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SCIENTIFIC SERIES NO. 18 MAY 22, 1911

Contributions from the School of Geology

FAUNA OF THE BUDA LIMESTONE

BY

FRANCIS LUTHER WHITNEY

INSTRUCTOR IN GEOLOGY AND PALEONTOLOGY IN THE UNIVERSITY OF TEXAS

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ERRATA

For presentation, read preparation, page 9.

For Stearnsia robinsi White, read Remondia robinsi (White), pages 17 and 42.

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BIBLIOGRAPHY.

Böse, E., Bol. Instituto Geologico de México, Nums. 24, 25. 1906, 1910.

Choffat, P., Recueil D'Etudés Paléontol. Faune Cret., du Portugal. 1886.

Conrad, T. A., Rept. U. S. and Mexican Bound. Surv., Vol. I, Pt. 2, 1857.

Cragin, F. W., Fourth Ann. Rept. Texas Geol. Surv., 1893.

d'Orbigny, A., Paleont. francaise, Terr. Cret., 1840-1860.

Gabb, W. M., Paleont. Cal., Vols. I and II, 1864-1869.

Goldfuss, A., Petfr. Germaniae, 1862.

Hill, R. T., Texas Geol. Surv. Bull. No. 4, 1889.
Paleont. of the Cret. Form. of Texas, 1889.

Hill, R. T., and *Vaughan, T. W.*, U. S. Geol. Surv., Bull. 151, 1898.

Lasswitz, Rudolf, Geol. und Paleont. Abh. (E. Koken), 1904.

Roemer, F., Die Kreidebildungen von Texas, 1852.
Neues Jahrbuch Min., Geol., und Paleont., 1887.

Shattuck, G. B., U. S. Geol. Surv., Bull. 205, 1903.

Shumard, B. F., Proc. St. Louis Acad. Sci., Vol. I, 1856-1860.
Proc. Boston Soc. Nat. Hist., Vol. VIII, 1862.

Stolicska, F., Paleont. Indica, 1866-73.

White, C. A., Smithson. Miss. Coll., Vol. XIX, 1880.
Eleventh Ann. Rept. U. S. Geol. and Geog. Surv. Terr., 1877.
Twelfth Ann. Rept. U. S. Geol. and Geog. Surv. Terr., 1882.
Archivos Museu Nacional Rio de Janeiro, 1887.

Zekeli, F., Die Gasterop. der Gosaugebilde, 1852.

FAUNA OF THE BUDA LIMESTONE.

By F. L. Whitney.

PREFATORY NOTE.

The species described in this paper were first figured and described in a thesis presented to the faculty of Cornell University for the A. M. degree.

A close examination of material collected since the completion of the above thesis has made necessary a few slight changes. Some species have been withheld from publication for further study with more satisfactory material, and a few forms have been added.

I am deeply indebted to Dr. F. W. Simonds and Prof. G. D. Harris for many helpful suggestions and to my wife, who, by careful collection and presentation of specimens, has added greatly to the number of species which I hope to figure and describe in the near future.

DESCRIPTION OF SPECIES.

MOLLUSCA.

PELECYPODA.

ARCIDAE.

Genus BARBATIA Gray.

BARBATIA SIMONDSI n. sp.

Pl. I, fig. 6.

Dimensions.—Length, 55mm.; breadth, 32mm.

Description.—Shell medium, elongate, inequilateral; beaks near anterior end, inflated, directed forward; anterior margin short, rounded; ventral margin nearly straight; posterior margin rounded, slightly truncate above; dorsal margin subparallel to the ventral; side of valve with a depression extending from the beak obliquely backward and downward to the ventral margin; surface marked with concentric lines of growth crossed by fine, well pronounced, radiating striæ, which cover the entire surface of the shell.

This shell resembles *Arca galliennei* d'Orbigny, but it is slightly different in form, and the striæ do not alternate in size. It also resembles *Barbatia micronema* Meek and *Arca galliennei var. tramitensis* Cragin, but comparison with Cragin's type, the equivalent of Meek's species, shows that the form and markings are somewhat different.

Localities.—Barton Creek and Shoal Creek, Austin, Texas.

PINNIDAE.

Genus PINNA Linnæus.

PINNA sp.

Pl. I, fig. 3.

Description.—There are, at hand, two specimens of this species, but both are too fragmentary for description. The specimen figured was found near the contact of the Buda with the Del Rio.

Localities.—Shoal Creek and Bouldin Creek, Austin, Texas.

PERNIDAE.

Genus INOCERAMOUS Sowerby.

INOCERAMOUS sp.

Pl. I, fig. 5.

Dimensions.—Length, 50mm.; breadth, 35mm.

