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THE FAUNA OF THE ESCONDIDO FORMATION

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By

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PREFACE.

At the suggestion of Professor F. L. Whitney, work was begun on the paleontology of the Escondido Formation in June, 1921, at which time, in company with Professor Whitney, the author spent a week collecting from the basal beds. Upon the return to Austin, eight weeks were consumed in getting familiar with the literature on Upper Cretaceous paleontology and in identifying the fossils brought in. During the school year, September, 1921 to June, 1922, the identification was continued and two other trips were made into the region of the outcrop of the formation, the latter trip including several days in Maverick and Uvalde counties. During the summer of 1922, the work was broadened into a thesis.

There yet remains much to be done on the paleontology of the formation. The author hopes to be able to finish the work at an early date and to present the results to the University of Texas for publication.

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DESCRIPTION OF SPECIES.

ECHINODERMATA

ECHINOIDEA

SALENIIDAE

Genus SALENIA Gray

Salenia whitneyi n. sp.

Plate 1, Figs. 1-3.

Description.--Test medium in size, elevated, the aboral surface depressed convex, the adoral surface nearly flat, slightly concave, the sides inflated and regularly curved.

The apical system is pentagonal, depressed conical. The ocular plates are small, subtrigonal, their basal margins continuous with the basal margins of the genitals forming the sides of the pentagonal outline. The genital plates are elongate, their basal extremities being the apices of the pentagon. Two small ridges ornament the margins of the genitals; the oculars are without ornamentation. The madreporite is narrow, elongate, extending from the genital pore to the margin of the plate.

The periproct is subtrigonal, bordered about equally by the suranal, the posterior genital, and the right posterior genital plates.

The ambulacra are narrow and flexuous. The non-poriferous areas are provided with two rows of rounded, mamillated, alternating tubercles, 22-24 in each row, between each

pair of which is a pair of prominent granules. The pores are circular, arranged in unigeminal series, those nearest the ambitus being the largest.

The interambulacra are broad and supplied with two rows of mamillated primary tubercles, 6-7 in a row, two rows of large granules in zigzag alignment, two rows of smaller granules between the larger, and many minute granules encircling the others.

The peristome is large, depressed, decagonal, the branchial notches strong.

Young forms lack the regularity of arrangement of granules in the interambulacra, are often relatively more depressed, and have the pentagonal outline of the apical system destroyed by protruding ocular plates.

Dimensions.--Height, 16 mm.; diameter, 23.; diameter of apical system, 15 mm.

Remarks.--This species is somewhat similar to Salenia Bellula Clark, but is larger, has no ornamentation on the apical disk, has a subtrigonal periproct, and has more primary tubercles on both the ambulacra and interambulacra.

Occurrence.--Basal chalky marl at King's Water Hole on the Hondo River about 2 miles north of Hondo, Texas.

PYGASTERIDAE

Genus HOLECTYPUS

Holectypus hondoensis n. sp.

Plate 1, Figs. 4-6.

Description.--Test sub-pentagonal almost circular, sub-conical, adoral surface flat, depressed at the peristome, sides regularly curved, ambitus near the adoral surface.

The apical disk is small, pentagonal(?). The details are not distinguishable on our specimen.

The ambulacral areas are straight, narrow, widest at the ambitus. The primary plates bear two pairs of pores and one primary tubercle. Each tubercle is in a relatively wide areola which in turn is surrounded by fine granules. The pores are small, circular and unigenital.

The interambulacral areas are about twice the width of the ambulacral. The primary plates are long, narrow, and supplied with 3 rows of primary tubercles. Each tubercle has a wide areola which in turn is surrounded by fine granules.

The peristome is small, depressed, and having slight branchial incisions which give it a decagonal margin.

The periproct is oval, being about twice as long as wide, situated on the flat adoral surface about equally distant from peristome and ambitus.

Dimensions.--Height, 8 mm.; diameter, 13 mm.

Remarks.--This species bears certain resemblances to Holactypus planatus Roemer, but differs by having only two rows of tubercles in the ambulacral areas, six in the interambulacral areas, and having a much smaller periproct.

Occurrence.--Basal chalky marl at King's Water Hole on the Hondo River about 2 miles north of Hondo.

ECHINOCORYTHIDAE

Genus ANANCHYTES Mercati

Ananchytes texana Cragin

Plate II, Figs. 1,2. Plate III Fig. 1.

Ananchytes texana Cragin, 1898, Geol. Survey Texas, Fourth Ann. Rept., pp. 145,146, pl. XXVI, figs. 1,2, pl. XXV, fig. 12.

Ananchytes texana Clark and Twitchell, 1915, Mes. and Cen. Echin. U.S., U.S.G.S., Mon. LIV, p. 82, pl. XXXV, figs. 2a-c; pl. XXXVI, figs. 1a-b.

Description.--"Large conico-hemispherical as seen from the side; plan ovate, wider anteriorly; peristome of moderate size, transverse, oblong-reniform, the anterior lip and immediately contiguous surface deeply and abruptly depressed, the remainder of the interior surface slightly depressed, the depression being posteriorly parted by a gentle median undulation that includes the periproct and becomes gradually obsolete a short distance in advance of it; periproct infra-marginal and relatively smaller than in most (if not all) other known species of the genus, rather narrowly ovate and posteriorly more or less pointed; anterior ambulacrum about two-thirds as wide as either of the adjacent interambulacra, ambulacral plates very numerous and narrow, averaging about a millimeter in width on the greater part of the zone; the pores rounded but usually more or less transversally elongated, the line connecting the pores of one pair being horizontal except in the case of a few of the lower pairs; surface nearly even, the principal tubercles rather small and not very prominent."

Measurements.--Length, 107 mm.; maximum breadth 87 mm.; height, 68 mm.; transverse and median diameters of peristome 15 and 7 mm. respectively." (Cragin).

Occurrence.--Medina County, on Seco Creek, 2.5 miles northwest of D'Hanis, possibly from just above the Exogyra ponderosa horizon of the Escondido Formation.

SPATANGIDAE

Hemiaster parastatus (Morton)

Plate III Figs. 2,3.

- Spatangus sp. Morton, 1830, Am. Jour. Sci., 1st ser., vol. 17, p. 286.
- Spatangus cor-marinum(?) Morton, 1830, Am. Jour. Sci., 1st ser., vol. 18, p. 250, pl. 3, fig. 10.
- Spatangus cor-marinum(?) Morton, 1830, Jour. Acad. Nat. Sci. Phil., 1st ser., vol. 6, p. 199.
- Spatangus parastatus Morton, 1833, Am. Jour. Sci., 1st ser., vol. 23, p. 294.
- Spatangus parastatus Morton, 1834, Synop. Org. Rem. Cret. Gr. U.S., p. 77, pl. 3, fig. 21.
- Hemiaster parastatus D'Orbigny, 1847, Prodrôme, vol. 2, p. 270
- Spatangus parastatus Bronn, 1848, Index palaeontologicus, vol. 1, p. 1160.
- Hemiaster parastatus D'Orbigny, 1853-36, Paleontologie française, vol. 6, p. 265, pl. DCCCXCIV, fig. 4.
- Hemiaster parastatus Marcou, 1853, Explan. Text to Geol. Map. U.S. and Brit. Prov. N.A., p. 47, pl. 7, fig. 8.
- Hemiaster parastatus Desor, 1858, Synopsis des échinides fossiles, p. 373.
- Holaster parastatus Gabb, 1859, cat. Invert. Fossils Cretaceous p. 19.
- Hemiaster (?) parastatus Meek, 1864, Smithsonian Misc. Coll. vol. 7, (177), p. 3.
- Hemiaster (-) parastatus Clark, 1891, Johns Hopkins Univ. Circ., vol. 10. No. 87, p. 77.
- Hemiaster (?) parastatus Meek, 1864, Check List Inv. Fossils N.A., Cret. and Jur., p. 3.
- Hemiaster parastatus Clark, 1893, John Hopkins Univ. Circ., col. 12, No. 103, p. 52.
- Hemiaster parastatus Clark, 1893, Bull. U.S.G.S., No. 97, p. 83, pl. 45, figs. la-m.
- Hemiaster parastatus Johnson, 1905, Proc. Acad. Nat. Sci. Phil., 1905, p. 7.
- Hemiaster parastatus Weller, 1907, Cretaceous paleontology of New Jersey: Geol. Sur. New Jersey, pp. 298-300, pl. XV.
- Hemiaster parastatus Slocum, 1909, Field Mus. Nat. Hist. Pub. 134, Geol. Sur., vol. 4, No. 1, pp. 9, 10.
- Hemiaster parastatus Clark and Twitchell, 1915, Mes. and Cen. Echin. U.S., U.S.G.S., Mon. LIV, p. 92, pl. XLVIII, figs. la-n.

Description.--"Test distinctly cordate, the ventral surface flat with the exception of the peristomal depression, the sides rounded and inflated laterally and in front, the posterior side high and nearly vertically truncated, the dorsal surface convex, greatly elevated toward the posterior margin, and with a distinct, deep anterior sulcus. Ambulacral areas dissimilar, petaloid, with the

petals depressed, those of the postero-lateral pair short and broad, those of the antero-lateral pair curving forward and about twice the length of the postero-lateral pair, the anterior unpaired ambulacrum very broad, with the poriferous zones far apart and the pores small and approximated. Interambulacral areas broad, composed of large plates. Surface of all the plates covered with small tubercles between which are numerous microscopic granules; the peripetalous fasciole broad and distinct. Apical disk small, compact, posterior to the center of the dorsal surface but in front of the apex of the test, the four genital plates distinctly perforated and separated by the five small oculars. Anal opening small, situated high on the truncated posterior side."

"The dimensions of a complete example are: length, 37.5 mm.; width, 37.5 mm.; height, 28.12 mm."

"Remarks.--This species is most closely related to *H. ungula*, from which it may be separated by its deeper and broader anterior sulcus, more posterior position of the apical disk, and its more inflated sides." (Weller).

Occurrence.--Vincentown sand of Rancocas Group, New Jersey, Ripley Formation, Alabama, and the basal chalky marl beds of the Escondido at King's Water Hole, Hondo River, 2 miles north of Hondo, Texas.

Genus *HEMIASTER* Desor.

Hemiaster lacunosus Slocum

Plate I Fig. 7-12.

Hemiaster lacunosus Slocum, 1909, Field Mus. Nat. Hist. Pub. 134, Geol. ser., vol. 4, No. 1, pp. 10, 11, Pl. 11, figs. 1-7.

Hemiaster lacunosus Clark and Twitchell, 1915, U.S. Geol. Survey Mon. LIV, p. 97, Pl. L, figs. 3a-d; Pl. LI, figs. 1a-1.

Description.--"Test small, indistinctly cordate,

ventral surface moderately convex, dorsal surface convex, strongly elevated in the posterior interambulacral area and gradually sloping with an indistinct anterior sulcus; anterior and lateral borders inflated, posterior margin truncated. Ambulacral areas petaloid, with straight petals situated in depressions of the surface, the anterior-lateral pair nearly twice as long as the posterolateral pair; poriferous zones of the paired petals wide, pores transversely elongate and situated in a deep depression which grades into an indistinct anterior sulcus; poriferous zones of this petal narrow and far apart; Pores small, round, and separated by a tubercle. Interambulacral areas broad and composed of large plates. Surface of the test covered with a multitude of small tubercles with sunken areoles that increase in size toward the peristome. The tubercles have perforated mamelons and crenulated bosses, the inter-spaces being filled with microscopic granulations. Peripetalous fasciole wide and distinct, moderately bent inward between the petaloid areas except the two posterior ones. Apical disc sunken, small, and situated somewhat posterior to the center of the dorsal surface, the four genital plates distinctly perforated and separated by five small radial plates. Right anterior genital plate large, convex and forming the madreporite. Peristome transversely arched, bilabiate, with prominent labrum. Periproct about the size of the peristome, elongated vertically and situated near the top of the posterior truncation."

"Hemiaster lacunosus resembles Hemiaster parastatus in general form and proportions, but is distinguished from that species by its smaller size and by the sunken areoles. Moreover, the posterior interambulacral area is rounded, while in Hemiaster parastatus, it is in the form of a ridge. Hemiaster lacunosus is similar to Hemiaster stella in size, but differs from it in the shape of the fasciole, the sunken areoles and the form of the anterior margin. It resembles Hemiaster dalli in having sunken areoles, but in general form, these two species are quite dissimilar. The specific name adopted refers to the sunken areoles by which the species is distinguished." (Slocum).

Occurrence.--Pontotoc and Houston, Miss., and King's

Water Hole two miles north of Hondo, Texas, on the Hondo River.

Geologic horizon.--Ripley Formation and basal Escondido.

Hemiaster brucksi n. sp.

Plate IV. Figs 1-3.

Description.--Test cordate, dorsal surface inflated, ventral surface slightly convex, plastron broad and distinct, peristome depressed, sides gently curved.

The apical disk is small, central. The genital plates are perforate; the oculars are not visible on our specimens.

The unpaired ambulacrum is broad and in a deep sulcus which extends beyond the margin to the region of the peristome. The poriferous areas are narrow and far apart. The pores are small, circular, approximate, and disappear above the margin, but reappear near the peristome. The non-poriferous area is supplied with numerous small granules, the larger of which, near the poriferous area, are situated in sunken areoles. The anterior sulcus makes a strong notch in the margin of the test.

The antero-lateral ambulacra are slightly flexuous, petaloid, and situated in deeply impressed grooves. The pores are elongate, conjugate, and widely separate. The plates are long, narrow, and provided with only a few small granules.

The postero-lateral ambulacra are petaloid, about half as long as the antero-lateral ambulacra, and situated in deep grooves.

The posterior interambulacrum is a ridge apparently highest near the apical disk. The plates are large and ornamented with small, crenulate, mamillated tubercles situated in slightly depressed areoles. The other interambulacra are broad, high, and ornamented with tubercles similar to those of the posterior interambulacrum. The tubercles of the adoral side are the largest.

The peristome is oval, depressed, bilabiate, the under lip extended. The ambulacra are well developed in the peristomal region.

The periproct is small, situated high on the posterior, slightly truncated surface.

Remarks.--Hemiaster brucksi is similar to Hemiaster parastatus, but is differentiated by its deep anterior sulcus, central position of its apical disk, and its lower postero-interambulacra.

Dimensions.--Length, 41mm.; width, 42 mm.; height, 27.5 mm.

