

A new Early Carboniferous nautilid from the Caney Formation of Oklahoma, Central North America

Authors: NIKO, SHUJI, and MAPES, ROYAL H.

Source: Paleontological Research, 8(4) : 341-344

Published By: The Palaeontological Society of Japan

URL: <https://doi.org/10.2517/prpsj.8.341>

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

A new Early Carboniferous nautilid from the Caney Formation of Oklahoma, Central North America

SHUJI NIKO¹ AND ROYAL H. MAPES²

¹Department of Environmental Studies, Faculty of Integrated Arts and Sciences, Hiroshima University, 1-7-1 Kagamiyama, Higashihiroshima, Hiroshima 739-8521, Japan (e-mail: niko@hiroshima-u.ac.jp)

²Department of Geological Sciences, Ohio University, Athens, Ohio 45701, U.S.A. (e-mail: mapes@ohio.edu)

Received April 13, 2004; Revised manuscript accepted September 21, 2004

Key words: Caney Formation, *Epistroboceras caneyense* sp. nov., middle Chesterian (Early Carboniferous), Oklahoma, trigonoceratid nautilid

Introduction

The Caney Formation, named and defined by Taff (1901), comprises a relatively thin (approximately 115 m thick in the type section) marine sedimentary unit consisting mostly of shale with limestone concretions. The formation is divided into the Ahloslo, Delaware Creek, Sand Branch, and Rhoda Creek Members in ascending order (Elias, 1956; Elias and Branson, 1959, and others). We describe below a new trigonoceratid nautilid species, *Epistroboceras caneyense*, recovered from limestone concretions in the dark gray shale of the Sand Branch Member at the type section for this member. The material examined was collected at an outcrop in the stream bed of Sandy Branch Creek, approximately 1.6 km downstream from the junction of this stream and Highway 48 south of the town of Wapanucka, Johnston Co., Oklahoma. The locality is identical to loc. 2082 (Girty, 1909) and loc. M-15 (Mapes, 1979). Ammonoids, including *Cravenoceras richardsonianum* and *Eumorphoceras bisulcatum*, from this locality indicate a middle Chesterian (late Early Carboniferous) age in Gordon's (1964) biostratigraphic scheme.

Systematic paleontology

Family Trigonoceratidae Hyatt, 1884

Genus *Epistroboceras* Turner, 1954

Type species.—*Epistroboceras stubblefieldi* Turner (1954, p. 308, 309, pl. 22, figs. 1–8; text-fig. 1c) from the Isle of Man.

Other included species.—*Epistroboceras anglicum*

(Hyatt, 1893, p. 410, 411) from Yorkshire, *E. caneyense* sp. nov. (this report), *E. gracile* Shimansky (1967, p. 154, 155, pl. 19, figs. 5a, b, v, 6) from the southern Urals, *E. phillipsianum* (Orbigny, 1847, pl. 93, figs. 1, 2, only; see Koninck, 1878, p. 130) from Belgium, *E. ? pinum* Shimansky (1996, p. 27, pl. 2, figs. 4a, b, v) from Novaya Zemlya, *E. rusanovi* Shimansky (1993, p. 21, 22, pl. 3, figs. 8a, b, v, 9a, b) from Novaya Zemlya, *E. ? sulcifer* (Léveillé, 1835, p. 38, pl. 2, figs. 1, 2) from Belgium, *E. texanum* (Miller and Youngquist, 1948, p. 654, 655, pl. 94, fig. 6, text-fig. 1) from Texas and Nevada (Youngquist, 1949, pl. 57, figs. 10–12), *E. sp.* from the Fayetteville Formation, Arkansas (Gordon, 1964, p. 147, pl. 11, figs. 2, 3, text-fig. 21B), *E. sp.* from the Pitkin Formation, Arkansas (Gordon, 1964, p. 147).

Range.—Middle Visean to late Serpukhovian (Early Carboniferous).

Diagnosis.—Coiled genus of trigonoceratids having evolute and compressed shell with concave venter, carinate ventrolateral angles, and converging but obtusely angulated flanks; juvenile shell like *Stroboceras*, but lateral grooves developed in juvenile stages become obsolescent with maturity; adoral growth lines are not accentuated as in *Stroboceras*; flanks commonly ornamented by longitudinal lirae; sutures with shallow ventral and broadly rounded lateral lobes; siphuncle subventral.