Description.—Shell subovate, ventricose, inequilateral; hinge oblique to long axis; umbo narrow, prominent, incurved. Shell ornamented externally and internally with rounded, concentric plications, separated by grooves of similar width. The plications are very fine at the beak, but gradually increase in size toward the base.

There is only one specimen of this species in this collection, and it is too fragmentary for determination. The outlines shown in the figure may not be accurate, but are the result of following down the parts of shell and cast while removing the rock covering them.

Locality.—Barton Creek, Austin, Texas.

OSTREIDAE.

Genus ALECTRYONIA Fischer.

ALECTRONIA CARINATA Lamarck.

Pl. I, figs. 1, 2.

Ostrea carinata Roemer, 1849, Texas, p. 394.

Ostrea carinata Roemer, 1852, Die Kreide. von Texas, p. 75, Taf. 9, fig. 5.

Ostrea carinata Conrad, 1857, Rept. U. S. and Mex. Bound. Surv., Vol. I, Pt. 2, p. 156, Pl. 10, fig. 6.

Ostrea carinata White, 1884, Fourth Ann. Rept. U. S. Geol. Surv., p. 293, Pl. 43, figs. 1-4.

Ostrea carinata Hill, 1889, Texas Geol. Surv., Bull. No. 4, p. 6.

Alectryonia carinata Hill, 1898, U. S. Geol. Surv., Bull. No. 151, p. 26.

Dimensions.—Length, 42mm.; breadth, 10mm.

Description.—Shell narrow, curved, moderately auriculate; beaks depressed, slightly twisted; surface ornamented with twelve or more strong, narrow, sharp ribs, which, in some speci-

mens, are ornamented with two or three rows of tubercles; ribs more elevated on the convex side of the shell; ventral margin strongly dentate.

The specimens collected from the Buda have not attained such vigorous development as those from the Georgetown.

Locality.—Shoal Creek, Austin, Texas.

PECTINIDAE.

Genus PECTEN Mueller.

PECTEN WRIGHTII (Shumard).

Pl. I, fig. 4.

Janira wrightii Shumard, 1860, Trans. Acad. Sci., St. Louis, Vol. I, 1856-1860, p. 607.

Vola (Janira) wrightii Hill, 1889, Geol. Surv. Texas, Bull. No. 4, p. 8.

Vola wrightii Cragin, 1892, Fourth Ann. Rept. Geol. Surv. Texas, p. 217, Pl. 32, figs. 2, 3.

Dimensions.—Length, 22mm.; height, 28mm.

Original description.—Shell ovate, subtrigonal, longest diameter from beak to base; superior valve flat or slightly concave, marked with three strong, rounded, plications, which are prolonged at the base into prominent angles; inferior valve strongly convex; anterior and posterior slopes abrupt, margins straight and diverging from the beak at an angle of about 40°; surface ornamented with four very prominent, simple radiating ribs or folds on the body of the shell, and one much less developed within the margin on either side. Both valves are also elegantly marked with crowded, strongly waved concentric, filiform striæ; beaks elongated, slender, incurved; wings unknown.

Locality.—Shoal Creek, Austin, Texas.

SPONDYLIDAE.

Genus SPONDYLUS Linnæus.

SPONDYLUS CRAGINI n. sp.

Pl. II, figs. 7, 8.

Dimensions.—Greatest length, 35mm.; greatest breadth, 27mm.

Description.—Shell variable, inequilateral, inequivalve, oblique. Inferior valve the larger, ventricose, produced, orna-

mented exteriorly with faint costæ and thin lamellæ; interior with fine, flat, wavy, radiating costæ, separated by grooves of equal width. Superior valve convex, ornamented with many, irregular, wavy, radiating costæ, eight of which are stronger than the others, and separated by three strong costæ, often supplemented by weaker ones. The strong ribs sometimes bear lamellar spines, which, in the adult, are confined to the umbonal region. In the young specimens, all the ribs are spine bearing, and the spines extend throughout the length of the shell. Ears transversely ribbed.

This species resembles *S. hystrix* Goldf., both in young and adult stages. However, there are eight heavy costæ on this species, whereas *S. hystrix* has only six.

Locality.—Shoal Creek, Austin, Texas.

SPONDYLUS TEXANUS n. sp.

Pl. II, figs. 1, 2, 3.

Dimensions.—Length, 25mm.; breadth, 23mm.

Description.—Shell small, subtrigonal, inequilateral, auriculate; anterior straight; posterior slightly produced; base regularly rounded; surface marked by fifty or more fine, uneven, irregular, sometimes dichotomous costæ, about equal in width to the grooves separating them. Ears ornamented with fine, oblique, pronounced striæ; interior marked with costæ, corresponding to those on the outside, strongest at base of shell, thereby giving it a crenulate-serrate appearance; muscle impression with a raised border in thickened portion of shell. Right valve unknown.