Occurrence.--Hemiaster brucksi occurs in the basal chalky marl beds of the Escondido formation at King's Water Hole on the Hondo River about 2 miles north of Hondo, Texas.

MOLLUSCA

PELECYPODA

PARALLELODONTIDAE

Genus NEMODON Conrad

Nemodon sellardsi n. sp.

Plate IX, Figs. 5,6.

Description.- Test elongate, angular, ventricose.

The anterior margin is gently rounded and passes with regular curvature into the broadly convex ventral margin. The subtruncate posterior margin meets the ventral at an acute angle. The hinge line is long and straight.

The beaks are high, broad, incurved, widely separate, and situated about one-third the length of the shell from the anterior margin.

The valves are very ventricose through most of their length, with a narrow depressed area on the posterior dorsal surface. A broad, shallow depressed area extends from the beaks to the center of the ventral margin. The surface of each valve is supplied with 36-40 fine, unequal, concentric striae. The interspaces are narrow, acute, unequal. Only a few delicate concentric growth lines are present. The radiating striae are finest in the region of the central depressed area.

Remarks.- Nemodon sellardsi is very similar to Nemodon

eufalensis (Gabb), but is differentiated from that species by a shorter hinge line, convex rather than sinuous ventral margin, and a shorter and less truncated posterior margin.

Dimensions.- Length, 18 mm.; width, 10 mm.; height, 11 mm.

Occurrence.- Basal chalky marl beds at King's Water Hole on the Hondo River about 2 miles north of Hondo, Texas; chalk cliff on San Geronimo Creek at Cliff, Texas.

Genus CUCULLAEA Lamarck

Cucullaea neumanensis n. sp.

Plate IV, fig. 4. Plate XIV, fig. 3.

Description.- Test oblique, subtrapezoidal, angulated. The beaks are high, incurved, rather acute at the summits, situated about two-fifths the length of the shell from the anterior margin.

The anterior margin is regularly curved; the ventral margin almost straight; the posterior subtruncate. The hinge line is long; the inner margin, as shown on the cast, broadly curved.

The faint impressions on the cast indicate that the surface of the shell is ornamented with wide radiating striae and finer concentric lines of growth.

Dimensions.- Length, 28 mm.; width, 19 mm.; height, 24 mm.

Remarks.- The radial, elevated lamina or buttress which supports the posterior adductors is relatively anterior to and weaker than that of Cucullaea tippiana Conrad or Cucullaea antrosa Morton and does not extend to the margin.

Occurrence.- Basal chalky marl beds of the Escondido Formation above the Neuman Road crossing of the Hondo River about $2\frac{1}{2}$ miles northwest of Hondo, Texas.

OSTREIDAE

Genus OSTREA Linneus

Ostrea cortex Conrad

Plate V, figs. 1,2. Plate VI, figs. 1,2.

Ostrea cortex Conrad, 1857, U.S. and Mex. Bound. Sur., vol. 1, Paleont. and Geol. of the Bound., p. 157, pl. XI, figs. 4a-d.

Ostrea cortex Coquand, 1869, Monog. Genre Ostrea Terrain Createc, pp. 64, 65, pl. 34, figs. 11-14.

Ostrea cortex White, 1875, Rep. Geogr. and Geol. Expl. and Sur. west of one Hundredth Meridian, vol. 4, pt. 1, p. 170, pl. 15, figs. 2a-c.

Ostrea cortex White, 1884, Fourth Ann. Rep. U.S. Geol. Sur., p. 294, pl. 37, figs. 3,4.

Description.- "Elongated, pointed toward the apex; inferior valve ventricose, very thick, with very prominent, concentric, imbricated laminae; cardinal fosset long and profound, somewhat curved, with a rounded ridge on either side."

"A remarkable species, with a rough bark-like exterior; the upper valve is somewhat ventricose and marked like the opposite exteriorly."
(Conrad)

Our specimens, collected from the upper beds of the Escondido Formation and the type outcrop of the Pulliam

formation, show that the lamellae of the surface become free toward the margin and extend out from the shell in delicately fluted plates. These plates are quickly worn away when exposed to weathering, presenting the smooth surface shown in the original figures of Conrad.

The cardinal area is usually elongate-triangular, in large specimens, however, the ridges on either side of the area become almost parallel, sometimes even constricted in places.

The muscle scar is large, rounded toward the margin, and rather acutely projected toward the cardinal area.

Occurrence.- Upper beds of the Escondido formation at Rock Crossing on the Hondo River, and on the D'Hanis-Medfrio Road about 8 miles south of D'Hanis, Medina county; Pulliam Formation at Pulliam ranch on the Nueces River in Uvalde County; Dry Creek, Mexico.

Gryphaea convexa (Say)

Plate IV, figs. 7,8.

Ostrea convexa Say, 1820, Am. Jour. Sci. 1st ser., vol. 2, p. 42.

Gryphaea convexa Mort., 1828, Jour. Acad. Nat. Sci. Phil., 1st ser., vol. 6, p. 79, pl. 4, figs. 1-2.

Gryphaea convexa Mort., 1829, Jour. Acad. Nat. Sci. Phil., 1st ser., vol. 6, p. 121.

Gryphaea convexa Mort., 1830, Am. Jour. Sci. 1st ser., vol. 17, p. 283.

Gryphaea convexa Mort., 1834, Synop. Org. Rem. Cret. Gr. U. S., p. 53, pl. 4, figs. 1-2.

Gryphaea convexa Troost, 1840, 5th Geol. Rep. Tenn. p. 46.

Pycnodonta vesicularis Cook, 1868, Geol. N. J. p. 374, figs.

- Gryphaea vesicularis White (in part), 1884, 4th Ann. Rep. U.S.G.S., p. 303, pl. 48, figs. 1-5.
- Gryphaea vesicularis Whitf. (in part), 1886, Pal. N. J., vol. 1 (Monog. U.S.G.S., vol. 9), p. 36, pl. 3, fig. 15, pl. 4, figs. 1-2.
- Gryphaea vesicularis Hill and Vaughan, 1902, U.S.G.S., Geol. Atlas, Austin Folio, fig. 51.
- Gryphaea convexa Johns., 1905, Proc. Acad. Nat. Sci. Phil. (1905), p. 11.
- Gryphaea convexa Weller, 1907, N.J. Geol. Sur., Cret. Pal. vol. 4, p. 451, pl. XLV, figs. 1-2.

Description.- "Shell variable in outline, large and robust, oblique, very thick, the surface more or less rugose, the beak in front of middle of the shell. Lower valve strongly convex, more or less auriculate posteriorly, the auriculation separated from the body of the shell by a conspicuous sinus which extends from behind the beak obliquely backward to the posterior margin of the shell, the cardinal side of the auriculation usually flattened and somewhat elevated; the body of the shell most strongly elevated along a line which extends obliquely backward from the beak to the basal margin, this prominence being more or less rounded or in some cases almost subangular; the posterior slope of the shell surface to the sinus limiting the auriculation is usually more abrupt than the anterior slope. The scar of attachment usually inconspicuous. Upper valve nearly flat or slightly concave. The dimensions of a rather large convex valve are: length, 105 mm.; height, 98 mm.; convexity, 58 mm." (Weller)

The specimens which we have of this species are smaller than that figured by Weller, but the characters are very similar. The left valve of our specimen is slightly oblique, the beak situated a little anterior of the center of the shell, the surface only moderately rugose, the umbonal ridge distinct but not deep. The hinge line is straight, long, and continued out straight almost to the end of the auriculation. The auriculation is rather large and set off from

the body of the shell by the sinus posterior to the umbonal ridge.

Occurrence.- *Gryphaea convexa* occurs rather plentifully in the calcareous shale in the bed of the Medina River at Castroville, Texas. The position of this shale in the section of the Escondido Formation is not definitely known, but is possibly toward the base. This species is reported from the Marshalltown clay-marl and the Navesink marl in New Jersey and from Alabama and Mississippi.

Genus EXOGYRA Sayers

Exogyra costata Garder

Plate VI, fig. 3. Plate X, figs. 1,2,6,7.

- Exogyra costata* Say, 1820, Am. Jour. Sci., 1st ser., vol. II, p. 43.
- Exogyra costata* Morton, 1828, Jour. Acad. Nat. Sci. Phila., 1st ser., vol. VI, p. 85, pl. VI, figs. 1-4.
- Exogyra costata* Morton, 1830, Amer. Jour. Sci. 1st. ser., vol. XVII, p. 284.
- Exogyra costata* Morton, 1834, Syn. Org. Rem. Cret. Group, U.S., p. 55, pl. VI, figs. 1-4.
- Exogyra costata* Troost, 1840, Fifth Geol. Rept., Tennessee, p. 46.
- Exogyra costata* Roemer (?) 1849, Texas, p. 396.
- Exogyra costata* Roemer (?) 1852, Kreide. von Texas, Bonn. p. 72.
- Exogyra costata* Conrad, 1857, Rept. U.S. and Mex. Bound. Survey, vol. 1, pt. 2, pp. 154, 155, pl. IX, figs. 2a, 2b, pl. X, fig. 1.
- Exogyra interrupta* Conrad, 1858, Jour. Acad. Nat. Sci. Phila., 2d ser., vol. III, p. 330, pl. XXXIV, fig. 15.
- Exogyra costata* Emmons, 1858, Rept. North Carolina Geol. Survey, p. 278, fig. A.
- Exogyra costata* Owen, 1860, Second Rept. Geol. Recon., Arkansas, pl. VII, fig. 4.

- Exogyra costata Meek, 1864, Check List Inv. Fossils, North America, Cret. and Jur., p. 6.
- Exogyra costata Cook, 1868, Geol. of New Jersey, p. 374, fig.
- ? Ostrea torosa Coquand, 1869, Mon. du Genre Ostrea, Terrain Cret., p. 38, pl. XIV, figs. 1-4; pl. XV, figs. 1,2 (ex parte).
- Exogyra costata Stoliczka, 1871, Mem. Geol. Survey India. Pal. Ind., Cret. Faunas Southern India, vol. III, p. 461, pl. XI, figs. 1-3; pl. XLI, fig. 1.
- Exogyra costata Gabb, 1876, Proc. Acad. Nat. Sci. Phila. p. 323.
- Exogyra costata White, 1884, Fourth Ann. Rept. U.S. Geol. Survey, p. 304, pl. LVII, figs. 1,2.
- Exogyra costata Whitfield, 1885, Mon. U.S. Geol. Survey, vol. IX, pp. 39-41. pl. VI, figs. 1,2 (ex parte).
- Exogyra costata Say, 1896, Bull. Amer. Pal., vol. 1, p. 291 (No. 5, p. 21).
- Exogyra costata Hill, 1901, Twenty-first Ann. Rept. U.S. Geol. Survey, pt. 7, pl. XLVII, figs. 1, 1a.
- Exogyra costata Hill and Vaughan, 1902, Geol. Atlas of U.S., U.S. Geol. Survey, Austin, folio, illustration sheet, fig. 52.
- Exogyra costata Bose, 1906, Bol. Mexico Inst. Geol., No. 24, pp. 51-54, pl. VI, fig. 3, pl. VII, fig. 1; pl. VIII, figs. 2,3; pl. IX, fig. 3.
- Exogyra costata Veatch, 1906, Prof. Paper U.S. Geol. Survey, No. 46, pl. XI, figs. 2, 2a.
- Exogyra costata Weller, 1907, Geol. Survey of New Jersey, Pal., vol. IV, pp. 456-458, pl. XLVII, fig. 1.
- Exogyra costata Stephenson, 1914, Prof. Paper U.S. Geol. Survey, No. 81, p. 50, pl. XVI, figs. 3,4; pl. XVII, figs. 1,2; pl. XVIII; pl. XIX, figs. 1-4; pl. XX, fig. 1.
- Exogyra costata Garder, 1916, Maryland Geol. Sur., Upper Cret., p. 564.

Description.- "Shell of adult specimens thick and massive, becoming ponderous in some overgrown specimens; subcircular to subovate in outline; dimensions of an average-sized specimen, length 105 mm., height 115 mm., convexity 65 mm.; the dimensions of the largest specimen in the collections, length 162 mm., height 200 mm., convexity 100 mm. (Mon. U.S.G.S. No. 81, pl. XVIII); valves unequal. Left or lower valve much larger than right valve, convex, and attached in proximity to beak to an external object; the beak usually more or less deformed by the scar of attachment; apical portion of shell spirally coiled within the margin; hinge and other internal shell characters essentially

the same as in Exogyra ponderosa Roemer; outer surface of shell characterized by regularly arranged, prominent, often rugged, radiating, entire or bifurcating costae, which in typical normal specimens extend in curves conforming to the spiral twist of the shell from the beak to the margin; the costae are separated by depressions which are usually narrower than the costae themselves; in occasional non-typical specimens the costae are weakly developed and in large overgrown individuals the costae become faint or disappear entirely in the direction of the margin (Pl. XVIII); in cross section the costae vary in shape from semicircular to squarish; the costae vary in maximum width on different adult individuals from 3-8 mm.; many specimens are further ornamented by concentric, embricating growth lamellae, which vary greatly in prominence from mere growth lines to broad, thin, projections, in some specimens extending outward from the summits of the costae in spine-like folds (Pl. XIX, Fig. 1); in some specimens the summits of the costae are ornamented with slight nodular protuberances (Pl. XIX, figs. 3-4); in most specimens there is a more or less distinctly marked umbonal ridge extending from the beak around to the posterior margin in a curve corresponding to the spiral twist of the shell; along the umbonal ridge the costae bifurcate frequently, those in front and below the ridge extending in a slight backward curve to the lower margin, and those above and to the rear of the ridge extending with a strong, upward curve to the upper posterior margin. Upper or right valve flatly spiral, roughly disk-shaped or operculiform, the outer surface varying from a slightly convex to slightly concave; the valve inclosed within and slightly depressed below the projecting margin of the lower valve; hinge and other internal shell characters essentially the same as in Exogyra ponderosa Roemer; beak depressed, not prominent; surface of shell ornamented with numerous concentric sharp-edged lamellae, separated by narrow, deep depressions; radiating costae absent or but faintly developed on most specimens but on some specimens are fairly prominent on upper posterior one third of the shell surface (Pl. XX, fig. 1)."

