

Pessagnoites, a new foraminifer genus from the Upper Cretaceous of the Austin Chalk, northeast Texas

Arafat A. AlShuaibi

Department of Earth and Environmental Sciences, Faculty of Science, Kuwait University,
P. O. Box 5969, SAFAT-13060, Kuwait
email: alshuaibi.a@ku.edu.kw

ABSTRACT: A new genus *Pessagnoites* is described from the Austin Chalk of Northeast Texas. This taxon is included in the Marginotruncanidae and is characterized by possessing an extraumbilical-non umbilical in position primary aperture and sutural supplementary apertures both on the spiral and umbilical sides of the test. *Pessagnoites* n. gen. marks the base of the lowermost Coniacian (Superzone UK4, Zone 4B) in Texas. Its co-occurrence with *Cremnocreamus deformis erectus* herein suggests its placement as a primary marker taxon marking the base of the Coniacian worldwide.

INTRODUCTION

The Austin Chalk of Texas was studied by several authors (Chatham 1950; Gimbrede 1961; Jacobsen 1961; McNulty 1962, 1976; Clark and Bird 1966; Pessagno 1967, 1969; Marks and Stam 1983; Holloway 1999; AlShuaibi 2008; AlShuaibi and Pessagno 2009). Unfortunately, no detailed investigations have been made to the planktonic foraminiferal biostratigraphy and chronostratigraphy of the Austin Chalk from Ellis County to northeast Texas (text-fig. 1) except for the work of “AlShuaibi” (2006) and Pessagno et al. (2005); these authors proposed a high resolution planktonic foraminiferal biostratigraphy to the lower Coniacian to lowermost Campanian strata of the Austin Chalk and in northeast Texas.

The purpose of this study is to describe and document the first occurrence of *Pessagnoites* n. gen. (and its new two species) as invaluable taxon marking the boundary between the lowermost Coniacian (Superzone UK4, Zone 4B) and Turonian of the Austin Chalk of northeast Texas. The co-occurrence of *Pessagnoites* n. gen. with *Cremnocreamus deformis erectus* (= *C. rotundatus* of the International Commission on Stratigraphy, 2004) herein suggests its placement as a primary marker taxon (Pessagno et al. 1984) marking the base of the Coniacian worldwide. This genus is placed under the family Marginotruncanidae Pessagno 1967 emend AlShuaibi and Pessagno because it shows extrumbilical non-umbilical primary aperture as indicated by AlShuaibi and Pessagno 2009. The planktonic foraminiferal zonation in this study is adapted from Pessagno et al. (2005) and was redefined when feasible.

METHODS

A total of 151 samples were collected carefully from outcrops of the Austin Chalk in Ellis moving northward to Dallas, Collin

and Grayson counties, thence eastward crossing Fannin, Lamar and Red River counties (text-fig. 1). All samples were processed utilizing Kariminia's (2004) acetic acid technique. Micrographs were taken via JEOL CarryScope JCM-5700 at the Faculty of Science, Kuwait University. Holotypes and paratypes are housed in the author's collection at the Department of Earth and Environmental Sciences (DEES), Kuwait University.

SYSTEMATIC PALEONTOLOGY

Kingdom PROTISTA
Phylum SARCOMASTIGOPHORA
Subphylum SARCODINA
Class RHIZOPODEA
Subclass GRANULORETICULOSIA
Order FORAMINIFERIDA
Suborder GLOBIGERININA
Family MARGINOTRUNCANIDAE Pessagno 1967. Emend.
AlShuaibi and Pessagno

Genus *Pessagnoites* Al Shuaibi, **n. gen.**

Type species: *Pessagnoites ectorensis*, n. sp.