Locality.—This and the above species were found in the chalky beds, about ten feet below the contact with the upper beds at Thirtieth Street, Shoal Creek, Austin, Texas.

ANOMIIDAE.

Genus ANOMIA Müller.

ANOMIA GENICULATA n. sp.

Pl. II, figs. 4, 5.

Dimensions.—Length, 10mm.; breadth, 11mm.

Description.—Shell small, sub-ovate, acuminate; left valve

convex, geniculate, ornamented with eight strong, radiating costæ, terminating in hollow, lamellar spines, at the geniculation. Below the geniculation, the surface is marked by heavy lines of growth, with only a trace of the costæ. Right valve ornamented with five or more radiating costæ extending to the margin and bearing four concentric rows of spines.

The hinge and interior were unknown when, in my thesis, I described this shell as *Plicatula geniculata* n. sp. Recently, however, material has been gathered, indicating that it should be referred to the genus Anomia.

Locality.—Shoal Creek, Austin, Texas.

MYTILIDAE.

Genus MODIOLA Lamarck.

MODIOLA AUSTINENSIS n. sp.

Pl. II, fig. 6.

Dimensions.—Length, about 40mm.; breadth, 18mm.

Description.—Shell elongate, subcuneate, arcuate, inflated anteriorly, compressed posteriorly; beaks subterminal, twisted forward; umbonal ridge prominent, sloping abruptly to the anterior; surface ornamented with concentric lines of growth, crossed by numerous fine striæ radiating from the beak, and covering the entire shell.

Locality.—Shoal Creek, Austin, Texas.

PHOLODOMYACIDAE.

Genus HOMOMYA Agassiz.

HOMOMYA BUDAENSIS n. sp.

Pl. III, figs. 1, 2. Pl. IV, figs. 1, 2.

Dimensions.—Length about 110 mm.; breadth, 60mm.; thickness 61mm.

Description.—Shell large, globose, equivalved, inequilateral, greatly produced and broadened posteriorly; anterior margin short, curved; ventral margin deeply curved; posterior margin broadly rounded; dorsal margin curved, subparallel with ventral; umbos globose, approximate, elevated, curved inward and

slightly forward, situated anteriorly; shell closed anteriorly, gaping posteriorly. Surface marked by lines of growth, which vary considerably in size.

This shell resembles very closely, *H. vulgaris* Shattuck, but differs from it in the curve of the dorsal and ventral margins, the expansion of the posterior, the greater proportional thickness of the shell, and the ornamentation.

Locality.—Shoal Creek, Austin, Texas. From the top of the formation downward, about six feet.

PACHYMYIDAE.

Genus PACHYMYA Sowerby.

Pachymya austinensis var. budaensis n. var.

Pl. V; Pl. VI.

Pachymya austinensis Shumard, 1859, Trans. Acad. Sci. St. Louis, Vol. I, pp. 604-605.

Pachymya austinensis White, 1879, Eleventh Ann. Rept. U. S. Geol. and Geog. Surv. Terr., p. 298, Pl. 8, figs. 1, a, b; Pl. 5, figs. 7, a, b.

Pachymya austinensis Hill, 1889, Geol. Surv. Texas, Bull. No. 4, p. 15.

Pachymya austinensis Shattuck, 1903, U. S. Geol. Surv., Bull. 205, p. 26.

Dimensions.—Length, about 15cm.; breadth, about 9cm.; thickness, about 5.5cm.

Description.—Shell large, heavy, gibbose; beaks anterior, incurved, approximate; umbonal slope angulated from the beaks to the posterior extremity; anterior margin short, narrowly rounded; posterior margin truncate, narrowly rounded to angulate below; ventral margin concave in the middle, more rounded anteriorly than posteriorly; dorsal margin nearly straight, subparallel to the ventral; sides, with a depression extending from below the beaks, obliquely backward and downward to the ventral margin; surface ornamented with strong, concentric lines of growth, crossed by granulate lines radiating from the beaks.

This shell is very closely related to *P. austinensis* Shum. and may be identical with it, but the Buda type is much higher posteriorly, and not so greatly angulated on the umbonal slope.

Locality.—Shoal Creek, Austin, Texas.

PLEUROPHORIDAE.

Genus ARTICA Schumacher.

ARTICA COMPACTA (White).

Pl. VII, figs. 1, 2, 3.

Pachymya ? compacta White, 1880, Proc. U. S. Nat. Mus., Vol. II, p. 297, Pl. 6, figs. 3, 4. (Smithson. Misc. Coll., Vol. 19.)

Pachymya ? compacta White, 1883, Twelfth Ann. Rept. U. S. Geol. and Geog. Surv. Terr., Pt. I, pp. 22, 23, Pl. 17, figs. 4a, b.