Remarks.- "The exact locality from which the type specimen of this species was taken is not known, but it is believed by Weller to have come from Mullica Hill, N.J., a Navesink marl (Monmouth Group) locality. In general this species occurs

in beds stratigraphically higher than those in which the species Exogyra ponderosa occurs, but there are apparent exceptions. (See p. 44)."
(Stephenson)

Gardner's Distribution.- Matawan Formation. Chesapeake and Delaware canal, Del. Monmouth Formation. Chesapeake and Delaware Canal, Delaware; Cecil and Prince George Counties Maryland. Navesink marls, Red Bank sand, and Tinton beds, N.J. In the eastern Gulf region the species is generally distributed through the zone of Exogyra costata, which includes the Ripley Formation (typical marine) of northern Mississippi, approximately the upper one half or two thirds of the Ripley Formation (typical marine beds of eastern Alabama and Georgia). In the Carolinas the species occurs throughout the Peedee sand. In Arkansas the species ranges through the Malbrook marl, the Nacatoch sand, and the Arkadelphia clay. In Texas the species is a common fossil in the Navarro formation and its equivalent the "Webberville" Formation. In Mexico the species occurs in the Cardenas division of the so-called lower Senonian. Ootatoor Formation. Southern India.

Occurrence.- The species occurs in the Escondido Formation in greatest numbers apparently toward the top of the formation where it is exposed about 5 miles east of Castroville in a creek bed on the San Antonio Road. A few small specimens were collected from the basal beds at King's Water Hole on the Hondo River about 2 miles north of Hondo, Texas, and from just below the Sphenodiscus pleurisepta zone at Eagle Pass, Texas.

Exogyra ponderosa (Roemer)

Plate VIII, fig. 1, 4. Plate XI, fig. 3.

Exogyra ponderosa Roemer, 1849, Texas, p. 395.

Exogyra ponderosa Roemer, 1852, Kreidebildungen von Texas, pp. 71-72, Taf. 9, figs. 2a-b.

- Exogyra ponderosa Shumard, 1853, Marcy's Exploration of the Red River, La., pp. 204-205.
- Exogyra costata (var.) Conrad, 1857, U.S. and Mex. Boundary Survey, vol. 1, pt. 2, p. 154, Pl. VIII, fig. 3, Pl. IX, fig. 1.
- Ostrea torosa Coquand (in part), 1869, Monographie du genre Ostrea, terrain cretace, Paris, p. 38, Pl. IX, figs. 1, 2, and 3.
- Exogyra ponderosa Credner, 1870, Zeitschr. Deutsch. geol. Gesell., vol. 22, p. 229.
- Exogyra ponderosa White, 1875, Rept. Geol. Surveys W. 100th Mer., vol. 4, pt. 1, p. 172, Pl. XIV, figs. 1 a-c.
- Exogyra ponderosa White, 1884, Fourth Ann. Rept. U.S. Geol. Survey, p. 306, Pl. L, figs. 1-2.
- Exogyra costata Whitfield (in part), 1885, Mon. U.S. Geol. Survey, vol. 9, pp. 39-41, Pl. VI, figs. 1-2. Also Paleontology of New Jersey, vol. 1, 1886, pp. 39-41, Pl. VI, figs. 1-2.
- Exogyra ponderosa Stanton, 1893, Bull. U.S. Geol. Survey, No. 106, pg. 65-66, Pl. VII, figs. 1 and 2.
- Exogyra ponderosa Hill, 1901, Twenty-first Ann. Rept. U.S. Geol. Survey, pt. 7, XLV, fig. 1.
- Exogyra ponderosa Hill and Vaughan, 1902, Austin folio (No. 76), Geol. Atlas U.S., U.S. Geol. Survey, illustration sheet, fig. 46.
- Exogyra ponderosa Veatch, 1906, Prof. Paper U.S. Geol. Survey No. 46, Pl. IX.
- Exogyra ponderosa Weller, 1907, New Jersey Geol. Survey, Paleontology, vol. 4, text, pp. 458-460, Pl. XLVII, fig. 2.
- Exogyra ponderosa Stephenson, 1914, Mon. 81, U.S.G.S., p. 46.

Description.- "Shell of adult very thick and ponderous, in outline subcircular to extended subovate; dimensions of an adult individual, length 111 mm., height 177 mm., convexity 94 mm. (U.S.G.S., Mon. 81, pl. XIV); dimensions of a medium-sized specimen, length 97 mm., height 112 mm., convexity 60 mm. (Pl. XV, fig. 1). Left or lower valve much larger than right valve, strongly convex; attached in proximity to beak to external object, this part of shell often very much deformed by scar of attachment; apical portion of shell spirally coiled within the marginal outline of shell; hinge with ligamental groove broad, deeply impressed, parallel on the upper side by a rather faintly developed, narrow shallow groove, both grooves curved to conform to spiral twist of shell; posterior to the larger groove a shallow, pitted or striated depression; surface of shell marked by thin, rather

prominent, concentric, imbricating growth lamellae, with intermediate fine growth lines; costae either entirely absent or small, regularly arranged costae present in proximity to beak and extending back from beak one-half to three-fourths inch (Pl. XIII, figs. 5-7), or, in addition to the preceding, very faint irregular costae extending back to varying distances away from the beak; a more or less clearly defined umbonal ridge extends from the beak backward, in a curve conforming to the spiral twist of the shell, to the lower posterior margin, usually, however, becoming rounder and less clearly recognizable toward the margin (Pl. XV, fig. 1). Upper or right valve flat or slightly concave, operculiform, subcircular or subovate in outline, with a nearly flat, spiral twist, the beak being well within the margin; beak depressed, not prominent; this valve enclosed within and slightly depressed below the projecting margin of the lower valve; hinge with broad, deeply impressed ligamental groove curved to conform to the spiral twist of the shell, the upper margin of the groove finely crenulated (Pl. XV, fig. 3); posterior to the groove a striated protuberance occupies a position in apposition to the similarly striated depression on the left valve; in proximity to the beak the surface is marked by numerous, fine, concentric growth lines, which away from the beak toward the margins are produced into thin projecting lamellae, separated by deep, narrow depressions." (Stephenson)

Occurrence.- This species occurs in the Escondido Formation in a zone of yellow clay of unknown thickness beginning about 30 feet from the base of the formation, and exposed on the bank of Seco Creek at Anacacho Crossing about $2\frac{1}{2}$ miles northwest of D'Hanis, Texas; about 1 mile below this outcrop R. A. Liddle # lists another outcrop of the same beds where

Bulletin, Univ. of Tex., No. 1860, The Geol. and Min. Res. of Medina Co., p. 62.

specimens of this species occur in great numbers.

Exogyra ponderosa Roemer Var. *erraticostata* Stephenson

Plate VII. fig. 1. Plate IX. fig. 1.

Exogyra ponderosa Roemer var. *erraticostata* Stephenson, 1913,
U.S.G.S., Mon. 81, p. 49, pl. XV, fig. 4; pl. XVI, figs.
1,2.

Description.- "In all its characters except the surface ornamentation of the left or lower valve this variety is essentially like the typical *Exogyra ponderosa* Roemer."

"The surface of the left valve is characterized by the presence of fairly well defined, sharp to rounded, ridged, radiating costae or plications which differ from the costae on *Exogyra costata* Say in their general weaker development and in their striking irregularity as regards size, shape, and distribution (U.S.G.S., Mon. 81, pl. XV, fig. 4). In proximity to the beak the shell is usually ornamented with small, irregularly arranged costae (such as are present on some specimens of *Exogyra ponderosa* Roemer, pl. XIII, fig. 5), extending backward over the shell one-half to three-fourths of an inch (pl. XVI, fig. 1) and merging into the irregular costae just described, which characterize the variety. The irregular costae extend backward 3 to 5 inches from the beak, becoming weaker in the direction of the margin; in the larger individuals there is usually a considerable part of the surface bordering the margin on which the costae are either very faint or are entirely absent (pl. XVI, fig. 1)."

Remarks.-That this form is closely related to *Exogyra ponderosa* Roemer is proved by the fact that practically all gradations are found between the specimens typical of the species, and the extremes of the variety. The specimen illustrated in Plate XVI, figure 1, represents one of the intermediate gradations; in this specimen the irregular costae are rather strongly developed in front of the umbonal ridge on a part of the shell not showing in the illustration, for which reasons it is referred to this variety."

Geologic occurrence.- In the eastern Gulf region *Exogyra ponderosa* var. *erraticostata* appears to be coextensive with *Exogyra ponderosa* Roemer in its occurrence stratigraphically and geographically. It is present in the Tombigbee sand member

of the Eutaw formation and ranges upward to about the middle of the Selma chalk, where the latter is most fully developed in western Alabama and east-central Mississippi, and is present in the corresponding non-chalky equivalents of this part of the Selma chalk in eastern Alabama and Georgia—that is, in approximately the lower one-third or one-half of the Ripley formation. The lower limit of its range is shown in plates IX and X by the dotted line indicated by the red letter P and the upper limit by the red line 2. In the Carolinas the variety occurs in the marine invertebrate bearing beds forming the upper part of the Black Creek formation, and is present questionably in the extreme basal beds of the overlying Peedee sand."

"From Weller's description# of Exogyra ponderosa Roemer the variety is doubtless present in the

Weller, Cret. Pal. N.J., N.J. Geol. Sur., Pal., vol. 4, 1907, text, pp. 460-462.

Marshalltown clay marl of the Matawan group in association with the typical forms of the species."

"In Arkansas and northeastern Texas the variety occurs in the Brownstown marl. Farther south in Texas it occurs in the basal part of the Taylor marl and it has been recognized in collections from beds near San Carlos, Presidio County, regarded as synchronous with a part of the Taylor marl."

(Stephenson)

This species is found associated with Exogyra ponderosa at each locality at which the latter was collected.

Genus PECTEN Muller

Pecten venustus Morton

Plate VII, figs. 2-7.

Pecten venustus Morton, 1833, Am. Jour. Sci. 1st ser., vol. XXIII, p. 293, pl. V, fig. 7.

Pecten venustus Morton, 1834, Syn. Org. Rem. Cret. Group, U. S., p. 58, pl. V, fig. 7.

Pecten venustus Meek, 1864, Check List Inv. Fossils, N. A., Cret. and Jur., p. 7.

Pecten venustus Conrad, 1868, Cook's Geol. of New Jersey,
p. 725.

Pecten venustus Whitfield, 1885, Mon. U. S. Geol. Survey,
vol. IX, p. 45, pl. VII, figs. 1,2.

Pecten venustus Johnson, 1905, Proc. Acad. Nat. Sci. Phila.,
p. 11.

Pecten venustus Weller, 1907, Geol. Survey of New Jersey, Pal.,
vol. IV, p. 478, pl. LI, figs. 1-5.

Description.- "Shell quite small, seldom attaining a height of more than five-eighths of an inch, and not commonly of more than half an inch. Form nearly circular below the ears and a little straightened on the cardinal slopes. Valves convex, slightly inequivalve and erect, or not perceptibly inequilateral. Cardinal line about half as long as the greatest width of the valves, which is a very trifle less than the height. Auriculations very unequal, distinctly separated from the body of the shell. The posterior one is quite small and alike in each valve; anterior large, ribbed on each valve, and provided with a moderately distinct notch below in the right one. Right valve most convex, marked by 17 to 19 elevated radiating ribs, which are somewhat flattened on the top and are marked by fine transverse striae. Interspaces narrow and deep. Many of the ribs of this valve become duplicate below the middle of the valve. Left valve depressed, convex, with narrow, sharply-elevated ribs, which are separated by much wider interspaces, and are marked by comparatively distant elevated rugae. Many of the wider interspaces have a thinner and smaller rib along their middle below the center of the valve, corresponding to the duplicated ribs of the opposite valve."

"On the interior of the valves the ribs are distinctly marked, but much more distinctly so along the margin of the shell. Cardinal line marked by a single ridge on each side of the center nearly parallel to the hinge-line in the left valve, with corresponding grooves in the right. Ligamental pit well marked." (Weller)

Occurrence.- This species occurs in great numbers in the clay above the Ananchytes texana zone of the Escondido Formation at the outcrop on Seco Creek south of the Rothe

Ranch house about 3 miles northwest of D'Hanis. It is reported by Gardner from the Matawan Formation in Del. and New Jersey; from the Monmouth Formation, New Jersey, Ripley Formation, Exogyra costata zone, Mississippi; and from the Selma Chalk, Exogyra costata zone, Alabama and east-central Mississippi.

TRIGONIDAE

Genus TRIGONIA Brug.

Trigonia medinensis n. sp.

Plate IX, figs. 2-5.

Description.- Test ovate subtrigonal in outline.

The anterior, ventral, and ventro-posterior margins are broadly rounded. The posterior margin is subtruncate toward the top. The dorsal margin is broadly concave, becoming more acutely so toward the beaks.

The beaks are almost anterior, slightly recurved, strong.

The valves are convex anteriorly and more depressed posteriorly. A narrow, rather prominent sulcus extending from the region of the beak, subparallel to the hinge-line, to the posterior margin divides the surface of the shell into two distinct areas, a lower and larger area ornamented with about 15 strong, rather acute radiating costae which are strongest on the posterior third of the shell, and an upper narrow area supplied with smaller, gently arcuate costae directed toward the hinge-line at an angle of about 90°.

Dimensions.- Length, 50 mm.; height, 40 mm.; thickness, about 23 mm.

Remarks.- Trigonia medinensis is very similar to Trigonia thoracica Morton, but has more and finer costae and does not have the conspicuous nodes of that species. It is also somewhat similar to Trigonia eufalensis Gabb, but lacks the posterior alateness of that form.

Occurrence.- Medina County, in a creek bed about 5 miles east of Castroville on the San Antonio Road. The beds from which this shell is taken are very probably immediately below the Sphenodiscus pleurisepta horizon.

SPONDYLIDAE

Genus PLICATULA Lamarck

Plicatula mullicaensis Weller

Plate X, fig. 7. Plate XI, figs. 1, 2, 5.

Plicatula mullicaensis Weller, 1907, Cret. Paleon. N.J., Geol. Sur. N.J., p. 485, pl. LII, figs. 3-5.

Description.- "Shell obliquely ovate. The upper valve depressed convex, marked by radiating costae and concentric lines of growth, at the junction of which the radiating costae are produced into short spines."

"The dimensions of an average specimen are: total length, 30 mm.; width, 22 mm."

Remarks.- This species is abundant at Mullica Hill and has usually been identified as P. utricosa. It differs from that species, however, in its much more regular outline and its much finer surface markings. Only the upper valves of the species have been observed, but these seem to be more uniform in their characters than is usual for members of this genus." (Weller)

Both valves are present in our specimens. The left valve is slightly concave, almost flat; the right is very moderately convex. The beaks are depressed and indistinct; that of the right valve is sub-truncate at the point of attachment. The spines of the lower valve are smaller and less numerous than those of the upper. The rows of spines increase by intercalation.