Discussion.—*Epistroboceras* was considered to be a subgenus of *Stroboceras* (Hyatt, 1884) by Gordon (1964) based on similarity of the juvenile shell morphologies. The *Stroboceras*-like indented shells in the early growth stages are also recognized in *Aphe-laeceras* (Hyatt, 1884) and *Echigoceras* (Niko, 2002).

Although there is a possibility that the genus *Aphelaeceras* with a tightly coiled shell is assignable as a subgenus of *Stroboceras*, *Echigoceras* cannot be so assigned because it differs in having a cyrtconic shell. This suggests that the early juvenile shell morphology should be considered a suprageneric characteristic rather than a subgeneric one in the sense of Gordon (1964). In addition, loss of the outer whorl contact, which is the diagnostic feature of *Stroboceras*, has not been recorded in *Epistroboceras*. For these reasons, we consider *Epistroboceras* to be a distinct genus.

Turner (1954) assigned *Nautilus bisulcatus* Koninck (1878; non M'Coy, 1844; see Miller and Garner, 1953, p. 136) and *N. sulcatus* Sowerby, 1826 to *Epistroboceras*. Subsequently Histon (1999) transferred *Stroboceras crassum* Foord, 1900 to *Epistroboceras*. Shmanský (1967) added a new species, *Epistroboceras chancharensis*, from the southern Urals. However, the well developed lateral grooves in the adoral whorls of these species suggest that they are better referred to *Stroboceras* rather than *Epistroboceras*. *Epistroboceras kathleenae* Ramsbottom and Moore (1961) from Ireland does not belong to the genus *Epistroboceras*. Its almost circular whorl shape and six spirals (= longitudinal ridges) on the flanks suggest a possible relationship between *E. kathleenae* and *Discitoceras* (Hyatt, 1884). *Aphelaeceras* has the most closely similar shell morphology with *Epistroboceras*, but it has non-angulated flanks in the adoral whorls. In terms of this criterion, *Epistroboceras ventrosiphonatum* Lai and Wang in Wang (1983) from the Middle Carboniferous of Xinjiang, Northwest China may be referable to *Aphelaeceras*.

***Epistroboceras caneyense* sp. nov.**

Figure 1

Diagnosis.—Species of *Epistroboceras* with a width/height ratio of approximately 0.77 on adoral whorl; relatively deep lateral (ocular) sinus in peristome; siphuncular position near midway between center of whorl and ventral margin, with a siphuncular position ratio (see the description for its definition) of approximately 0.22.

Description.—The single coiled phragmocone available for study has an evolute shell consisting of approximately 1 3/4 volutions with 28 mm in maximum observable diameter and 9 mm in maximum observable whorl width; umbilicus perforate; short diameter of umbilical perforation 4.5 mm. Juvenile whorl facing umbilical perforation is *Stroboceras*-like with cone-shaped embryonic shell; sections of juvenile whorl are subcircular with concave venter as ven-