Dimensions.—Length, 30mm.: breadth, 19mm.: thickness, 16mm.

Original description.—Shell small, narrower posteriorly than anteriorly, slightly gaping behind; beaks depressed, approximate, incurved, directed forward, their position being very near the front; basal margin broadly convex; posterior margin narrowly rounded; postero-dorsal margin forming an oblique downward and backward truncation of that part of the shell; cardinal margin nearly straight, subparallel with the basal margin, much shorter than the full length of the shell; ligament short, its area depressed and sharply defined; front very short, depressed beneath the beaks and narrowly rounded below; umbonal ridges prominent and angular or subangular; the space above and behind them, moderately broad and flattened; the remainder of each valve somewhat regularly convex. Hinge and interior markings unknown. Surface marked by the ordinary concentric lines of growth.

A study of the material found in the Buda, shows that this shell is not a Pachymya, but either a Trapezium (Cypricardia), as White suspected, or an Artica. The material that I have been able to study indicates, by its hinge structure, that it belongs to the latter genus.

Locality.—Shoal Creek, Austin, Texas.

CRASSATELLITIDAE.

Genus STEARNSIA White.

STEARNSIA ROBINSI White.

Pl. VII, fig. 7.

Stearnsia robinsi White, 1887, Proc. Acad. Nat. Sci. Phila., Pt. 1, for 1887, pp. 33, 34, Pl. 2, figs. 7-9.

Astarta (Stearnsia) robinsi Hill, 1889. Texas Geol. Surv., Bull. No. 4, p. 11.

Dimensions.—Length, 22mm.; breadth, 16mm.

Original description.—Shell much compressed, trihedral in marginal outline; lunule long and narrow, nearly straight from end to end, concave transversely; escutcheon similar in shape and character to the lunule, but longer; beaks small, appressed, angular; ligament slightly exposed, and it appears to have been divided into an outer and inner portion by a calcareous septum; umbonal furrows distinct, producing an emargination at the posterior part of the convex basal border and considerable prominence of the posterior extremity; hinge strong; the lateral teeth slender and extending the full length of the lunule and escutcheon respectively; surface marked by strong concentric furrows and ridges, which end abruptly at the margin of the lunule and escutcheon respectively; the surface of both lunule and escutcheon plain.

The material studied seems to be a little different from that figured by White, but a comparison with specimens from the Del Rio and a probable Georgetown rock, leads me to believe that the differences are not sufficient to be specific.

Locality.—Shoal Creek, Austin, Texas.

VENERIDAE.

Genus MERETRIX Lamarck.

Meretrix leonensis ? (Conrad).

Pl. VII, fig. 4.

Cytherea leonensis Conrad, 1857, Rep. U. S. and Mex. Bound. Surv., Vol. I, Pt. 2, p. 153, Pl. 6, fig. 1.

Cytherea leonensis Hill, 1889, Texas Geol. Surv., Bull. No. 4. p. 14.

Dimensions.—Length, 35mm.; breadth, 44mm.

Description.—Shell medium, subovate, inequilateral, moderately ventricose; beaks, about one-fourth the length of the shell from the anterior end, small, excavated anteriorly, approximate. Anterior margin slightly curved, rounded below; ventral margin broadly rounded; posterior margin convex, rounded below. Surface ornamented with concentric lines of growth.

The material found in the Buda resembles *C. leonensis*, as figured in the Mexican Boundary Report. However, the anterior margin seems to be more gently curved in my specimens, while

the posterior is more rounded. The proportions also agree closely with those of Conrad's figure. In my thesis, I referred to this as *Meretrix budaensis* n. sp., but the study of more material inclines me to refer it doubtfully to Conrad's species.

This species appears to be quite common in the upper layers of the Buda, but it is not well preserved.

Localities.—Shoal Creek, Barton Creek, and Bouldin Creek, Austin, Texas.

Genus TAPES Mergerle von Muhlfeldt.

TAPES AUSTINENSIS n. sp.

Pl. VII, figs. 8, 9.

Dimensions.—Length, 25mm.; breadth, 17mm.

Description.—Shell small, ovate-elongate, narrowly rounded anteriorly and posteriorly; posterior broader than anterior; ventral margin broadly convex; dorsal margin convex, gently sloping downward from the beaks to the posterior margin; beaks approximate, situated about three-fifths the length of the shell from the posterior end. Surface marked by fine, unequal, concentric lines of growth.

Locality.—Shoal Creek, Austin, Texas.

GASTROCHAENIDAE.

Genus FISTULANA Bruguiére.

FISTULANA RUPERTI n. sp.

Pl. VII, figs. 5, 6.

Dimensions.—Length, 23mm.; breadth, 12mm.