Occurrence.- Navesink marl at Mullica Hill, New Jersey and from the Exogyra costata zone of the Escondido formation in a creek bed on the San Antonio Road about 5 miles east of Castroville, Texas.

Lima reticulata Forbes

Plate VIII, fig. 2 & 3. Plate X, fig. 3,4.

Lima reticulata Forbes, 1845, Quart. Jour. Geol. Soc., London, vol. 1, p. 62; two text plates.

Lima reticulata Meek, 1864, Check list of Inv. Fossils, N.A., Cret. and Jur., p. 7.

Radula reticulata Conrad, 1868, Cook's Geol. of New Jersey, p. 725.

Radula reticulata Stoliczka, 1871, Mon. Geol. Sur. of India, Palaeont. Indica., Cret. Fauna Southern India, vol. III, p. 416.

Radula reticulata Whitfield, 1886, Mon. U. S. Geol. Survey, vol. IX, p. 63, pl. IX, figs. 8,9.

Lima reticulata Weller, 1907, Geol. Survey of New Jersey, Pal., vol. IV, p. 492, LIV, figs. 3,4.

Lima reticulata Gardner, 1916, Upper Cret., Maryland Geol. Survey, p. 600, pl. XXXIV, figs. 12, 13.

Description.- "Shell small, moderately oblique, strongly ovate and inflated. Hinge short; beaks proportionally strong, and projecting beyond the cardinal line. Valves nearly equal; anterior margin straight and not at all gaping; auriculations small but distinct, rectangular or very

slightly pointed at the outer angles. Surface radially ribbed, those of the anterior and posterior slopes faintly marked or obsolete, ribs (about 30) distinct, with five or more indistinct on each side; subangular on the middle of the valves and rounded toward the sides, crenulate or subspinose on the larger specimens when well preserved, but often appearing nearly smooth. Entire surface marked by concentric lines which give a roughened surface when perfect, giving the reticulated character indicated by the specific name. The shells are all small, seldom exceeding three-fourths of an inch in length, and are very fragile. The right valve appears to be a little less ventricose and the beak shorter than the left in all the specimens which I have seen where the two are united." (Whitfield)

Occurrence.- Basal chalky beds of the Escondido at King's Water Hole on the Hondo River about 2 miles north of Hondo, Texas.

Gardner's outside distribution.- Matawan formation. Merchantville clay marl, Woodbury clay, Marshalltown clay marl, Wenonah sand, New Jersey. Monmouth Formation. Navesink marl, New Jersey. Black Creek Formation. North and South Carolina. Eutaw Formation (Tombigbee sand member). Exogyra ponderosa zone, Mortoniceras subzone, Georgia; Russell County, Alabama; Peedee Sand North and South Carolina. Ripley Formation. Exogyra ponderosa zone, Union Springs, Alabama; Boonville, Mississippi. Exogyra costata zone, Georgia; Eufaula, Alabama; east-central Mississippi; Alcorn, Union and Tippah counties, Mississippi. Selma Chalk. Exogyra costata zone, east-central Mississippi. Extreme top of zone, Pataula Creek, Georgia.

LIMIDAE

Genus LIMA Bruguiere

Lima hilli n. sp.

Plate XII, fig. 4. Plate XII, fig. 1.

Description.- Test medium-sized, thin, oblique, compressed,

very inequilateral.

The ventral and posterior margins are rounded, serrated; the anterior very broadly rounded; the dorsal straight, sub-parallel to the ventral.

The surface of the left valve is ornamented with about 30 delicate, acute, radiating striae which become more pronounced posteriorly. The ribs 8-15, counting antero-posteriorly, are very faint forming a distinct banded area of minute ornamentation. The margins have a serrated appearance due to the extension of the ribs. Faint concentric growth lines occur closely spaced and becoming very numerous near the margin.

The right valve, and the umbo and beak of the left valve are missing in both of our specimens.

Dimensions.- Length, about 35 mm.; height, 25 mm.

Remarks.- Lima hilli is very similar to Lima shumardi Shattuck, but differs by the presence, in our species, of a band of very fine ribs and a marginal band of growth lines.

Occurrence.- Exogyra costata zone of the Escondido formation in a creek bed about 5 miles east of Castroville on the San Antonio Road.

ANOMIIDAE

Genus ANOMIA Mull.

Anomia nuecesensis n. sp.

Plate XII, figs. 2,4.

Description.- Test nacreous, fragile, irregularly sub-

circular, depressed.

The margin is flexuous corresponding to the undulating nature of the surface of the shell. The hinge line is rather short, irregular. The ligamental area is marginal and long.

The surface of left valve is ornamented with delicate, wavy, irregular, radiating striae and slightly stronger lines of growth. The growth lines give the effect of irregular banded areas to the surface of the shell.

The beak is central, marginal, depressed, indistinct.

The greatest tumidity is at about the center of the valves. The surface of left valve slopes with gentle undulations about equally in all directions.

The pallial^vline and muscle scars could not be located on our specimens.

Dimensions.- Length, 34 mm.; height, 30 mm.; semi-width, 6 mm.

Remarks.- Anomia nuecesensis is somewhat similar to Anomia argentaria Morton, but is much larger, less elongate in outline, and is more distinctly supplied with concentric lines of growth.

Occurrence.- Possibly only slightly below the Sphenodiscus pleurisepta horizon at the old Flowers Ranch headquarters just west of the Nueces River in Uvalde County.

Anomia liddlei n. sp.

Plate VII, figs. 3, 5.

Description.- Test small, nacreous, subcircular to elongate in outline, ventricose.

The left valve is convex, somewhat irregular in outline. The surface is ornamented with very fine striae and stronger lines of growth, the intersection of the two giving a delicate cancellated effect. The greatest convexity is from one-third to one-half the height of the shell from the beak. The slope is about equal in all directions, Some left valves have a distinct spatuloid shape.

The right valve is almost flat, perforated near the beak by the byssal notch. The surface is ornamented with delicate radiating striae and stronger lines of growth.

The beaks are depressed, indistinct. The area of attachment of the byssus in the left valve is very weak, often crumbling away at the slightest touch. The hinge-line is short, angular, irregular. The ligamental area is narrow, rather long.

The pallial line is entire.

Dimensions.- Length, 15 mm.; height, 12 mm.; width, about 6 mm.

Remarks.- *Anomia liddlei* is very similar to *Anomia nuecesensis*, but is more regular in ornamentation and general outline, smaller, and is free from undulations.

Occurrence.- Basal chalky marl at King's Water Hole on the Hondo river about 2 miles north of Hondo, Texas; chalk cliff on San Geronimo Creek at Cliff, Texas; just below the Sphenodiscus pleurisepta zone at the crest of the low hills east of Eagle Pass.

PHOLADOMYACIDAE

Genus PHOLADOMYA Sowerby

Pholadomya simondsi n. sp.

Plate XII, fig. 6. Plate XIII, fig. 1.

Plate XIV, figs. 1,4.

Description.- Test oblong, rounded, ventricose toward the beaks, depressed posteriorly.

The anterior and ventral margins are broadly rounded, the posterior moderately attenuated.

The beaks are high incurved, approximated, situated about one fourth the length of the shell from the anterior end. The umbos are broad and strong.

The surface of each valve is ornamented with 18-20 irregularly placed, notched, radiating costae of moderate strength separated by rounded interspaces of varying width. The extreme anterior and posterior portions of the valves are without ribs. The strongest ribs and widest interspaces are situated adjacent to the posterior non-ribbed area. Very fine concentric lines of growth are present at

irregular intervals.

The greatest tumidity occurs immediately below and slightly back of the beaks.

The hinge line is straight, about two-fifths the length of the shell.

Dimensions.- Length, 118 mm.; height, 94 mm.; width, 65 mm.

Remarks.- Pholadomya simondsi bears close resemblance Pholadomya occidentalis Morton and Pholadomya conradi Gardner, but differs from both in having a more pointed anterior margin, more rostrate posterior margin, and fewer ribs; it differs from Pholadomya occidentalis Morton in not having ribs so high on the posterior ventral surface, and from Pholadomya conradi Gardner in having a less prominent and more posteriorly placed beak.

Occurrence.- Basal chalky marl at King's Water Hole on the Hondo River about 2 miles north of Hondo, Texas; just below the Sphenodiscus pleurisepta zone at the crest of the low hills just east of Eagle Pass, Texas.

Pholadomya escondidoensis n. sp.

Plate XIII, fig. 2.

Description.- Test ovate, very ventricose, grossly sculptured.

The anterior margin is pointed, sub-truncate above,

broadly rounded below; ventral margin broadly rounded; posterior margin rounded below becoming more acutely so toward the dorsal margin. The hinge line is not visible on our specimen.

The beaks are incurved, approximated, high, rather acute at the summits, broadening rapidly.

The surface of each valve is ornamented with 8-10 low although rather acute ribs which are widely separate anteriorly, becoming closely spaced toward the posterior. The five anterior interspaces are very wide, some attaining a width of 25 mm.; the others are narrow and rather acutely convex. The closely spaced, unequal, irregular, growth lines together with the wide interspaces and acute ribs give a massive rugged appearance to the shell. The shell itself is very fragile.

Dimensions.- Length, about 134 mm.; width, 90 mm.; height, 89 mm.

Remarks.- Pholadomya escondidoensis has an outline similar to that of Pholadomya simondsi, but the massive ornamentation of the latter clearly distinguishes it from that species.

Occurrence.-Just below the Sphenodiscus pleurisepa horizon at the crest of the low hills east of Eagle Pass.

CARDIIDAE

Genus *CARDIUM* Linneus*Cardium cliffensis* n. sp.

Plate XVI, figs. 1, 3.

Description.- Test cordate, elongate dorso-ventrally, valves subtrigonal in outline.

The anterior margin is broadly curved; the posterior is almost straight. The ventral margin is pointed. The hinge line is apparently short and acutely curved.

The beaks are high, narrow, pointed, incurved, wide apart. The umbos are narrow and prominent.

The anterior adductor muscle scars are large, subtrigonal, adjacent to the margin; the posterior adductor scars are not visible on our specimens.

Two deeply incised, curved sinuses form a large heart-shaped area on the posterior of the shell just below the cardinal area. A similar though much smaller area occurs on the anterior end.

Dimensions.- Length, 42 mm.; width, 45 mm.; height, 78 mm.

Remarks.- *Cardium cliffensis* is somewhat similar to *Cardium spillmani* Conrad, but is relatively more elongate, is less extended anteriorly, has more acute beaks, and is more pointed ventrally.

Occurrence.- Basal chalky marl beds of the Escondido formation at King's Water Hole on the Hondo River about 2 miles north of Hondo, Texas; white chalky cliff, probably basal Escondido, on San Geronimo Creek at Cliff, Texas.

VERERIDAE

-Genus CYPRIMERIA Conrad

Cyprimeria depressa Conrad

Plate XII, figs. 7-9.

Dosinia depressa Conrad, 1860, Jour. Acad. Nat. Sci. Phila., 2nd ser., vol. IV, p. 278, pl. XLVI, fig. 6.

Dosinia depressa Meek, 1864, Check List Inv. Fossils, N.A., Cret. and Jur., p. 13.

Cyprimeria depressa Conrad, 1875, Kerr's Rept. Geol. Sur. of North Carolina, Appendix, p. 9.

Cyprimeria depressa Gabb, 1876, Proc. Acad. Nat. Sci. Phila., p. 308.

Cyprimeria depressa Whitfield, 1885, Mon. U.S. Geol. Sur., vol. IX, p. 156, pl. XXII, figs. 11, 12.

Cyprimeria depressa Johnson, 1905, Proc. Acad. Nat. Sci., Phila., p. 16.

Cyprimeria depressa Gardner, 1916, Maryland Geol. Sur. Upper Cret., p. 687, pl. XL, figs. 8-10.

Description.- "Shell rather small and thin for the genus, transversally ovate in outline, conspicuously compressed; lunule and escutcheon not differentiated; umbones small, flattened, anterior, the apices acute, prosogyrate and projecting slightly beyond the margin; umbonal angle not far from 140° ; anterior dorsal slope less gentle, more uniform, and less produced than the posterior, merging gradually into the anterior lateral margin; Posterior dorsal margin produced, more or less gibbous, very thin and sharp by reason of the bevelling along its inner surface; posterior lateral margin vertically truncate; base line obliquely arcuate, much more strongly so in front than behind; external surface striated with a modified incremental sculpture which is sharp and regular in the immediate vicinity of the umbones, but which becomes less sharp and less regular away from them; resting stages increasingly

numerous toward the base line; ligament sub-marginal, opisthodetic; cardinals three in number in each valve, radiating fan-like from beneath the umbones; anterior cardinal of right valve sharp, elevated, laminar, the middle cardinal broad, low, asymmetrically cuneate, the posterior cardinal even more elevated than the anterior and, like it, thin and laminar, though feebly reinforced on its anterior surface; anterior cardinal of left valve rather heavy, expanding ventrally, the middle cardinal elevated along its posterior margin, the posterior thin, sharp, laminar and not very prominent; laterals not developed, though there is a minute and irregular depression a little less than half-way down the posterior dorsal margin of the left valve, which is occupied by a corresponding elevation in the right; muscle scars rather small and obscure, the anterior elongated, the posterior semi-elliptical, placed high up under the extremities of the hinge plate; pallial line simple but truncated posteriorly, far distant from the base line; inner ventral margins simple."

"Outside Distribution.- Black Creek Formation. Northand South Carolina. Eutaw Formation. Exogyra ponderosa zone (basal), Russell County Alabama. (Tombigbee sand Member) Exogyra ponderosa zone, Mortoniceras subzone, Russell County, Alabama. Ripley Formation. Exogyra ponderosa zone, Georgia; Russell County, Alabama. Exogyra costata zone, Georgia; Eufaula, Alabama; Union and Tippah counties, Mississippi. Extreme top of zone, Pataula Creek, Georgia; Chattahoochee River, Alabama." (Gardner)

Remarks.- Only three imperfect internal casts were found by us from the Escondido Formation. This form is identified as Cyprimeria depressa chiefly because of the close resemblance in general outline. The following slight variations, however, may be noticed; the posterior truncation and strong varices of the New Jersey form are lacking in our specimen.