tral groove (vg), and concave ventrolateral shoulders as ventrolateral grooves (v-lg) and roughly rounded flanks and dorsum; bilaterally symmetrical 2 lateral grooves (lg 1, 2) developed on flanks, latter of which is very narrow and shallow; vg and v-lg in juvenile whorl are overlapped by succeeding whorl as impressed area. Juvenile whorl surface is ornamented by four longitudinal ridges with bilateral symmetry, and accentuated growth lines; ventral ridges (vr) at boundary between vg and v-lg, ventrolateral (v-lr) at boundary between v-lg and lg 1, lateral (lr) on flanks at boundary between lg 1 and lg 2, and dorsolateral (d-lr) at boundary between lg 2 and umbilical wall. Adoral whorl rapidly inflates and its sections shift to compressed suboctagonal profiles; width/height ratio of whorl approximately 0.77; vg relatively wide for genus forming ventral platform bordered by carinated ventrolateral angles (= vr) approximately 120 degrees, having 0.23 in ratios of vg width per whorl width; flanks converging, form bilaterally symmetrical obtuse angle of approximately 160 degrees, at approximately 1/3 length of flank from venter; v-lg, lg 1 and lg 2 become obsolescent and flattened as shell grows; umbilical angle becomes distinct with approximately 120 degrees; umbilical walls indicate nearly linear profiles; 1 dorsal (contact) groove is added. Except for vr, surface ridges become subdued as shell grows; weak lirae partly recognized on flanks; growth lines indicate a lobate peristome shape, with deep V-shaped ventral (hyponomic) sinus, rounded ventrolateral saddle, relatively deep U-shaped lateral (ocular) sinus, and nearly linear dorsal rim. Adoral sutures with shallow but broad lateral lobe; sutures on ventral side cannot be observed where shell walls are not exfoliated. Septa moderately concave for genus, forming short camerae; there are 6 to 7 camerae in corresponding whorl height. Siphuncular position subventral, near midway between center of whorl and ventral margin; ratio of distance of central axis of septal foramen from ventral whorl surface per corresponding whorl height in dorsoventral section (siphuncular position ratio) is approximately 0.22.

Material examined.—A single partly preserved shell is the holotype that is deposited in the Ohio University Zoological Collection (OUZC) at Ohio University at Athens, Ohio with a registration number of OUZC 5100.

Etymology.—The specific name is derived from the Caney Formation from which the type specimen was recovered.

Discussion.—*Epistroboceras caneyense* sp. nov. can be distinguished from the most similar species *E. texanum* by having a higher width/height ratio on the