Description.—Shell elongate, suboval, broader anteriorly than posteriorly, substance thin; beaks nearly terminal; anterior margin broadly rounded; posterior margin narrowly rounded; dorsal and ventral margins convex and diverging from the posterior; beyond the middle the ventral margin turns abruptly to meet the anterior; ventral side gaping for a considerable part of its length; surface smooth, marked by fine lines of growth.

Tube clavate and generally vertical in the rock.

This species is very common in some beds of the Buda, and

seems to range from near the base to the top. The material is quite well preserved, but difficult to remove.

Locality.—Shoal Creek, Austin, Texas.

GASTEROPODA.

NATICIDAE.

Genus TYLOSTOMA Sharpe.

TYLOSTOMA HILLI n. sp.

Pl. VIII, figs. 1, 2. Pl. IX.

Dimensions.—Height about 100 mm.; maximum breadth, 77mm.; minimum breadth, 52mm.

Description.—Shell large, globose, solid, greatly compressed; spire elevated; whorls five and one-half, convex; body whorl much larger than the others, inflated, about two-thirds the height of the shell; surface smooth; varices well developed and strong on the spire of the adult; aperture elongate; lip unknown.

Locality.—Barton Creek, Shoal Creek, Austin, Texas.

TYLOSTOMA HARRISI n. sp.

Pl. X, figs. 12, 13, 14.

Dimensions.—Height, 39mm.; breadth, 24mm.

Description.—Spire elevated, conical, whorls five, convex; suture somewhat canaliculate; lip thin, slightly reflected; inner lip callous; aperture acute posteriorly, rounded, produced anteriorly. Surface smooth, marked by fine lines of growth. The varices are not prominent on the exterior of the type specimen. They are, however, more pronounced on some individuals of this species. They are well developed on casts.

Locality.—Shoal Creek, Barton Creek, Austin, Texas.

CERITHIIDAE.

Genus CERITHIUM Adanson.

CERITHIUM STANTONI n. sp.

Pl. X, figs. 1, 2.

Dimensions.—Height, 32mm.; breadth, 8mm.

Description.—Spire elevated, angle 16°; whorls twenty-seven or more; aperture rounded; canal short, twisted. Decorations consist of two spiral rows of tubercles to the whorl, situated at its edges; posterior tubercles much larger than anterior of same whorl. As the shell grows larger, the tubercles become more separated.

Figure 1, Pl. X, shows an adult form; figure 2, a younger form.

Locality.—Shoal Creek, Austin, Texas.

CERITHIUM SHUMARDI n. sp.

Pl. X, fig. 3.

Dimensions.—Height, 55mm.; breadth, 30mm.

Description.—Shell turreted; whorls six or more, moderately convex; spire straight, angle about 31°; sutures well defined; aperture subquadrate; acute anteriorly-posteriorly; columella simple; lip unknown; surface ornamented with fourteen transverse costæ. These costæ and the intervening spaces are traversed by five to seven heavy, prominent, rounded, revolving lines, separated by spaces about equally as wide, and ornamented with five to seven fine, variable, prominent, rounded lines. This ornamentation extends over about one-half the body whorl, the lower portion lacking the transverse costæ but ornamented with the same revolving lines, the heavy ones being somewhat tuberculate. This species is very similar to *C. aguilerae* Böse, but the lines are all single, whereas in that species some are paired. It has the single lines similar to *C. debile* Zekeli, but the transverse costæ are more numerous. These three species appear to be closely related.

Locality.—Shoal Creek, Barton Creek, Austin, Texas.

CERITHIUM HILLI n. sp.

Pl. X, fig. 4.

Description.—Shell turreted; spiral angle about 19°; number of whorls unknown; surface ornamented with twenty-four transverse ribs set end to end, giving the shell a fluted appearance, broken only by the suture lines. On the poorly preserved specimen at hand, there is no evidence of revolving lines.

This species appears to be quite rare, only one specimen having been obtained. It reminds one of *C. haidingeri* Zekeli, but differs from that species in the angle of the spire and the character of the transverse costæ.

Locality.—Shoal Creek, Austin, Texas.

FUSIDAE.

Genus FUSUS Lamarck.

FUSUS SIMONDSI n. sp.

Pl. XI, fig. 2.

Dimensions.—Length, 100mm.; breadth, about 30mm.

Description.—Shell elevated, turreted; whorls nine, rounded; sutures well defined; spire straight, conical, equalling about one-half the height of the shell; angle 25°; anterior canal long, straight, deep; lip and aperture unknown; surface of whorls ornamented with eight to ten transverse costæ, which, with the intervening spaces, are crossed by four to six prominent, rounded, revolving lines. The costæ are prominent on the upper part of the body whorl, but disappear below, leaving only the revolving lines.