Occurrence in the Escondido.- Basal chalky marl at King's Water Hole on the Hondo River about 2 miles north of Hondo, Texas; white chalky cliff on San Geronimo Creek, Cliff, Texas.

SAXICAVIDAE

Genus *PANOPEA* Menard*Panopea banksi* n. sp.

Plate XIV, figs. 5,6.

Description.- Test oblong, gibbous, gaping widely posteriorly.

The anterior margin is broadly rounded, the ventral almost straight, sometimes incurved toward the posterior which is only very gently curved. The intersection of the ventral and posterior margins is the most posterior part of the shell.

The beak is situated about one fourth the length of the shell from the anterior margin, elevated above the hinge line, broad, incurved.

The surface is ornamented with coarse, unequal, concentric striae which become almost obsolete on the posterior dorsal surface. A shallow sulcus extends from the beak to the intersection of the ventral and posterior margins. There is a faint disarrangement of the striae at their intersection with the sulcus.

The hinge line is short and straight.

Dimensions.- Length, 57 mm.; width 38 mm.; height, 35 mm.

Remarks.- *Panopea banksi* is somewhat similar to *Panopea decisa* Conrad, but is distinguished from that form by its more anteriorly placed beak, the anterior slope of its posterior margin from the ventral to the dorsal margins, and the presence

on Panopea banksi of a faint sulcus from the beak to the intersection of the ventral and posterior margins.

Occurrence.- Basal chalky marl at Kings Water Hole on the Hondo River about 2 miles north of Hondo, Texas.

Panopea yeatoni n. sp.

Plate XIV, fig. 2. Plate XV, fig. 2.

Description.- Test sub-quadrangular in outline, widely gaping posteriorly and closed in front.

The anterior and ventral margins are broadly rounded; the posterior margin, subtruncated; the hinge line straight and short.

The beaks are about one fourth the length of the shell from the anterior margin, high, incurved, and directed forward. The umbonal ridge is acute in the region of the beak but broadens widely toward the margin of the shell. Some specimens have a faint sinus both anterior and posterior to the umbonal ridge; others have only the posterior sinus.

The valves are ventricose, ornamented with strong, unequal, concentric, striae which are slightly wavy due to their intersection with the sinuses.

Only casts of this species have been examined.

Dimensions.- Length, 48 mm.; width, 35 mm.; height, 36 mm.

Remarks.- Panopea yeatoni is very similar to Panopea banksi, but is distinguished by having higher and more acute

beaks than the latter species, shorter and more stubby outline, and in some specimens two sinuses to only one in the case of Panopea banksi.

Occurrence.- Basal chalky marl at King's Water Hole on the Hondo River about 2 miles north of Hondo, Texas.

SCHAPHOPODA

DENTALIIDAE

Genus DENTALIUM Gray

Dentalium ~~by~~ *bee* n. sp.

Plate XV, Figs. 6, 8, 9, 10.

Description.--Test small, slender, tapering, gently arcuate

The anterior aperture is circular, not constricted, and apparently without ornamentation. The posterior aperture is small and circular.

Specimens collected from the crest of the low hills just east of the international railroad bridge at Eagle Pass have strong shells ornamented with six equal, strong, longitudinal striations, while the forms from the old Flowers Ranch just west of the Nueces River in Uvalde County have rather delicate shells and are ornamented with six thin striations, two of which, those on the inner and outer side of the arcuate shell, are much more extended. The two variations were collected from one horizon of the basal Taylor in Bexar county, by Dr. E. H. Sellards. The species has, therefore an extended vertical range.

Dimensions.--Length, 9 mm.; maximum diameter, 2.8 mm.

Occurrence.--Just below the Sponodiscus pleurisepa horizon of the Escondido Formation on the crest of the low hills just east of Eagle Pass, at the headquarters of the Old Flowers Ranch just west of the Nueces River in Uvalde County, and from basal Taylor on the Bandera Road near the west county line in Bexar County.

GASTROPODA

Genus LUNATIA Gray

Lunatia halli Gabb

Plate XV, figs. 4, 7.

Lunatia halli Gabb, 1860, Jour. Acad. Nat. Sci. Phila., 2nd ser., vol. iv, p. 391, pl. lxviii, fig. 11.

Lunatia halli Meek, 1864, Check List Inv. Fossils, N.A., Cret. and Jur. p. 20.

Lunatia halli Conrad, 1868, Cooks Geol. of New Jersey, p. 729.

Lunatia halli Whitfield, 1892, Mon. U.S. Geol. Survey, vol. xviii, p. 130, pl. xv, figs. 13-16.

Lunatia halli Johnson, 1905, Proc. Acad. Nat. Sci., Phila., p. 21.

Lunatia halli Weller, 1907, Rept. Cret. Pal. New Jersey, vol. iv, p. 677, pl. lxxvi, figs. 11-14 (synonymy and figs. 9, 10., 15-19 excluded.)

Lunatia halli Gardner, 1916, Md. Geol. Survey, Upper Cret. p. 499. pl. XIII, figs. 1,2.

Description.--"Shell of moderate size, with an elevated spire composed of about four or four and a half volutions in entire specimen, and much resembling a Paludina in general appearance; elevation about once and a half as great as the diameter of the last volution, and the last volution when measured on the apertural side forms about three-fourth of the entire height; volutions convex, not inflated, but regularly rounded, with a well marked suture in the casts, the only condition in which they are known from New Jersey, but which does not indicate a flattening at the top in the perfect shell; aperture elongate-ovate, acutely rounded below and somewhat sharper above than below, the greatest breadth being below the middle; base of the last volution sharply rounding into the umbilical cavity; umbilical opening in the casts small, not extending above the lowest volution and showing no evidence of any thickening or callus of any kind; surface unknown." (Whitfield).

Lunatia halli is the most common fossil of the clay beds immediately overlying the Ananchytes texana horizon. The shells are very small, well preserved. Ordinarily, the surface is without ornamentation, but on the body, whorl, in some specimens, there are minute growth lines with now and then a

broad, shallow, transverse depressed area.

Occurrence.--Clay beds immediately above the Ananchytes texana horizon of Escondido Formation exposed in the south bank of Seco Creek south of the Rothe Ranch house and about 3 miles northwest of D'Hanis.

Matawan Formation. Merchantville clay marl, Wenonah sand, New Jersey.

Monmouth Formation. Navesink marl, New Jersey, Maryland.

NATICIDAE

Genus GYRODES Conrad

Gyrodes petrosus (Morton)

Plate XV, Figs. 1, 3, 5.

Natica petrosa Morton, 1834, Syn. Org. Rem. Cret. group, U. S., p. 48, pl. xix, fig. 6.

Natica alveata Conrad, 1860, Jor. Acad. Nat. Sci. Phila., 2nd ser., vol. iv, p. 289, pl. xlvi, fig. 45.

Gyrodes alveata Meek, 1864, Check List Inv. Fossils, N. A., Cret. and Jur. p. 21.

Gyrodes petrosa Meek, 1864, Ibidem.

Gyrodes petrosus Conrad, 1868, Cook's Geol. of New Jersey, p. 729.

Gyrodes petrosus Whitfield, 1892, Mon. U. S. Geol. Survey, vol. xviii, p. 127, pl. xvi, figs. 1-4.

Gyrodes petrosa Gabb, 1876, Proc. Acad. Nat. Sci., Phila., p. 295.

Gyrodes petrosus Gardner, 1916, Md. Geol. Sur., Upper Cret. p. 496

pl. XIII, fig. 8.

Description.--"Shell (as seen in casts) of medium size or smaller, obliquely oval or depressed and somewhat patulose, with a low spire; the entire adult shell having three to three and a half volutions, the last of which forms the greatest bulk of the shell; volutions obliquely compressed from above, largest below the middle, often slightly flattened on the upper half and with a distinct flattened space bordering the suture; aperture large, very oblique, strongly receding below as seen in profile on its edge; semilunate in outline, rounded below and slightly acute above, somewhat modified in

the upper part by the intrusion of the preceding volution; umbilicus large, broadly patulos within and apparently without callus; peristome thin, and the substance of the shell also apparently slight; surface of the shell unknown."
(Whitfield).

Remarks.--This species is very common in the clay beds above the Ananchytes texana horizon. Many well preserved casts were collected by us from these beds in a few minutes. None of the specimens retain the shell.

Occurrence.-- Matawan Formation. Merchantville clay marl, and Wenonah sand, N.J., Monmouth Formation. Navesink marl and Red Bank sand, New Jersey. Ripley Formation. Navesink. Ripley Formation! Exogyra costata zone, Union and Tippah counties, Mississippi. Selma Chalk. Exogyra costata zone, Wilcox county, Alabama; east central Mississippi.

Turritellidae

Genus TURRITELLA Lamarck

Turritella trilira Conrad.

Plate XV, fig. 12

Turritella trilira Conrad, 1860, Jour. Acad. Nat. Sci. Phil., 2nd ser., vol. 4, p. 285.

Turritella corsicana Shumard, 1861, Proc. Boston Soc. Nat. Hist., vol. 8, p. 196.

Turritella trilira Gabb, 1861, Synop. Moll. Cret. Form. p. 147 (91).

Turritella corsicana Meek 1864, Check List Inv. Fossils N.A., Cret. and Jur., p. 18.

Turritella trilineata Hill, 1901, 21st Ann. Rept. U.S. Geol. Sur. pt. VII, pl. XLVII, fig. 3.

Turritella trilira Veatch, 1906, Prof. Paper U.S. Geol. Sur., No. 46, pl. XI, fig. 4.

Turritella trilira Weller, 1907, Geol. Sur. N.J., Pal., p. 899, pl. LXXIX, figs. 4, 5.

Turritella trilira Gardner, 1916, Maryland Geol. Sur., Upper Cret., p. 489.

Description.--"Shell turritoid, large for the genus, attaining a maximum altitude of 80 mm. and a diameter of more than 20 mm.; whorls probably 16 or more in number in a perfect individual, the early whorls flattened, the later feebly convex, converging at an angle of about 25°; external surface sculptured with three sharply and very prominently elevated laminar equisized and equilateral ridges, separated by symmetrically concave interspaces; the posterior spiral a little nearer the suture than the anterior; interspiral areas threaded with microscopically fine lirae, which are minutely crenulated by the incrementals; suture line distinct, impressed but inconspicuous by reason of the overhanging spiral ridges placed about midway on the upcurve of the interspiral between the posterior lamina and the anterior lamina of the preceding turn; interspiral areas between the laminae of succeeding whorls scarcely wider than those between the laminae on the same whorl; base very finely and evenly threaded; casts characterized by evenly rounded whorls, separated by rather deep sutural channels."

Distribution.--"Matawan Formation, Maryland; Wenonah sand, New Jersey. Black Feet Formation, North and South Carolina. Peedee Sand, North and South Carolina. Mutaw Formation (Tombigbee Sand member). Exogyra ponderosa zone, Prentiss County Miss. Ripley Formation. Exogyra costata zone, Georgia; Eufaula, Alabama; Union and Tippah counties, Miss. Extreme top of zone, Pataula Creek, Georgia. Selma Chalk. Exogyra costata zone, Wilcox County Alabama. Brownstown(?), Annona, Marlbroad, Nacatoch, and Arkadelphia Formations, Arkansas Taylor and Navarro Formations, Texas." (Gardner).

Remarks.-- T. trilira occurs in great numbers in the top beds of the Escondido formation outcropping at Rock Crossing on the Hondo River, about 9 miles southeast of Hondo, Texas.

RACHIGLOSSA

Genus ODONTOFUSUS Whitfield

Odontofusus medians Whit.

Plate XV Figs. 11, 13.

- Odontofusus medians Whitfield, 1893, Mon. U.S. Geol. Sur.,
vol. XVIII, p. 67, pl. V, figs. 18, 19, 20(?), 21(?).
Odontofusus medians Weller, 1907, Geol. Sur. N. J., Pal.,
vol. IV, p. 761, pl. XC, figs. 1, 2, 3, 4, 5.
Odontofusus medians Gardner, 1916, Md. Geol. Sur., Upper
Cret., p. 443.

Descriptions.-- "Shell, as known from casts, slender, turreted, with ventricose volutions, which are most convex above the middle of the exposed part; body whorl rapidly contracted below and extended into a slender, straight canal; spire slender, longer than the shell below when viewed from the back; apical angle 35 to 40; volutions five in number, with strongly marked suture line; plication near or perhaps below the middle of its length; aperture obliquely pyriform, broadest above the middle, and narrowed below, equal to or longer than one-half the length of the entire shell; volutions marked by a moderate number of vertical folds which extend from suture to suture on the whorls, and on the body volutions can be traced nearly to the axis of the shell and are directed slightly forward in their passage from above downward. No evidence of spiral lines on the surface can be seen."

"This species is intermediate between the other two species herein described, in its apical angle, in the ventricosity of the volutions, and in the number of vertical folds crossing the volution. The last volution does not increase any more rapidly than those above, in which feature it agrees with O. rostellaroides, but differs from O. typicus, and in the comparative length of the columella it differs from either in being more slender. The species is very marked and distinct from either of them and is readily recognized. On one of the examples, there appears to be a very faint indication of a second plication on the columella a short distance above the generic one, which may or may not be real. But if a natural feature, the space between them is entirely flat. Other specimens show no evidence whatever of this second plication. The vertical folds crossing the volutions are also much stronger on the one having the second ridge, and it may possibly indicate a distinct species. (Whitfield)

This species is only moderately numerous in the Escondido Formation. We have in our collection a large specimen and seven small ones most of which have the shell well preserved.

Occurrence.- Odontofusus medians occurs associated with Pecten venustus (Morton), Gyrodes Petrosus (Morton), and Lunatia halli (Gabb) in the clays overlying the Ananchytes texana horizon of the Escondido Formation in the cliff on the south side of Seco Creek south of the Rothe Ranch house about 3 miles northwest of D'Hanis, Texas.

Matawan Formation. Marshalltown clay marl, New Jersey.

Monmouth Formation. Navesink marl, New Jersey; Maryland.

VOLUTIDAE

Genus VOLUTOMORPHA Gabb.

Volutomorpha conradi Gabb.

Plate XVI, Figs 2, 4.

Volutilithes conradi Gabb, 1860, Jour. Acad. Nat. Sci. Phil. 2nd ser., vol. 4, p. 309, pl. 48, fig. 10.

Volutilithes conradi Gabb, 1861, Synop. Moll. Cret. Form, p. 149 (93).

Fulguraria conradi Gabb, 1861, Proc. Acad. Nat. Sci. Phil. p. 364.