Description: Test trochospiral, with or without imperforate peripheral band, with or without double keel; double keel weakly well developed, not truncating periphery; primary aperture extraumbilical-non umbilical in position. Final four chambers (rarely five) of the final whorl always coil perpendicular to the axis of coiling. Final four chambers compressed, overlapping earlier chambers of the previous whorl on spiral side. Sutural supplementary apertures often present on the spiral side along sutures or junction with previous whorl; supplementary apertures along junction with previous whorl tending to be larger in size; multiple sutural supplementary apertures along sutures on

umbilical side. Umbilicus often elliptical in shape with tegilla. Tegilla when present with infralaminar accessory apertures on well preserved specimens.

Remarks: *Pessagnoites*, n. gen. is placed under the Marginotruncanidae Pessagno because it shows the typical extra-umbilical-non umbilical primary aperture characteristic of the family. *Pessagnoites* is characterized by the presence of supplementary apertures on both the spiral side (typical of *Loeblichella* Pessagno) and its umbilical side either along the sutures or between chambers along the junction with the previous whorl.

Etymology: Pessagno + ites (m.). This genus is named after Dr. Emile A. Pessagno, Jr. in honor of his pioneering contributions to the study of the Upper Cretaceous planktonic foraminifera of the Western Gulf Coastal Plain.

Range: Superzone UK4, Zone 4B to Superzone UK3; lower Coniacian to Santonian.

Occurrence: *Pessagnoites*, n. gen. occurs in Atco, Bruceville, Ector, and Bonham Mudstone members of the Austin Chalk. This genus makes its final appearance below the first occurrence of *Globigerinelloides multispina* (Lalicker), *Ventilabrella* spp., *Globotruncana elevata* (Brotzen), and *Rugoglobigerina tradinghousensis* Pessagno.

***Pessagnoites ectorensis* AlShuaibi, n. sp.**
Plate 1, figures 1-8, 17, 18, 19

Description: Low trochospiral, test elongate, oval in outline with rounded periphery. Imperforate peripheral band usually with weak double keel; double keel not truncating periphery. Last two chambers of the final whorl with angled periphery. Chambers gradually increasing in size as added in the earlier whorl and more rapidly in the final whorl; five to six chambers in the final whorl. Last three chambers of final whorl overlap chambers of the earlier whorl. Chambers of the final whorl petaloid to oval, elongate, separate by straight, slightly curved, radial, depressed sutures, spirally and umbilically; sutures more deeply depressed umbilically. Chambers finely perforate, pustulose, sparse pustules in the last two chambers of the final whorl, both spirally and umbilically.

Etymology: *Pessagnoites ectorensis*, n. sp. is named after the City of Ector, Fannin County, Texas.

Type Locality: Sample EC02-4, Ector Member, Fannin County.

Deposition of Types: Holotype and paratypes are housed at AlShuaibi Collection (DEES-AUSH-1 for holotype, DEES-AUSP-1 for paratype), DEES, Kuwait University.

Range: Superzone UK4, Zone 4B; lower Coniacian.

Occurrence: This species was first noted in the Ector Member of the Austin Chalk at Farm Market Road 898 and Hayden Hall Road. It also occurs 0.7m above the contact between the Eagle Ford Formation and Atco Member in West Kiest Boulevard and White Rock Escarpment localities. This species makes its final appearance before the first occurrence of *Globotruncana bulloides* Volger, *Globotruncana fornicata* Plummer, and *Hastigerinoides watersi* (Cushman). In this report, *P. ectorensis*, n. sp. is considered as an excellent marker for the lower Coniacian.

***Pessagnoites mansfieldensis* AlShuaibi, n. sp.**
Plate 1, figures 9-16, 20, 21, 22.

Description: Test elongate lobulate with rounded periphery. Spiral side occasionally depressed, umbilical side often concave. Periphery with imperforate peripheral band line and weakly developed double keel; imperforate peripheral band shows fine pustules. Chambers rapidly increasing in size as added in the final whorl; six to seven chambers in the final whorl. Last three to four chambers of final whorl overlapping chambers of earlier whorl spirally; last chamber of the final whorl sometimes with angled periphery. Chambers spirally trapezoidal to ovoidal; chambers umbilically ovoidal. All chambers finely perforate, coarsely pustulose, both spirally and umbilically. Umbilicus very small and deep. Tegilla poorly preserved.

