

DIAGNOSES OF NEW TERTIARY FOSSILS FROM THE SOUTHERN UNITED STATES.

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A LARGE number of interesting or new species have recently been received by the Museum from the States bordering on the Gulf of Mexico, partly from friends of the National Museum and partly from the U. S. Geological Survey. Some of these are described in the following pages, but many more remain to be investigated. As it is desirable that as full a list as practicable of species belonging to each horizon shall be known, the following diagnoses are offered preliminary to the illustrated report upon them, which is in preparation.

Genus CAROLIA, Cantraine.

Subgenus WAKULLINA, Dall.

Shell with the single chondrophore of *Monia*, the obsolescent byssal notch and plug and simple adductor scar of *Ephippium*. The sensible but narrow cardinal area of *Ephippium* is here represented by a broad and conspicuous margin; the lateral edges of the ligamentary scar in the left valve form narrow, elevated crura, and the exterior is destitute of the radiating sculpture common to all the other forms of the group, and resembles that of the smooth *Anomias*.

Type.—*Carolia* (*Wakullina*) *floridana*, Dall.

CAROLIA (WAKULLINA) FLORIDANA, new species.

Shell thin, smooth, nacreous, adherent to other bodies, suborbicular, more or less irregular; right valve flattened or concave, especially at the umbo; left valve convex, with a moderately prominent umbo near the cardinal margin; hinge margin variable, but always with a transverse flattish area arched in the middle over the attachment of the internal ligament; exterior irregularly imbricated by the scaly nacreous layers; interior smooth, with a large subcentral, nearly orbicular

adductor scar; the minute sealed byssal foramen, under the middle of the chondrophore, connected by a soldered linear suture with the upper anterior margin of the valve; chondrophore rounded, triangular, broad, radiately rugose above, recurved as a thin lamina from the umbo in fully adult specimens, rather closely sessile, and fitting into the umbonal cavity of the left valve; left valve, with the ligamentary attachment broadly triangular, margined by a thin shelly lamina on each side, and arched over by the elevated portion of the cardinal area; there is no trace of a byssal-muscle scar in adult examples. Breadth in either direction about 110; maximum diameter of the closed valves, 9 mm.

Sopchoppy limestone, on the banks of Deep Creek, near the Sopchoppy River, Wakulla County, Florida, collected by the U. S. Geological Survey.

The original *Carolia* is from the Eocene of Egypt; the present species from the older Miocene of the Gulf border.

OSTREA PODAGRINA, new species.

Shell compact, thick and heavy, wider than high, with very short wide beaks, coarsely imbricated surface, inflated shell, with three or four strong, wide, rather irregular radial plications; interior smooth, distinctly margined, with a large subcentral adductor scar; hinge and beak flat, the ligamentary area in the flat valve hardly excavated, the edges of the flat valve near the cardinal border with two obscurely wrinkled projecting crura, which fit into shallow depressions in the opposite valve; elsewhere there are no striae or pustules on the edge of the valves. Height, 110; width, 100; diameter, 50 mm.

West bank of the Suwanee River, Florida, at station 2612, in the uppermost Eocene bed.

OSTREA FALCO, new species.

Shell thin, the fixed valve thin, irregular, cellular or deep, adherent over most of its surface, having a deep umbonal cavity under the cardinal border; the exterior rude, not perceptibly sculptured; free valve flat, thin, with a very acute, usually curved, flat beak; the interior margins with a row of strong pustules extending two-thirds the length of valve from the beak, and fitting into corresponding pits in the fixed valve; adductor scar small, rather laterally situated: the valve as a whole more or less arcuate; exterior showing remains of a purplish tint, with low, numerous, even, concentric imbrications, each of which is finely radially threaded, with rather wider interspaces between the threads; general outline flabelliform, wide, and rounded in front and acutely pointed behind. Height of a medium-sized specimen, 52; width, 35; diameter, about 19 mm., but very irregular in different specimens.

Jackson Eocene, in the Zenglodon bed, near Cocoa post-office, southern Alabama, collected by Messrs. Burns and Schuchert.

Type.—No. 129972. U. S. N. M.

Oysters are proverbially difficult and obscure mollusks, but probably no other species, recent or fossil, is more characteristic and distinct than the one above described.