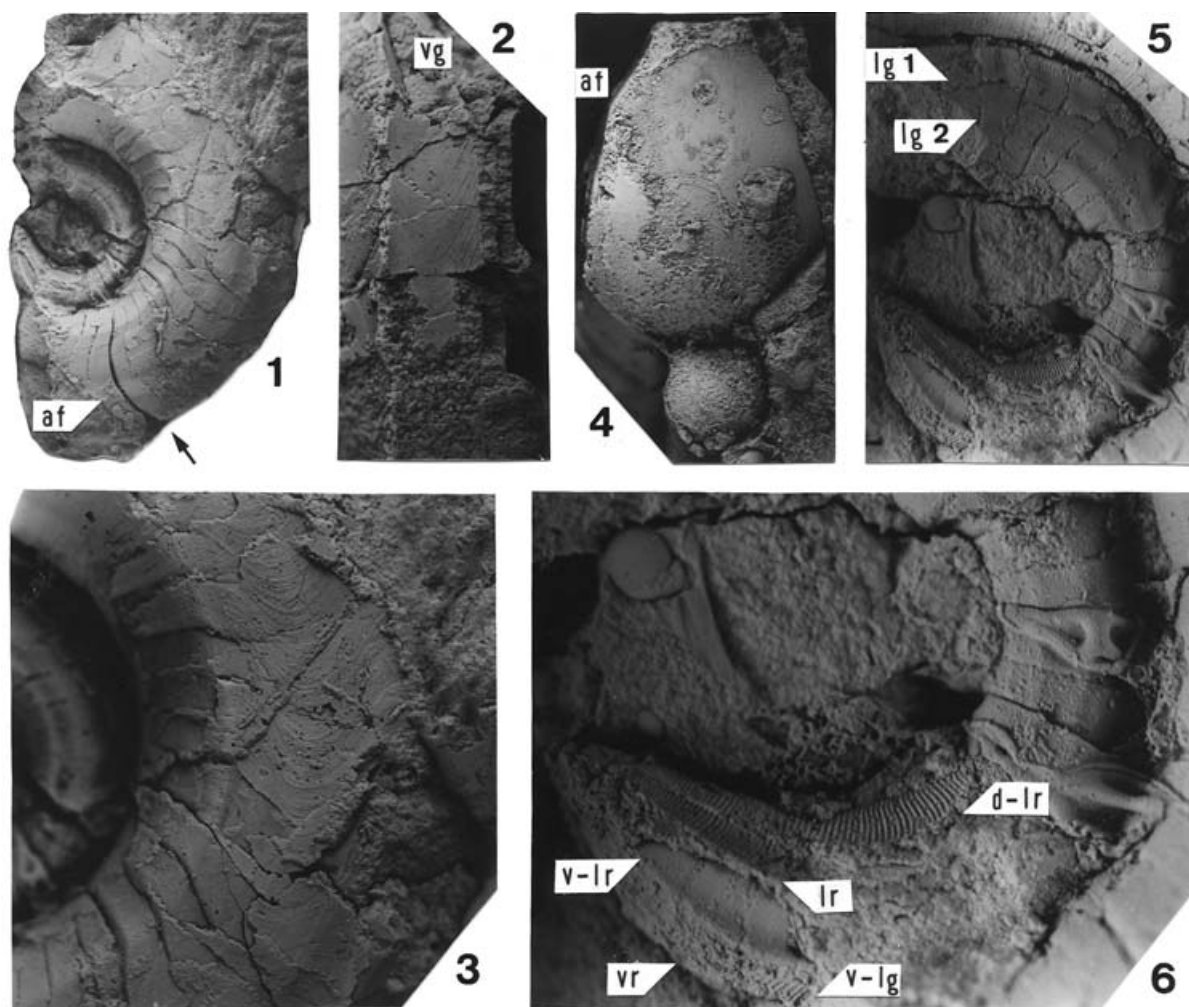


Figure 1. *Epistroboceras caneyense* sp. nov., holotype OUZC 5100. **1.** Lateral view, arrow indicates position of cross-sectional view of Figure 1.4, $\times 2$. **2.** Partial enlargement of ventral view, to show growth lines indicating ventral (hyponomic) sinus in peristome, $\times 5$. **3.** Partial enlargement of lateral view, to show growth lines indicating lateral (ocular) sinus in peristome, $\times 5$. **4.** Cross-sectional view, $\times 5$. **5.** Partial enlargement of lateral view, to show *Stroboceras*-like juvenile shell, $\times 5$. **6.** Details of apical part, $\times 10$. Abbreviations: vg = ventral groove; v-lg = ventrolateral groove; lg 1, 2 = lateral grooves; vr = ventral ridge; v-lr = ventrolateral ridge; lr = lateral ridge; d-lr = dorsolateral ridge; af = angle on flank.

adoral shell (approximately 0.77 versus approximately 0.5 in *E. texanum*), the less eccentric siphuncular position (siphuncular position ratios approximately 0.22 versus 0.18–0.20 in *E. texanum*), and the lack of distinct longitudinal lirae in the lateral groove of the juvenile shell. *Epistroboceras stubblefieldi* also has a lower width/height ratio on the adoral shell, ranging from 0.62 to 0.65, than the present new species, which has a ratio of approximately 0.77.

Acknowledgments

We appreciate the comments of an anonymous reviewer who improved the manuscript.

References

- Elias M. K., 1956: Upper Mississippian and Lower Pennsylvanian formations of south-central Oklahoma. *Petroleum Geology of Southern Oklahoma*, vol. 1, p. 56–134.
- Elias, M. K. and Branson, C. C., 1959: The section of the Caney Shale. *Oklahoma Geological Survey, Circular 52*, p. 3–24.
- Foord, A. H., 1900: Monograph of the Carboniferous Cephalopoda of Ireland. Part 3. *Monograph of the Palaeontological Society*, p. 49–126, pls. 18–32.
- Girty, G. H., 1909: The fauna of the Caney Shale of Oklahoma. *United States Geological Survey, Bulletin 377*, p. 1–106, pls. 1–13.
- Gordon, M. Jr., 1964: Carboniferous cephalopods of Arkansas. *United States Geological Survey Professional Paper 460*, p. 1–322, pls. 1–30.