This species resembles *F. texanus* Shattuck, but the spire and body whorl are nearly equal, and the angle of the spire is much less.

Locality.—Shoal Creek, Austin, Texas.

VOLUTIDAE.

Genus VOLUTILITHES Swainson.

VOLUTILITHES AUSTINENSIS n. sp.

Pl. XI, fig. 1.

Description.—Shell small, fusiform; spire elevated, sutures well defined; body whorl large, constituting the greater part of the shell, shoulder rounded; aperture narrow, elongate; canal long, straight, open and deep; columella with three strong, oblique plaits near the middle of the aperture; lip thin. Surface ornamented with about eighteen prominent, transverse costæ crossed by numerous, fine rounded, revolving lines.

Locality.—Shoal Creek, Austin, Texas.

ACTEONIDAE.

Genus CYLINDRITES Lycett.

CYLINDRITES WHITEI n. sp.

Pl. X, fig. 8.

Dimensions.—Height, 4.7mm.; breadth, 2.5mm.

Description.—Shell small; surface marked by prominent lines of growth; whorls four; spire depressed, canaliculate; aperture narrow, extending posteriorly to the end of the body whorl, anteriorly extended below the body whorl and narrowly rounded; columella with one fold.

There is, in this collection, only one specimen of this sepcies, but it is quite unlike any other that has come to my notice.

Locality.—Shoal Creek, Austin, Texas.

RINGICULIDAE.

Genus CINULIA Gray.

CINULIA CONRADI n. sp.

Pl. X, figs. 5, 6, 7.

Dimensions.—Height, 9mm.; greatest breadth, 7mm.

Description.—Shell small, imperforate, subglobose; whorls three, spire short, about one-eighth of the height of the shell; aperture elongate, acute posteriorly, rounded anteriorly; outer lip thickened, smooth, reflected; inner lip callous, with three plaits, two of which are well up on the shell; surface of body whorl ornamented with fourteen rather broad, spiral costella, separated by narrow grooves developed by a series of spirally arranged puncta. The lip is somewhat broken in the speeimen studied, but it appears to have been ornamented with two or more vertical lines.

Locality.—Shoal Creek, Austin, Texas.

CINULIA PELLETI n. sp.

Pl. X, figs. 9, 10, 11.

Dimensions.—Height, 18mm.; maximum breadth, 13mm.

Description.—Shell small, solid, subglobose; whorls about three, rounded; spire about one-sixth of the height of the shell;

aperture slightly oblique, rounded anteriorly, acute posteriorly; outer lip thickened, reflected, smooth within; inner lip callous, with three plaits, the upper one slightly above the middle of the aperture, the others well down. Surface marked with about twenty-seven revolving, well defined costella, separated by grooves equally as wide, and crossed by numerous fine, transverse lines.

Locality.—Batron Creek, Austin, Texas.

CEPHALOPODA.

TURRILITIDAE.

Genus TURRILITES Lamarck.

TURRILITES BRAZOENSIS Roemer.

Pl. XII, fig. 1.

Turrilites brazoensis Roemer, 1849, Texas, p. 415.

Turrilites brazoensis Roemer, 1852, Die Kreide. von Texas, p. 37, Taf. 3, fig. 2.

Turrilites brazoensis Hill, 1889, Texas Geol. Surv., Bull. No. 4, p. 23.

Original description.—The shell large, sinistral, tuberculate; whorls almost quadrilateral, flat outside, ornamented with four rows of large tubercles; the tubercles of the uppermost row standing on the obtusely rounded margin between the broad scarcely arched lateral surface of the whorl and the narrow superior surface, and extending themselves into plain plaits covering the superior surface; both middle rows consist of large, pointed tubercles; the lowest row of tubercles, composed of smaller tubercles, standing on the margin of the inner surface of the whorls and covered by the following whorl. The inner surface, turned toward the axis of the conical spire, covered with perpendicular plain plaits, which correspond to the tubercles of the lowest row.

The specimens collected froom the Buda are mere fragments. However, a fairly complete specimen from the Georgetown formation measures in height 20cm.; breadth, 9cm.

Locality.—Barton Creek, Shoal Creek, Austin, Texas.

TURRILITES ROEMERI n. sp.

Pl. XII, figs. 2, 3.

Dimensions.—Height, 36mm.; breadth, 30mm.

Description.—Shell turriculate, conical, sinistral; angle 49°; volutions angular in front, convex behind, overlapping; suture deep; surface ornamented with four rows of unequal tubercles; the anterior row with about thirty-two tubercles, placed on the sutural angle at the outer end of ribs which converge toward the umbilicus; a second row of narrow more elongate tubercles is placed parallel to and behind the first row. It has the same number of tubercles as the first. Below the second, is a third row of elongate tubercles, of the same number as those in the other rows. The fourth row consists of large, rounded tubercles placed in the middle of the volution, and numbering about eleven.