Remarks: *Pessagnoites mansfieldensis*, n. sp. differs from *P. ectorensis*, s. sp. 1) by having 5 to 6 chambers in the last whorl, 2) by having concave spiral side, and 3) by having a smaller, deeper umbilicus.

Etymology: *Pessagnoites mansfieldensis*, n. sp. is named after Mansfield Road, southwest Dallas County, Texas.

Type Locality: Sample CH2; Atco Member along Mansfield Road, southwest Dallas, Texas.

Deposition of Types: Holotype and paratypes are housed at AlShuaibi Collection (DEES-AUSH-2 for holotype, DEES-AUSP-2 for paratype), DEES, Kuwait University.

Range: Superzone UK4, Zone 4B to Superzone UK3; lower Coniacian to Santonian.

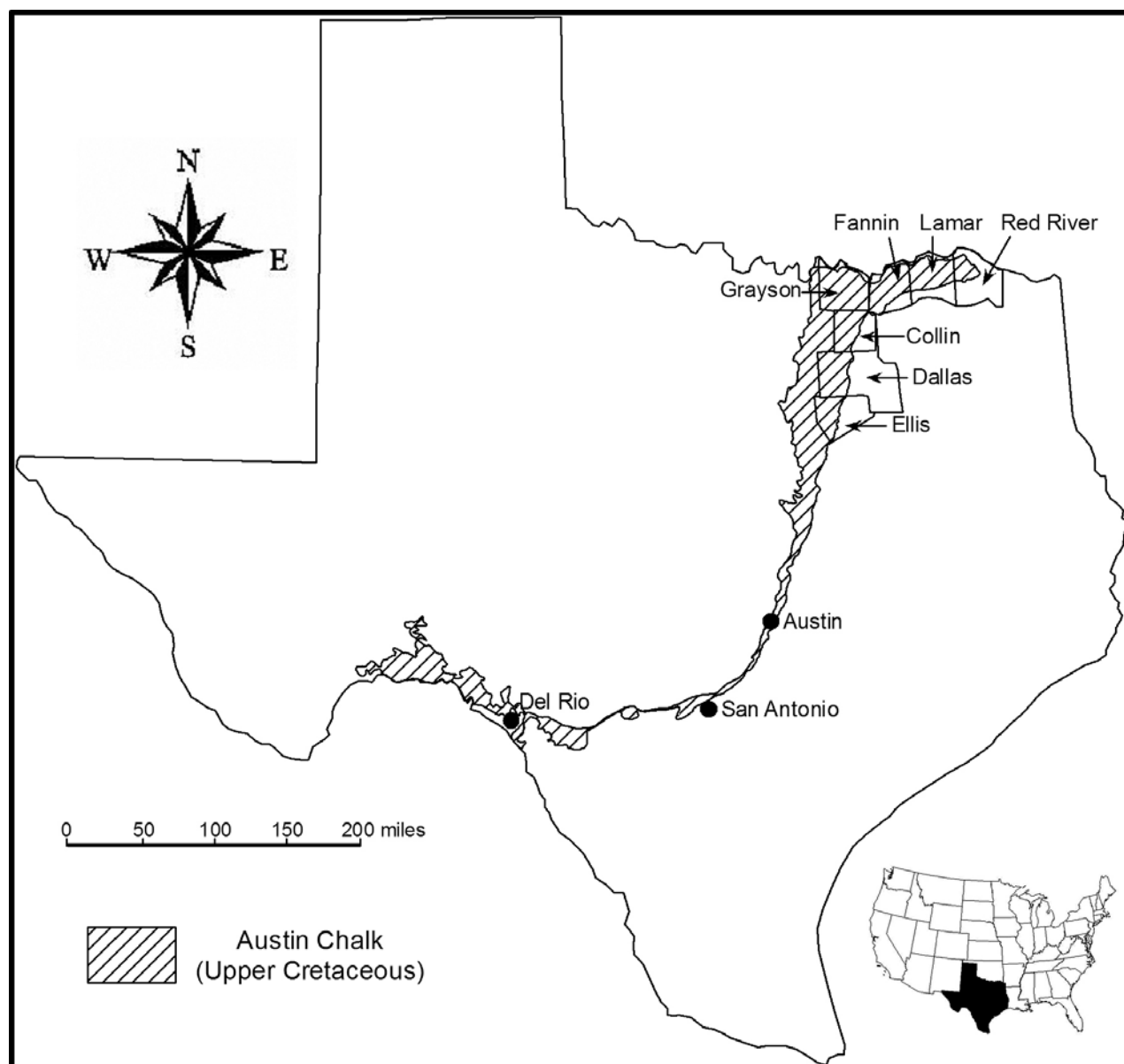
Occurrence: This species occurs in the Atco Member of the Austin Chalk at White Rock Escarpment, West Kiest Boulevard and Pleasant Run Road localities. It occurs also in the Ector Member at Hayden Hall Road and Farm Market Road 898 localities. *Pessagnoites mansfieldensis*, n. sp. was also observed in the Bruceville Member at President George W. Bush Turnpike, Belt Line and West Main Street localities; and Bonham Mudstone Member at Hestand Creek and Johnson and Johnson localities. This species was not observed in the Waxahachie and the Gober members of the Austin Chalk.