Rostellites conradi Meek, 1864, Check List Inv. fossils N.A. Cret. and Jur. p. 21.

Rostellites conradi Conrad, 1868, Cook's Geol. New Jersey, p. 730.

Volutomorpha conradi Gabb, 1876, Proc. Acad. Nat. Sci. Phil. (1876), p. 293.

Volutomorpha conradi Tyron, 1883, Struct. and Syst. Conch., vol. 2, p. 166, pl. 54, fig. 27.

Volutomorpha conradi Whitfield, 1892, Pal. N.J. vol. 2 (Mon. U. S.G.S., vol. 18) p. 71 pl. 6, fig. 21; pl. 7, figs. 1-3 4, 5(?)

Volutomorpha gabbi Whitfield 1892, Pal. N.J., vol. 2 (Mon. U.S.G.S., vol. 18, p. 73, pl. 7, fig. 6; pl. 8, figs 1-4.

- Volutomorpha conradi Johns., 1905, Proc. Acad. Nat. Sci. Phil.
p. 25.
- Volutomorpha gabbi Johns., 1905, Proc. Acad. Nat. Sci. Phil.
(1905) p. 25.
- Volutomorpha conradi Weller, 1907, Geol. Sur. N.J. Pal. vol.
IV, p. 780, pl. XCII, figs. 6, 7; pl. XCIII, figs. 1-3;
pl. XCIV, figs. 1-6.
- Volutomorpha conradi Gardner, 1916, Md. Geol. Sur., Upper
Cret., p. 427, pl. XV, fig. 8

Description.--"Shell large, some specimens apparently attaining a length of 4 1/2 inches; spire short, or only moderately elevated, although the general form of the shell is sometimes slender, the body volution, as viewed on the apertural side, forms fully four fifths of the entire length, even in the condition of internal casts; upper volutions compact, convex on the sides, and rather squarist or suddenly rounded to the suture on the top; body volution very large and very gracefully swollen or convex in the upper part, and prolonged and attenuated below forming a long, gracefully tapered anterior beak with the columella slightly twisted; top of the volution rather suddenly contracted to the suture; aperture large, very elongate-elliptical in outline and prolonged below, where it becomes narrowed as the outer lip approaches the axis; columella slightly twisted and marked by from one to three very oblique folds, the middle one of which is usually the strongest; surface of the casts usually smooth, with the exception of , in some cases only, a few distant vertical folds on the upper ones, and on the extreme upper part of the body volution; but where the external features are preserved, the whole shell is marked by strong, rounded, vertical folds, and but little less strongly marked, rounded, spiral ridges; the spiral ridges moderately distant on the upper part of the volution, but becoming less strongly marked and crowded, and finally almost obsolete, toward the base." (Whitfield).

Gardner's Distribution.--Magothy Formation.
Cliffwood clay, N.J.. Monmouth Formation. Navesink
marl, New Jersey; Maryland.

Remarks. Casts of this form are very numerous at Rock Crossing on the Hondo River about 9 miles southeast of Hondo, Texas at the outcrop of the topmost beds of the Escondido Formation. They are so poorly preserved, however, that their individual characters cannot be determined.

CEPHALAPODA

Genus BACULITES Lamarck

Baculites ovatus Say

Plate XVII, fig. 1.

- Baculites ovata* Say, 1820, Am. Jour. Sci. 1st ser., vol. II, p. 41.
- Baculites ovata* Morton, 1828, Jour. Acad. Nat. Sci. Phila., 1st ser., vol. VI, p. 89, pl. V, figs. 5,6.
- Baculites ovatus* Morton, 1830, Am. Jour. Sci. 1st ser., vol. XVII, p. 280; vol. XVIII, p. 249, pl. 1, figs. 6-8.
- Baculites ovatus* Morton, 1830, Jour. Acad. Nat. Sci. Phila., 1st ser., vol. VI, p. 196, pl. V, figs. 5,6; pl. VIII, figs. 6-8.
- Baculites ovatus* Morton, 1834, Syn. Org. Rem. Cret. Group, U. S., p. 42, pl. 1, figs. 6-8.
- Baculites ovatus* Marcou, 1853, Explan. Text to Geol. Map of U.S. and British Prov. N.A., p. 46, pl. VII, fig. 5.
- Baculites ovatus* Hall and Meek, 1856, Mem. Am. Acad. Arts and Sci., new ser., vol. V, p. 399, pl. V, figs. 1z-1c; pl. VI, figs. 1-7.
- Baculites ovatus* Meek, 1864, Check List Inv. Fossils, N.A., Cret. and Jur., p. 23.
- Baculites ovatus* Conrad, 1868, Cook's Geol. of New Jersey, p. 730.
- Baculites ovatus* White, 1875, U. S. Geol. and Geog. Expl. and Survey, w. 100th Merid., p. 199, pl. 19, figs. 4a-4c, 5a-5c.
- Baculites ovatus* Meek, 1876, Rept. Inv. Cret. and Ter. Fossils, Up. Missouri, p. 394, pl. XX, figs. 1a-1b, 2a-2d.
- Baculites ovatus* Whiteaves, 1889, Cont. Can. Pal., vol. 1, p. 181.
- Baculites ovatus* Whitfield, 1892, Mon. U. S. Geol. Survey, vol. XVIII, p. 275, pl. XLVI, figs. 3-9.
- Baculites ovata* Say, 1896, Bull. Am. Pal., vol. 1, No. 5, p. 19 (289). (Reprint, Harris.).
- Baculites ovatus* Johnson, 1905, Proc. Acad. Nat. Sci. Phila., p. 26.
- Baculites ovatus* Weller, 1907, Geol. Survey of New Jersey, Pal., vol. IV, p. 821, pl. CIX, fig. 5.
- Baculites ovatus* Gardner, 1916, Maryland Geol. Sur., Upper Cret., p. 375. pl. XII, figs. 2,3.

Description.- "Shell attaining a rather large size, elongate, gradually tapering, cross-section ovate, the ventral or siphonal side somewhat more narrowly rounded than the opposite. The dimensions of the cross-section of a large individual are 45 mm. by 26 mm. Surface of shell usually smooth, sides

of the living chamber sometimes with illdefined, broadly curved, obliquely transverse ribs or undulations whose greatest forward extension is on the ventral side, narrowly rounded at the extremity, the dorsal margin being more broadly rounded and the lateral margins with rather broad and deep sinuses just in front of the dorsal lip. The septa show considerable variation in different individuals as to their distance apart, some being crowded while others are more or less remote; the ventral or siphonal lobe is broad, with two terminals, widely separated, somewhat spreading branches, each of which is secondarily lobed upon the sides and extremity; first lateral saddle about as wide as high, but narrower than the ventral lobe, bifid at the extremity, each division being secondarily lobed; first lateral lobe deeper than wide, rather deeply bifid, each division with several secondary divisions; second lateral saddle similar to the first; second lateral lobe broader and shorter than the first; but somewhat similarly divided; third lateral saddles occupying the dorsal side, smaller than the other, bifid at the extremity with the inner division higher than the outer, and both of them secondarily lobed; dorsal lobe very small, smaller than or no larger than the terminal divisions of the adjacent lateral saddles. (Whitfield)

Remarks.- Of the many small fragments which we have of this species only one cast is well enough preserved to give an idea of the sutures and surface ornamentation. The surface is ornamented with small, broadly curved, obliquely transverse ribs which are extended far forward on the ventral side. Near the dorsal side are large, broadly rounded, widely separated nodes. The sutures are about the same as those described by Weller except that the lobes are a little broader and longer and the saddles are also longer. Our specimen is very small, its maximum transverse diameter being 16 mm.

Occurrence.- Baculites ovatus occurs in the basal

chalky marl beds of the Escondido Formation at King's Water Hole on the Hondo River about 2 miles north of Hondo, Texas. Weller lists (ob. cit.) Baculites from the Merchantville clay marl and the Navesink marl New Jersey, and from Alabama, Dakota, Montana, and Colorado.

Heteroceras beedei n. sp.

Plate XVII, figs. 2,5.

Description.- Test closely wound up to the free limb, tapering rapidly. A complete individual probably has only four or five whorls.

The surface of the whorls is ornamented with small, acute, transverse costae and minute rounded nodes. The costae continue around the entire surface of the whorl, although becoming very fine on the dorsal side. The nodes may occur as simple, round, knob-like elevations on the costae or they may appear at points of bifurcation of the costae. In the latter case the two new costae formed may continue around the whorl as separate costae or they may reunite. If the new junction occurs on the opposite side of the venter and at about the same distance from it, a new node is usually formed-- thus giving rise to two spiral rows of nodes. If the union takes place far down on the side of the whorl, there is no node formed. Some costae seem to disappear on the sides of the whorls without rejoining, their loose ends giving the

appearance of costae formed by intercalation. On the outer or deflected whorl as many as three new costae may be formed from one at the nodes, in which case at least one will extend no further than to a node on the opposite side of the venter. The nodes and costae are strong and apparently rather irregularly arranged on the deflected whorl. The entire shell is irregular, being coiled either dextrally or sinistrally. We have specimens of each type which are apparently, otherwise essentially similar. The suture, as shown from a fragment broken along the septa, has four lobes and four saddles. Of the lobes, one is ventral, another dorsal, and the other two occupy median positions. Of the saddles, two are ventral laterals (one on either side) and two are dorsals. The details of the sutures could not be traced on our specimens, which are all casts.

Remarks.- Heteroceras beedei bears certain resemblances to Heteroceras polyplacum A. Romer, but differs from it in that the latter may or may not have nodes and consequently bifurcating costae, and in that the greatest diameter of that species may be reached by a revolution or two before giving off the deflected whorl.

Heteroceras beedei also somewhat resembles Heteroceras conradi Morton, but the character of the figures of that species (all from small fragments) makes it impossible to determine the relation between the two forms.

Occurrence.- Ananchytes texana horizon of the Escondido Formation at its outcrop on Seco Creek about $2\frac{1}{2}$ miles northwest of D'Hanis, Texas.

SILESITIDAE

Genus PACHYDISCUS Zittel

Pachydiscus escondidoensis n. sp.

Plate XVII, Plate XIX, Plate XX.

Pachydiscus complexus Cragin, 1893, 4th Ann. Rep. Geol. Tex., Cont. Inv. Paleont. Tex. Cret., p. 237.

Description.- The shell of this species is not preserved in any of our specimens. The external characters, however, are very well shown on the casts.

The maximum diameter of our largest specimen measured apparently near the beginning of the body chamber is 350 mm. The transverse diameter of the body chamber at this point is 165 mm. The coils are rather involute. The maximum diameter of the umbilicus is 110 mm. At a point where the diameter of the whorl from venter to umbilicus is 40 mm. the surface is ornamented with small, rounded costae which extend from umbilicus to venter, bending forward rather strongly before crossing the venter. At about one-third the diameter of the whorl from the venter, appear secondary costae which have attained about the size of the primaries before crossing the venter. The venter is ornamented with a minute channel which is bounded by small rounded ridges. The whorl is relatively

more depressed here than later. These characters change but slightly throughout the life of the animal. The venter gradually becomes more and more broadly rounded, the costae stronger and farther apart, and the secondary costae begin lower and lower on the coil until at a diameter of 350 mm. the curve of the venter is much broader than that of the side of the whorl, the costae are rounded undulations, 30 mm. apart near the umbilicus, and the secondaries begin at the umbilicus.

The sutures are not preserved on any of our casts.

Remarks.- This species is very similar in general outward appearance to P. flaccidicosta Roemer, but it is distinguished from that species by a relatively smaller channel along the venter, by more ventricose whorls, and by the absence of strong nodes along the umbilicus.

Occurrence.- Pachydiscus escondidoensis occurs in the basal 6 feet of yellow marl of the Escondido Formation at King's Water Hole on the Hondo River about 2 miles north of Hondo and at Anacacho Crossing on Seco creek about $2\frac{1}{2}$ miles northwest of D'Hanis.

SCAPHITIDAE

Genus SCAPHITES Parkinson

Scaphites conradi (Morton).

Plate XVII, Figs. 3, 4.

Ammonites conradi Morton, 1834, Synopl Org. Rem, Cret. Group
U. S., p. 39, pl. xvi, figs. 1-3.

Scaphites pulcherrimus(?) Roemer, 1841, Verst. Norddeutschen
Kreidegeb., p. 91.

Scaphites conradi d'Orbigny, 1850, Prodr. de Paleont., vol. ii
p. 214.

Ammonites danoe d'Orbigny, 1850, Ibidem, p. 213.

Ammonites nebrascensis Owen, 1852, Rept. Iowa, Wis., and
Minn. pl 577, pl. viii, fig. 3; 1852,; pl. ix, fig 2.

Scaphites conradi Meek and Hayden, 1857, Proc. Acad. Nat. Sci.
Phila., for 1856, p. 281.

Scaphites conradi Meek , 1876, Rept. U.S. Geol. Survey
Territory vol. ix p. 430, pl. xxxvi figs. 2a-2c.

Description--"Shell short-oval-subdiscoid
or subcircular in outline, rather strongly com-
pressed, often attaining a very large size;
section of volutions oval, being higher than
wide; inner turns closely involute and deeply
embracing, generally nearly rounded on the
periphery; umbilicus small; deflected part of
the outer volution very short, and scarcely,
or not at all, free at the aperture, which is
oval, or with inner side more or less sinuous;
surface ornamented with moderate-sized, straight,
or slightly arched costae, some of which bifur-
cate once or twice, while shorter ones are
occasionally intercalated between the others;
costae all passing nearly straight across the
periphery, but often becoming nearly or quite
obsolete toward the aperture on the non-
separate deflected part of the outer volution--
all occupied by the little nodes of the lateral
surfaces, of which about 6 to 8 concentric
rows may usually be counted on each side of the
volutions; nodes of outer row around each mar-
gin of the flattened periphery, larger than
the others, and sometimes compressed."
"Septa rather deeply divided into four principal
lobes and as many sinuses on each side of the
siphonal lobe, which is nearly oblong in form,
about twice as long as wide, and bears three
slender digitate main branches on each side,
the two terminals of which are a little longer
than the others; first lateral sinus as long

as the siphonal, and a little wider--provided with three nearly equal, slender, deeply incised and digitate terminal branches and smaller lateral divisions: first lateral lobe as long as the siphonal, and nearly of the same breadth at its free end, where it is provided with two unequal branches, the larger of which (that on the inner side) is subdivided into three branchlets, and the smaller into two, while its slender body supports one or two small, partly digitate diverging lateral branchlets; second lateral sinus shorter than the first, and scarcely more than half as wide, with two nearly equal bifid and serrated terminal branches, and several short, obtuse, irregularly-notched, alternating lateral divisions, the sinuses between which are so deep as to give the body a very narrow, zigzag appearance; second lateral lobe a little more than half as long and wide as the first, and provided with two bifid digitate terminal branches, and one small nearly or quite simple, diverging lateral branchlets on each side of its slender body; third lateral sinus shorter than the second, but of nearly the same breadth, with a very slender body and two nearly equal, irregularly formed sub-divisions; third lateral lobe rather more than half as long and wide as the second, and very similarly formed; fourth lateral sinus half as long and wide as the third, with 2 small irregularly serrated, terminal branches; fourth lateral lobe small, and bifid at the end, the two divisions being very short and bi- or tri-dentate" (Meek)

Remarks-- One small fragment of this species was found by us in the clay above the Ananchytes texana horizon in the cliff on Seco Creek just south of the Rothe Ranch house about 3 miles northwest of D'Hanis, Texas. The sinuous costae and the two outer rows of nodes show up well; the inner nodes and the sutures are not very plain.