This species differs from *T. tuberculatus* Bosc, by the spiral angle and the shape of the tubercles; from *T. gravesianus* d'Orbiny, by the more elongate form of tubercle and the angle. In this species, the three rows of smaller tubercles are covered by the overlapping of the adjacent whorl, whereas in *T. tuberculatus* and *T. gravesianus* only one row is overlapped. It appears to be rare in the Buda, only one specimen having been found.

Locality.—Shoal Creek, Austin, Texas.

ARTHROPODA.

CRUSTACEA.

BRACHYURA.

Indeterminate Crustacean.

Pl. XIII, fig. 1.

There is, in my collection, a specimen of the great chela of a crustacean, possibly Paramithrax, but it is so poorly preserved that its determination is very doubtful.

Locality.—Shoal Creek, Austin, Texas.

Genus GRAPTOCARCINUS.

GRAPTOCARCINUS TEXANUS Roemer.

Pl. XIII, figs. 2, 3.

Graptocarcinus texanus Roemer, 1887, Neues Jahrbuch f. Mineral. und Paleont. Band 1, Heft. 2, pp. 173-176, figs *a* and *b*, text.

Dimensions.—Length, 28mm.; breadth, 36mm.

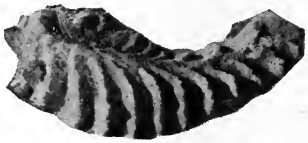
Description, original somewhat modified. — Cephalothorax transverse oval, rounded, five-sided in outline; enclosed by a fine, raised, sharp border separating the dorsal and ventral surfaces; dorsal surface moderately convex, flattened centrally; frontal bent downwards, ending in a broad, obtuse-angled, pointed rostrum, divided medially by a fine, longitudinal furrow; outer margin of rostrum raised; orbits deeply cut. Surface coarsely and thickly granulate; between the grains or tubercles are scattered separate smaller ones. Where the tubercles are not completely preserved and crumbled on the summits, they appear ring-like and deepened in the centre. On the central surface are two pairs of converging furrows. The furrows of the anterior pair are longer and stronger than those of the posterior. They are bent slightly inwards and converge at an angle of about 130°. They are deepest and broadest at their outer ends. At their inner ends, they are so weak that their junction is scarcely visible. The furrows of the posterior

pair are at first parallel to the anterior pair, then bent abruptly backwards and weakened till scarcely traceable. No other sculpture is present on the dorsal surface. The surface of the sloping and inwardly bent ventral side is almost smooth. It is finely granulate only opposite and just behind the frontal. Opposite the front pair of furrows is a small notch, in the sharp margin separating the dorsal and ventral surfaces, from which a fine, line-like furrow passes forward in a moderate curve.

Localities.—Shoal Creek, Barton Creek, Austin, Texas.

PLATE I.

PLATE I.



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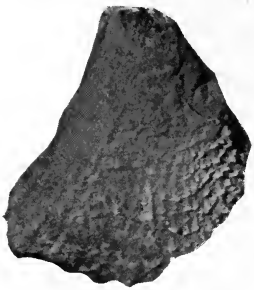

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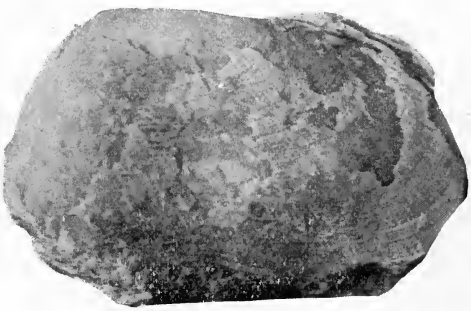

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DEAR SIR: I take pleasure in sending to you a copy of Bulletin No. 9 of The University of Texas Mineral Survey, entitled "Report of a Reconnaissance of Trans-Pecos Texas, North of the Texas & Pacific Railway," by George Burr Richardson.

This Bulletin is the ninth in the series which was begun in July, 1901. The other Bulletins are as follows:

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5. The Minerals and Mineral Localities of Texas, January, 1903.
6. The Mining Laws of Texas and Tables of Magnetic Declination, July, 1903.
7. Report of Progress for 1903, and Topographic Map of Terlingua Quadrangle in Brewster and Presidio Counties, January, 1904.
8. The Geology of the Shafter Silver Mine District, Presidio County, June, 1904.

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Very truly,

WM. B. PHILLIPS,
Director.

Austin, Texas, November, 1904.