ACKNOWLEDGMENT

The author would like to thank the Electron Microscopy Unit at the Faculty of Science, Kuwait University for their assistance in finalizing this paper.

REFERENCES

- ALSHUAIBI, A. A., 2006. "Coniacian to lowermost Campanian Stratigraphy of the Austin Chalk, Northeast Texas". Ph.D. Dissertation, The University of Texas at Dallas, 220 p.
- , 2008. Coniacian to lowermost Campanian stratigraphy of the Austin Chalk, northeast Texas. *American Association of Petroleum Geologists, 2008 annual convention and exhibition, abstract volume 13*, p. 6.
- ALSHUAIBI, A. A. and PESSAGNO, E. A., 2009. Emended definition of the family Marginotruncanidae Pessagno 1967. *Micro-paleontology*, 55: 623-626.



TEXT-FIGURE 1
Map showing the area of study.

CHATHAM, E. W., Jr., 1950. "Upper Cretaceous foraminifer genus *Globotruncana* and its stratigraphic Distribution." Master's Thesis, The University of Texas at Austin, 57 p.

CLARK, D. L. and BIRD, K. J., 1966. Foraminifera and paleoecology of the Upper Austin and Lower Taylor (Cretaceous) strata in North Texas. *Journal of Paleontology*, 40: 315-327.

GIMBREDE, L. A., 1961. "Significant foraminifera in the Austin Group." Ph. D. Dissertation, Louisiana State University, 93 p.

HOLLOWAY, J. W., 1999. "Lithostratigraphy and biostratigraphy of the Austin Chalk from San Antonio west to the Anacacho Mountains", Ph.D., *The University of Texas at Dallas*, 266 p.

INTERNATIONAL SUBCOMMISSION ON CRETACEOUS STRATIGRAPHY (SCS), 2004. Report. In: *International Commission on Stratigraphy (ICS) Consolidated Annual Report for 2004*, 59-62. Geneva: International Union of Geological Sciences.

JACOBSEN, J. M., 1961. Vertical distribution of foraminifera in the Lower Chalk Member of the Austin Formation, Southern Dallas County, Texas. *Journal of the Graduate Research Center*, 39: 179-187.

KARIMINIA, S. M., 2004. Extraction of calcified radiolaria and other calcified microfossils from micritic limestone utilizing acetic acid. *Micropaleontology*, 50: 301-306.