Gardner lists Scaphites conradi from the Monmouth Formation in

Maryland Geol. Sur., Upper Cret., p. 385.

Md.; The Ripley Formation, Exogyra costata zone, Prairie Bluff, Alabama; Fox Hill, Western Interior.

Scaphites bakeri n. sp.

Plate XXII, figs. 1

Description.- Shell medium in size, oval, inflated. Each lateral surface of the shell is ornamented with four spiral rows of tubercles. The tubercles nearest the umbilicus are rounded while the ones toward the venter become progressively more elongate until at the venter they are about four times as long as wide and very prominent. Many fine, rounded, slightly flexuous costae, which have their maximum forward extension in the region of the venter, occur on the regularly coiled whorls.

The living chamber of an adult specimen occupies about two-thirds of a whorl, is very much inflated near the middle, and is supplied with much stronger nodes and weaker costae than the preceding whorls.

The aperture is constricted; the outer margin extends anteriorly considerably farther than the inner.

The sutures cannot be seen.

Remarks.- *Scaphites bakeri* is very similar to *Scaphites spiniger* Schlüter in general shape, number of rows of tubercles, and in number and arrangement of costae, but is distinguished from that species by the closer proximity of its first row of tubercles to the umbilicus, its more elongate tubercles and the closer proximity of the two rows of tubercles on either side of the venter.

Dimensions.- Length, 87 mm.; width, 80 mm.; maximum convexity, 34 mm.

Occurrence.- Basal chalky marl beds of the Escondido formation at King's Water Hole on the Hondo River about 2 miles north of Hondo, Texas.

PLACENTICERATIDA

Family SPHENODISCIDAE

Genus SPHENODISCUS Meek

Sphenodiscus pleurisepta (Conrad)

Plate XXI, Plate XXII, figs. 2,3.

Ammonites pleurisepta Conrad, 1857, U.S. and Mex. Bound.

Sur., vol. 1, pt. II, p. 159, pl. 15, figs. 1a-b-c.

Amonites pedernalis Binckhorst, 1873, Mon. Gast. et. Ceph. du Limbourg, p. 21, pl. V, al, fig. 1 (no others).

Sphenodiscus pleurisepta Bohm, 1898, Zietschr. Deutsch. geol. Gesell., vol. L, pl. 7.

Sphenodiscus pleurisepta, Hyatt, 1903, U.S. Geol. Sur., Mon. XLIV, p. 59, pl. III, figs. 7-15; pl. IV; pl. V, figs. 1-3; pl. VI, fig. 6.

Description.- This species has a decidedly depressed shell during most of its life, only becoming rounded at the venter during its gerontic stage. During the earlier stage the venter is very depressed, the surface is ornamented with two spiral rows of rather strong, round or transversally elongate nodes and very fine, sigmoidal, transverse costae. Toward late ephibic stage the outer row of nodes has moved relatively closer to the venter and the nodes become very feeble. By the end of the ephibic stage the outer nodes have

disappeared entirely and the inner row, now become elongate transversally, and occupying a position about midway between the venter and the line of involution. During the gerontic stage the nodes become widely separate, about 22mm. at a point where the diameter of the shell is 185 mm., and the venter broadly rounded. The shell is always strongly involute, the umbilicus being about 8 mm. in large specimens.

The suture undergoes but slight variation from the ephibic to the gerontic stages. At a point where the diameter of the whorl from the venter to the line of involution is 30 mm. five lateral saddles are bilobate, short, phyllaform, and seven broadly rounded saddles of short length occur between the last bilobed saddle and the line of involution. The first lateral lobe has 4 short branches, the second 5, the third 6, the fourth 5, the fifth 3, and the remaining 7 are simply bilobed, as well as it is possible to determine on a specimen which slightly is eroded through this area. The sutures at this stage are widely separate. At a diameter of 45 mm. from the venter to the line of involution the ventral lobe is broad, gently curved, its lateral lobe having short branches. The first lateral saddle on this suture is short, narrow, bilobed; the second is narrow at the neck but more widely bilobed; the third, fourth, and fifth are broadly bilobed; the remaining 8 are broadly rounded. The lobes apparently have the same shape as the earlier stage, but are simply larger. The third lateral lobe of the succeeding suture

almost interlocks with the third and fourth saddles of this suture. On a larger specimen at a diameter of 50 mm. the first and second lateral saddles are broader and the second and third are becoming trilobate. At a diameter of 60 mm. and on the fifth suture from the last on an animal which was evidently far advanced in the gerontic stage, total diameter 160 mm., the siphonal lobe is long and wavy, its lateral lobe trilobed with each small lobe rebranched; the other lobes similar to those of the first suture except that each small lobe may be rebranched; second and third lateral saddles trilobate; the third lobe interlocking with the third and fourth saddles of the preceding suture. At this point the sutures are very close together from the third lateral saddle to the umbilicus.

Occurrence.- Top beds of the Escondido formation at Rock Crossing on the Hondo River about 9 miles southeast of Hondo, Texas, and around the Country Club grounds at the crest of the hill east of Eagle Pass; Brooksville, Noxubee, County, Mississippi.

PLATE I

	Page.
<i>Salenia whitneyi</i> n. sp. -----	1
Fig. 1. Aboral view of the type specimen. (x1 3/4)	
2. Lateral view of the same. (x1 3/4)	
3. Adoral view of the same. (x1 3/4)	
<i>Holectypus hondoensis</i> n. sp. -----	2
Fig. 4. Aboral view of the type specimen. (x3)	
5. Lateral view of the same. (x3)	
6. Adoral view of the same. (x3)	
<i>Hemiaster lacunosus</i> Slocum -----	6
Fig. 7. Adoral view of a specimen from basal Escondido. (x2)	
8. Posterior view of the same. (x2)	
9. Aboral view of the same. (x2)	
10. Lateral view of the same. (x2)	
11. Aboral view of a specimen from the Ripley Formation, Alabama. (x2)	
12. Lateral view of the same. (x2)	



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PLATE II

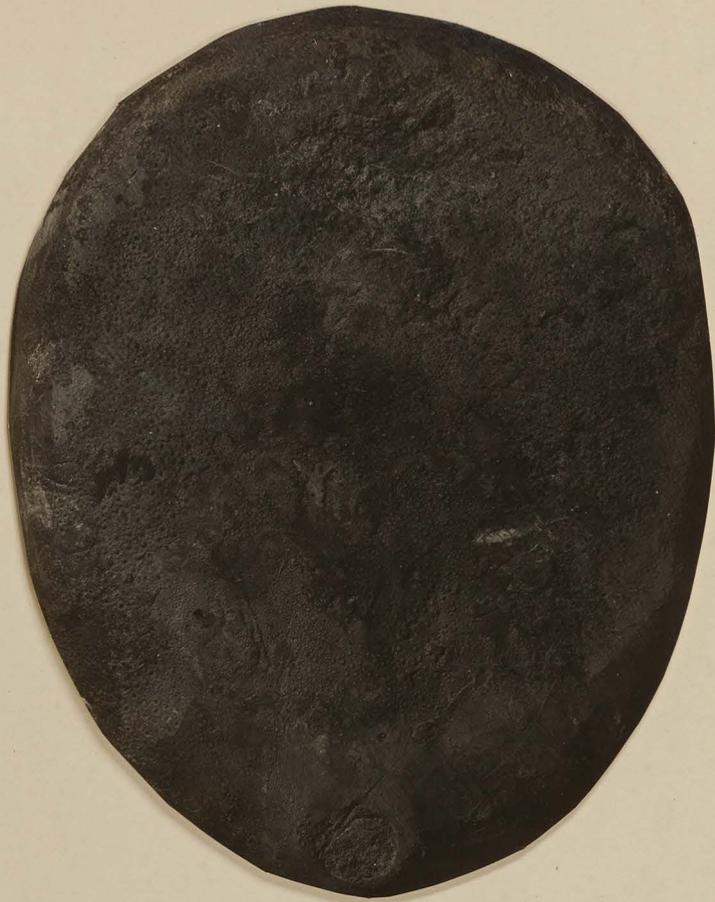
Ananchytes texana Cragin ----- Page. 4
Fig. 1. Aboral view of an entire specimen.
2. Lateral view of the same.



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PLATE III

	page.
Ananchytes texana Cragin -----	4
Fig. 1. Adoral view of the specimen figured on Plate II.	
Hemiaster parastatus (Morton) -----	5
Fig. 2. Aboral view of a slightly crushed specimen. (xl 1/3)	
3. Adoral view of the same. (xl 1/3)	

PLATE IV

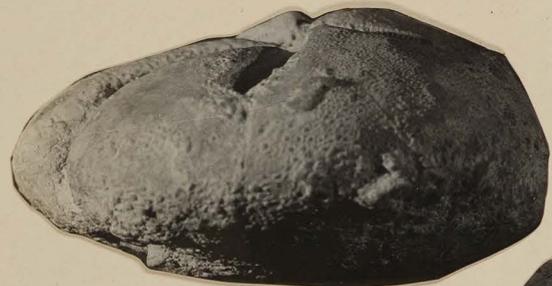
	Page.
Hemiaster brucks1 n. sp. -----	8
Fig. 1. Posterior view of the type specimen. (x2 1/4)	
2. Aboral view of the same. (x2 1/4)	
3. Lateral view of the same.	
Cucullaea nuemanensis n. sp. -----	11
Fig. 4. Lateral view of a perfect cast. (x2 1/2)	
Nemodom sellardsi n. sp. -----	10
Fig. 5. Lateral view of the type specimen. (x2)	
6. Dorsal view of the same. (x2)	
Gryphaea convexa Morton -----	13
Fig. 7. Left valve of a small specimen.	
8. Left valve of a slightly more gibbous specimen.	



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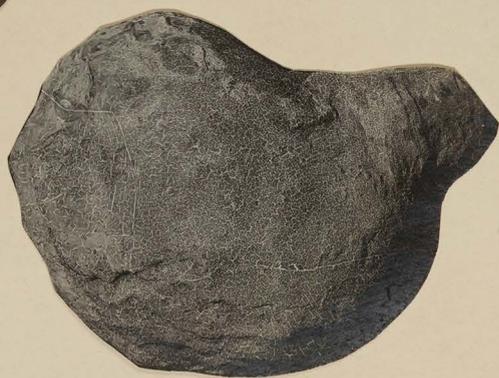
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PLATE V

Ostrea cortex Conrad -----	Page.	12
Fig. 1. Exterior of the left valve of a specimen showing the extended lamellae. (xl 1/2)		
2. Interior of the same. (xl 1/2)		



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PLATE VI

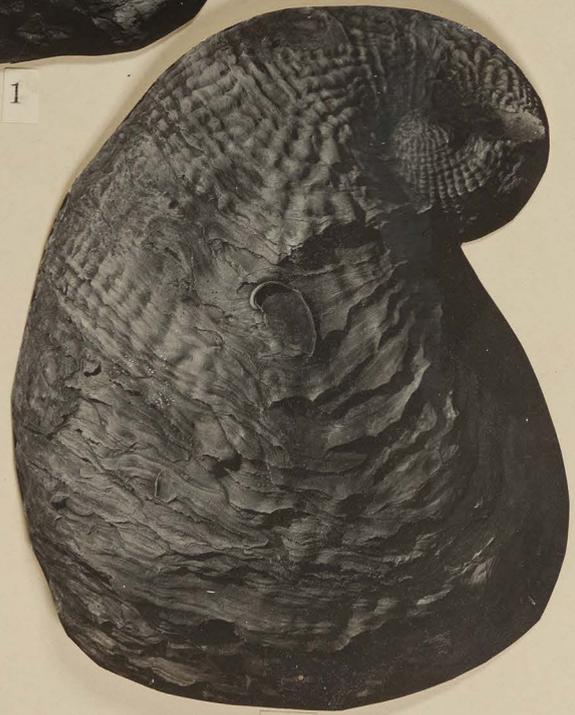
	Page.
Ostrea cortex Conrad -----	12
Fig. 1. Exterior of the left valve of a large specimen from near Eagle Pass showing the free edges of the lamellae worn away by weathering.	
2. Exterior of a right valve from the type outcrop of the Pulliam Formation	
Exogyra costata Say -----	15
Fig. 3. Exterior of a left valve showing the disappearance of the costae far from the margin of the shell.	



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PLATE VII

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<i>Exogyra ponderosa</i> var. <i>erraticostata</i> Stephenson -----	21
Fig. 1. Exterior of a perfect left valve.	
<i>Pecten venustus</i> Morton -----	22
Fig. 2, 3, and 4. Left valves showing the surface ornamentation. (x3)	
5, 6, and 7. Right valves. (x3)	





PLATE IX

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<i>Exogyra ponderosa</i> var. <i>erraticostata</i> Stephenson -----	21
Fig. 1. Interior view of a left valve.	
<i>Trigonia medinensis</i> n.sp.-----	24
Fig. 2. External view of a left valve.	
3. External view of a right valve.	
4. Dorsal view of a left valve.	
5. Dorsal view of a right valve.	



