conservation and Economic Development, Trenton, NJ, 237 pp.
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