MARKS, P. and STAM, B., 1983. The Austin Chalk-Taylor succession in Texas and the Santonian-Campanian Boundary. *Cretaceous Research*, 4: 271-279.

McNULTY, C. L., Jr., 1962. Some observation on Austin equivalents in northeast Texas. *The Texas Journal of Science*, 14: 418.

———, 1976. *Globotruncana fornicate* Zone of Upper Austin Group (Cretaceous), northeast Texas, *American Association of Petroleum Geologists Bulletin*, 60: 2058-2062.

PESSAGNO, E. A., Jr., 1967. Upper Cretaceous Planktonic Foraminifera from the Western Gulf Coastal Plain. *Palaeontographica Americana*, 5 (37): 249-445.

———, 1969. *Upper Cretaceous stratigraphy of the western Gulf Coast area of Mexico, Texas, and Arkansas*. Boulder, CO: Geological Society of America. Memoir 111, 139 p.

PESSAGNO, E. A., JR., GHAZI, A. M., KARIMINIA, M., DUNCAN, R. A. and HASSANIPAK, A. A., 2005. Tectonostratigraphy of the Khoy Complex, Northwestern Iran. *Stratigraphy*, 2: 49-63.

Manuscript received August 30, 2010

Manuscript accepted September 30, 2010

Manuscript published April 7, 2011

PLATE 1

Scale in the upper right = number of μm cited for each illustration.

- 1,2,3,4 *Pessagnoites ectorensis*, n. sp. Ector Member. Farm Market Road 898 locality. Sample EC02-4. Note point "b" in figure 3 and 4 showing supplementary apertures on umbilical side. Scale = 161.5 μm . Holotype.
- 5,6,7,8 *Pessagnoites ectorensis*, n. sp. Ector Member. Farm Market Road 898 locality. Sample EC02-4. Note point "b" in figure 7 and 8 showing supplementary apertures on umbilical side. Scale = 120 μm . Paratype.
- 9,10,11, 12 *Pessagnoites mansfieldensis*, n. sp. Atco Member. West Kiest Boulevard locality. Sample WKB6A. Note point "b" in figure 11 and 12 showing supplementary apertures on umbilical side. Scale = 202 μm . Holotype.
- 13,14,15, 16 *Pessagnoites mansfieldensis*, n. sp. Ector Member. Hayden Hall Road locality. Sample EC01-1. Note point "b" in figure 15 and 16 showing supplementary apertures on umbilical side. Scale = 168.3 μm . Paratype.
- 17 *Pessagnoites ectorensis*, n. sp. Ector Member. Farm Market Road 898 locality. Sample EC02-4. Enlargement of point "a" in figure 1 showing the supplementary apertures on spiral side. Scale = 103 μm .
- 18 *Pessagnoites ectorensis*, n. sp. Ector Member. Farm Market Road 898 locality. Sample EC02-4. Enlargement of point "a" in figure 5 showing ornamentation of test. Note spiny nature of test surface near supplementary apertures. Scale = 29 μm .
- 19 *Pessagnoites ectorensis*, n. sp. Ector Member. Farm Market Road 898 locality. Sample EC02-4. Enlargement of tegilla in figure 7. Scale = 81 μm .
- 20 *Pessagnoites mansfieldensis*, n. sp. Atco Member. White Rock Escarpment locality. Sample CH2. Enlargement of point "a" in figure 11 showing tegilla. Scale = 86.4 μm .
- 21 *Pessagnoites mansfieldensis*, n. sp. Atco Member. White Rock Escarpment locality. Sample CH2. Enlargement of point "a" in figure 9 showing supplementary apertures on spiral side. Scale = 113.4 μm .
- 22 *Pessagnoites mansfieldensis*, n. sp. Atco Member. White Rock Escarpment locality. Sample CH2. Enlargement of figure 11 showing loose coiling of test. Note extraumbilical-non umbilical position of aperture (point a). Note position of very small umbilicus (point b). Scale = 144.3 μm .