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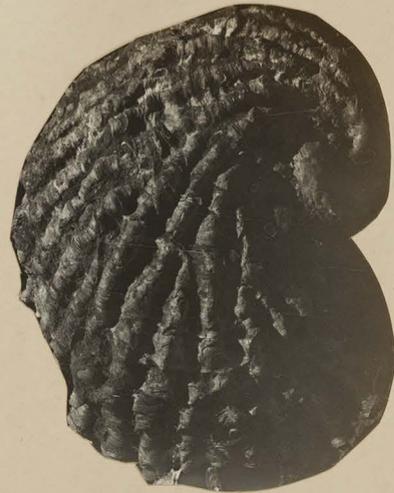
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PLATE X

	Page.
<i>Exogyra costata</i> Say ----- Figs. 1, 2, 4, and 6. Views of left valves of young specimens showing variation in surface ornamentation.	15
<i>Iima reticulata</i> (Forbes) ----- Fig. 3. View of a slightly crushed right valve. (x2 1/2) 5. View of an imperfect left valve. (x2 1/2)	26
<i>Plicatula mullicaensis</i> Weller ----- Fig. 7. View of an almost perfect right valve, (x2 1/2)	25



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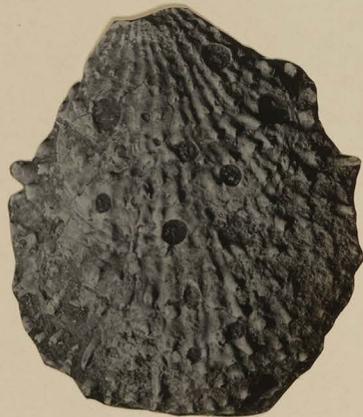
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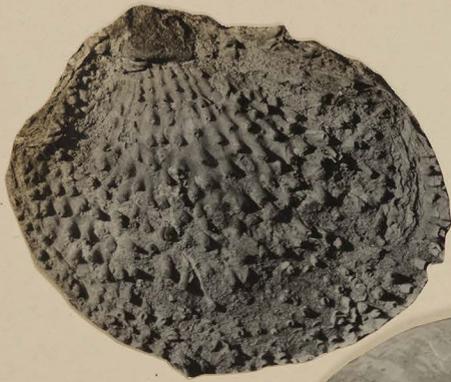
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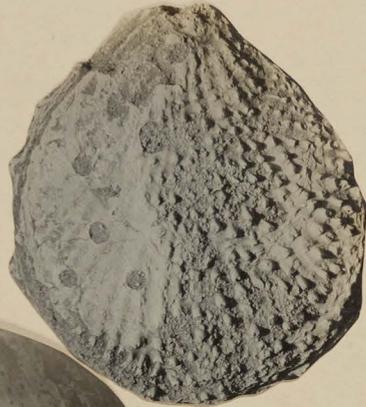
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PLATE XI

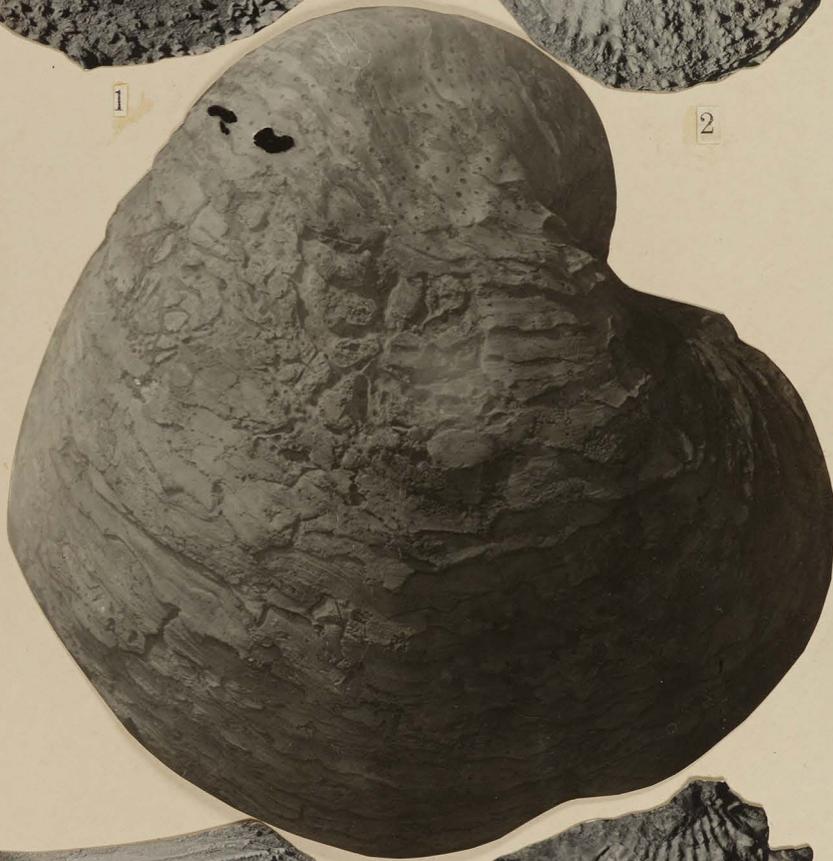
	Page.
<i>Plicatula mullicaensis</i> Weller -----	25
Fig. 1 and 2. Views of almost perfect left valves. (x2 1/2)	
5. View of a fragment of a right valve. (x2 1/2)	
<i>Exogyra ponderosa</i> Roemer -----	18
Fig. 3. View of a left valve.	
<i>Lima hilli</i> n. sp. -----	27
Fig. 4. View of an imperfect left valve. (x2)	



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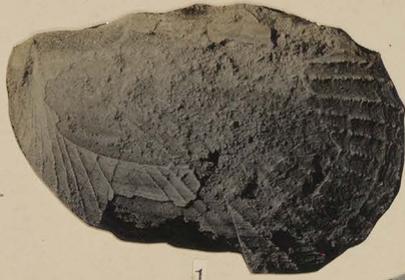
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PLATE XII

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<i>Lima hilli</i> n. sp. -----	27
Fig. 1. View of an imperfect left valve. (x2)	
<i>Anomia nuecesensis</i> n. sp. -----	28
Figs. 2 and 4. Views of almost perfect left valves.	
<i>Anomia liddlei</i> n. sp. -----	30
Fig. 3. View of a right valve showing byssal notch.	
5. View of a left valve.	
<i>Pholadomya simonlsi</i> n. sp. -----	31
Fig. 6. View of the left valve of the type specimen.	
<i>Cyprimeria depressa</i> Conrad -----	35
Fig. 7. View of an imperfect left valve.	
8. View of the dorsal surface.	
9. View of an imperfect left valve.	



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PLATE XIII

	Page.
<i>Pholadomya simondsi</i> n. sp. -----	31
Fig. 1. View of the cast of a left valve.	
<i>Pholadomya escondidoensis</i> n.sp. -----	32
Fig. 2. View of the right valve of the type specimen.	



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PLATE XIV

	Page.
<i>Pholadomya simonlsi</i> n. sp. -----	31
Fig. 1. Anterior view of the type specimen.	
4. Anterior view of a slightly more ventricose specimen.	
<i>Panopea yeatoni</i> n. sp. -----	38
Fig. 2. View of the right valve of the type specimen.	
<i>Cucullaea nuemanensis</i> n. sp. -----	11
Fig. 3. Anterior view of the type specimen. (x3 1/2)	
<i>Panopea banksi</i> n. sp. -----	37
Fig. 5. View of the right valve of the type specimen.	
6. Dorsal view of the type specimen.	

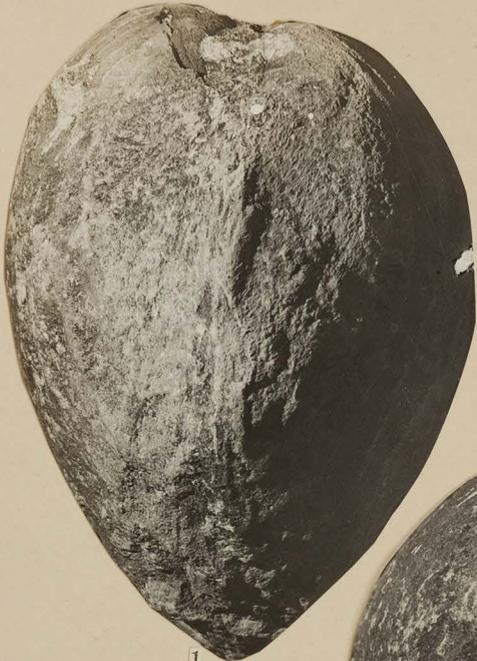


PLATE XV

	Page.
Gyrodos petrosus (Morton) -----	42
Figs. 1, 3, and 5. Dorsal; lateral, and ventral views of a nearly perfect specimen. (x2 1/2)	
Panopea yeatoni n. sp. -----	32
Fig. 2. Dorsal view of the type specimen.	
Dentalium bybeeii n. sp. -----	40
Figs. 6, 8, and 9. Lateral views of specimens collected at Eagle Pass showing equal longitudinal striations. (x2)	
10. Lateral view of a specimen from the old Flowers ranch showing two extended striations. (x2)	
Lunatia halli Gabb -----	41
Figs. 4 and 7. Lateral views of a perfect specimen. (x2 1/2)	
Odontofusus medians Whitfield -----	44
Figs. 11, and 13. Lateral views of a nearly perfect specimen. (x2 1/2)	
Turritella trilira Conrad -----	43
Fig. 12. Lateral view of a specimen almost covered with bryzoa.	



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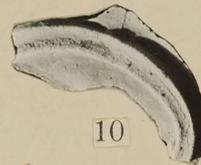
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PLATE XVI

	Page.
<i>Cardium cliffensis</i> n. sp. -----	34
Fig. 1. Anterior view of a natural cast,	
3. Lateral view of the same.	
<i>Volutomorpha conradi</i> (Gabb) -----	46
Figs. 2 and 4. Lateral views of rather imperfect casts.	



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PLATE XVII

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Baculites ovatus Say -----	48
Fig. 1. Lateral view of a cast. (x2)	
Heteroceras beedei n. sp. -----	50
Fig. 2. Lateral view of a well preserved cast.	
5. Portion of regularly wound whorls.	
Scaphites conradi Morton -----	54
Fig. 3. Right lateral view of a fragment. (x2 1/2)	
4. Left lateral view of the same. (x2 1/2)	

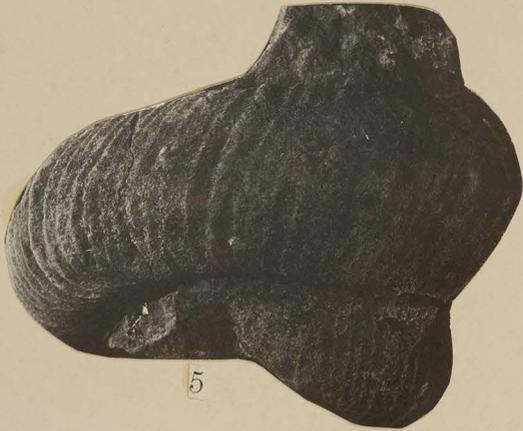
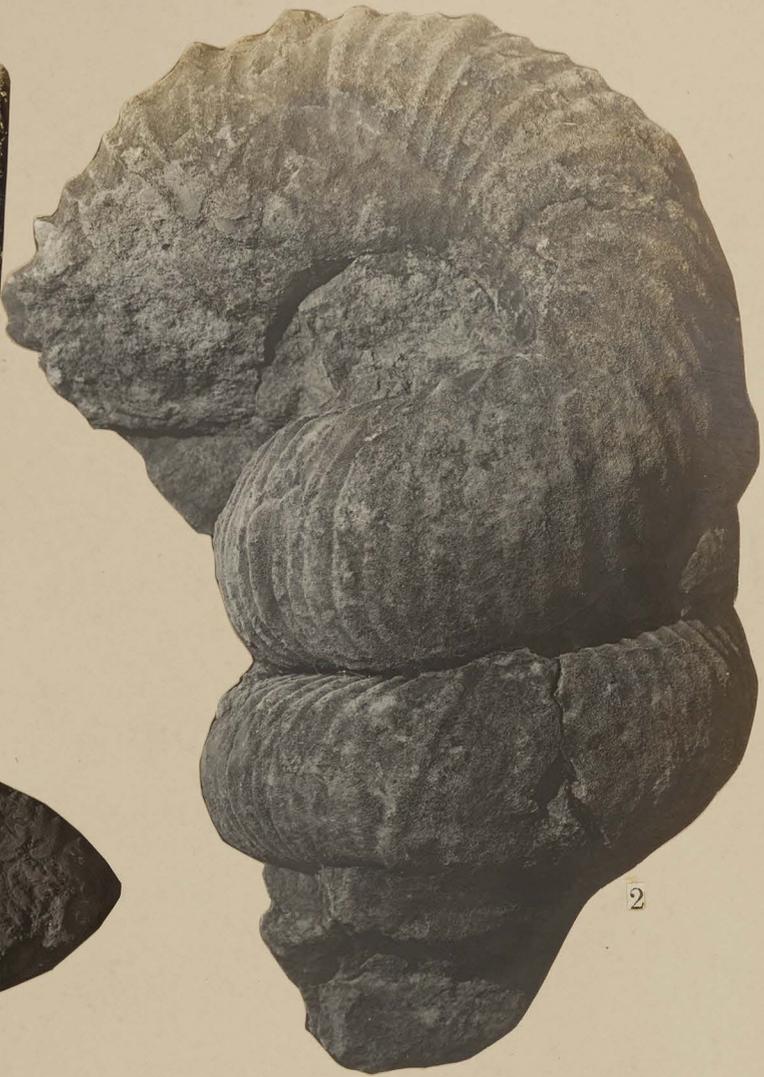


PLATE XVIII

Pachydiscus escondidoensis n. sp. ----- Page. 52
Fig. 1. Lateral view of a very large specimen.
(x1/2)



PLATE XIX

Pachydiscus escondidoensis n. sp. ----- Page. 52
Fig. 1. Lateral view of a medium-sized specimen.
(x3/5)



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PLATE XX

Pachydiscus escondidoensis n. sp. -----	Page.	52
Fig. 1. Ventral view of specimen shown on Plate XVIII. (x1/2)		



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PLATE XXI

Sphenodiscus pleurisepta (Conrad) ----- Page. 57
Fig. 1. Lateral view of a large specimen.



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PLATE XXII

	Page.
Scaphites bakeri n. sp. -----	56
Fig. 1. Lateral view of the type specimen.	
Sphenodiscus pleurisepta (Conrad) -----	57
Fig. 2. Ventral view of a large specimen.	
3. Lateral view of a small specimen showing sutures.	



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