- Histon, K., 1999: A revision of A.H. Foord's monograph of Irish Carboniferous nautiloid cephalopods (1897–1901). Part 2. *Monograph of the Palaeontographical Society*, vol. 153, p. 63–129, pls. 8–18.
- Hyatt, A., 1883–1884: Genera of fossil cephalopods. *Proceedings of the Boston Society of Natural History*, vol. 22, p. 253–338.
- Hyatt, A., 1893: Carboniferous cephalopods. Second paper. *Geological Survey of Texas, Fourth Annual Report, 1892*, p. 377–474.
- Konink, L.G. de, 1878: Faune du Calcaire Carbonifère de la Belgique. Première partie. *Annales du Musée Royal d'Histoire Naturelle de Belgique*, vol. 2, p. 1–152, pls. 1–31.
- Léveillé, C., 1835: Aperçu géologique de quelques localités très riches en coquilles sur les frontières de France et Belgique. *Mémoires de la Société Géologique de France*, vol. 2, p. 29–40, pl. 2.
- Mapes, R.H., 1979: Carboniferous and Permian Bactritoidea (Cephalopoda) in North America. *The University of Kansas Paleontological Contributions, Article 64*, p. 1–75, pls. 1–41.
- M'Coy, F., 1844: *A Synopsis of the Characters of the Carboniferous Limestone Fossils of Ireland*, 274 p., Privately published. (reissued by Williams and Norgate, London, 1862)
- Miller, A.K. and Garner, H.F., 1953: Lower Mississippian cephalopods of Michigan. Part II. Coiled nautiloids. *Contributions from the Museum of Paleontology, University of Michigan*, vol. 11, p. 111–151, pls. 1–4.
- Miller, A.K. and Youngquist, W., 1948: The cephalopod fauna of the Mississippian Barnett Formation of central Texas. *Journal of Paleontology*, vol. 22, p. 649–671, pls. 94–100.
- Niko, S., 2002: *Echigoceras sasakii*, a new Middle Carboniferous nautilid from the Omi Limestone Group, Central Japan. *Paleontological Research*, vol. 6, p. 351–355.
- Orbigny, A.d., 1845–1847: *Paléontologie Universelle*. Paris, 392 p., 55 pls. (not seen)
- Ramsbottom, W.H.C. and Moore, E.W.J., 1961: Coiled nautiloids from the Viséan of Ireland. *Liverpool and Manchester Geological Journal*, vol. 2, p. 630–644, pls. 27–30.
- Shimansky, V.N., 1967: Kamennougolnye Nautilida (Carboniferous Nautilida). *Akademiia Nauk SSSR, Trudy Paleontologicheskogo Instituta*, vol. 115, p. 1–258, pls. 1–30. (in Russian)
- Shimansky, V.N., 1993: Noviye rannekamennougolnye trigonotatidiy (Nautiloidea) Novoi Zemli (New Early Carboniferous trigonocetatids (Nautiloidea) from Novaya Zemlya). *Paleontologicheskii Zhurnal*, 1993, no. 1, p. 17–24, pls. 3, 4. (in Russian with English abstract)
- Shimansky, V.N., 1996: Kamennougolnye neammonoidnye golovonogiye mollyuski Novoi Zemli (Carboniferous non-ammonoid cephalopods of Novaya Zemlya). *Paleontologicheskii Zhurnal*, 1996, no. 4, p. 24–29, pl. 2. (in Russian with English abstract)
- Sowerby, J. de C., 1826–1829: *The Mineral Conchology of Great Britain; or Coloured Figures and Descriptions of Those Remains of Testaceous Animals or Shells, which have been Preserved at Various Times and Depths in the Earth, Volume 6*, 609 p. B. Meredith, London.
- Taff, J.A., 1901: Description of the Coalgate Quadrangle (Indian Territory). *United States Geological Survey, Geologic Atlas, Folio 74*, p. 1–6.
- Turner, J.S., 1954: On the Carboniferous nautiloids: some Middle Viséan species from the Isle of Man. *Liverpool and Manchester Geological Journal*, vol. 1, p. 298–325, pls. 20–25.
- Wang, M., 1983: Cephalopoda. In, *Atlas of the Palaeontology of the Northwestern Regions of China. Fascicle Xinjiang Uyghur*, p. 510–533, pls. 177–180. Geological Publishing House, Beijing. (in Chinese)
- Youngquist, W., 1949: The cephalopod fauna of the White Pine Shale of Nevada. *Journal of Paleontology*, vol. 23, p. 276–305, pls. 56–64.