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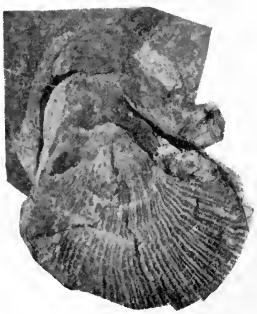

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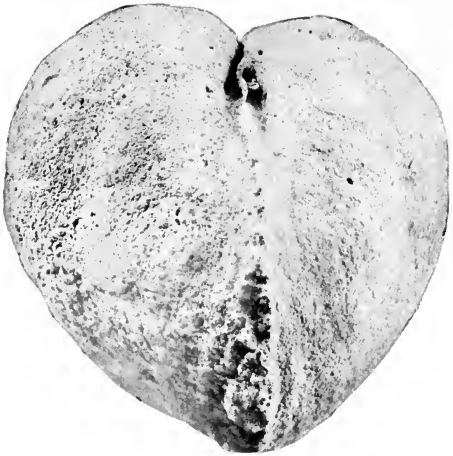

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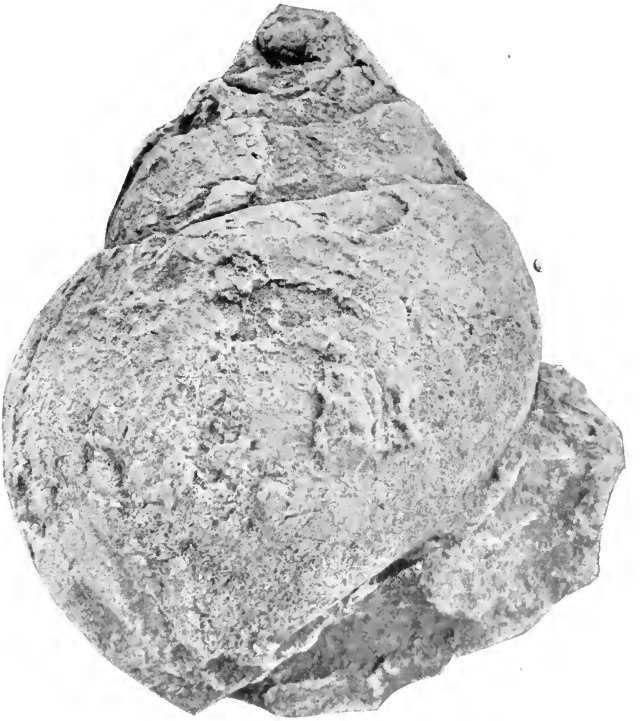

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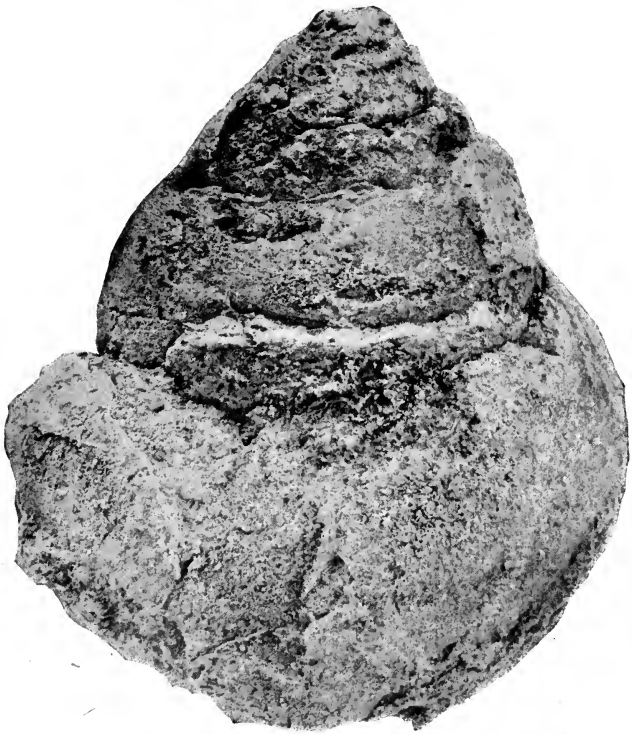

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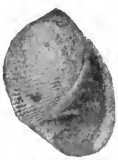

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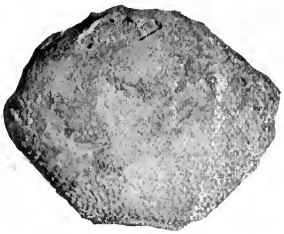

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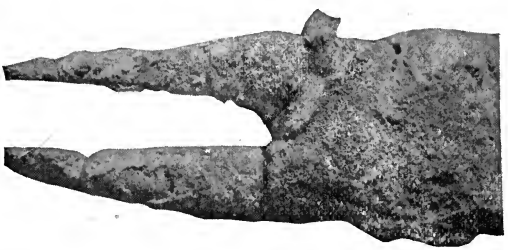

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