TURRITELLA ALCIDA, new species.

Shell resembling *T. aequistriata*, Conrad, but more acute and more rapidly enlarging, shorter, with the anterior ridge on the whorl compressed and almost keeled, closer to the suture in front, to which the base drops abruptly, and, on the final base, flatter; owing to the form of the base and the constriction of the upper part of the whorl, the turns appear to overhang the suture. Length, 85; diameter, 21.5 mm., in a specimen with 17 whorls.

"Alum Bluff sands," horizon of the older Miocene, at Oak Grove, Santa Rosa County, Florida; also in the same bed at Rock Bluff, Appalachianicola River, Florida.

Characteristic of this horizon and confined to it.

ACTÆON CHIPOLANUS, new species.

Shell small, fusiform, with six whorls; an elevated spire, acute except for the rather blunt apical whorl, brilliantly polished all over and sculptured only by a few incised lines in front of the periphery, and more crowded, and becoming more crowded anteriorly; suture distinct, almost channeled; nucleus small, rounded, the sinistral part buried in the whorl; aperture about equal to the spire, narrow, rounded in front, with a thin edge continuous with the pillar; pillar thin, with a single plait; umbilical region impressed. Altitude, 6.3; major diameter, 2.6 mm.

Habitat.—Chipola beds (2213), 1 mile below Bailey's Ferry, Calhoun County, Florida.

Types.—No. 113860, U. S. N. M.; also specimens in the collection of T. H. Aldrich.

Not very different from *A. punctostriatus*, which is proportionally shorter, stouter, less glossy, and with the spire-angle less acute.

ACTÆON (RICTAXIS) FUSULUS, new species.

Shell small, very slender; specimens decollate, but originally with five or more whorls; surface polished, slightly striated by the incremental lines: whorls spirally grooved by about 25 strong, channeled grooves, which become more close-set anteriorly; these grooves are crossed by elevated incremental lines, regularly equidistant and close-set, giving a punctate appearance to the grooves; the interspaces near the suture considerably wider than the grooves and flattened, anteriorly equal to the grooves and somewhat rounded, and elevated so as to look thread-like; suture distinct, not deep; aperture narrow, rounded in front, crenulated on the edge by the sculpture, the outer lip rounded

in front, but not quite continuous with the obliquely truncate pillar; pillar short, concave, with a strong plait behind at its junction with the body. Longitude of decollate type, 7.5; of last whorl, 6; of aperture, 4.5; maximum diameter, 2.5 mm.

Habitat.—Chipola beds, with the last species.

Types.—No. 113863, U. S. N. M.; also specimens in Mr. Aldrich's collection.

This is a peculiar and characteristic species not like any heretofore known from American Tertiary or recent fauna, and easily recognized by its slender, drawn-out form and sharp spiral sculpture.

ACTÆON MYAKKANUS, new species.

Shell rather slender, the aperture longer than the spire, the whorls five beside the nucleus; outline pointed-ovate, suture distinct, not impressed; sculpture of about 25 evenly distributed, spiral, punctate grooves with wider interspaces; the interspaces are flattened and polished, with transverse incremental rugæ; aperture rather narrow, the outer lip thin, so that the sculpture is reflected on the inner surface, anteriorly rounded and continuous, with a thin, short, arched pillar lip, carrying one well-marked plait, with a deep groove behind it; base with no trace of umbilicus. Longitude of shell, 8; of aperture, 5; maximum diameter of last whorl, 3.5 mm.

Habitat.—Pliocene sands of the Myakka River, Florida; one specimen collected by Mr. Joseph Wilcox.

Type.—No. 113110, U. S. N. M.

This is a shell more slender than the average of the genus, but a good deal stouter than *A. fusulus*, from which it is otherwise readily discriminated by the evenly disposed spiral sculpture and the untruncate pillar.

RINGICULA SEMILIMATA, new species.

Shell minute, of three and a half whorls; spire about equal to the aperture; surface polished, suture distinct, not deep, the spire a little turritid and rather pointed; whorls smooth behind the periphery, in front of it evenly spirally grooved, with wider interspaces; aperture wide, with a thickened and reflected margin; outer lips slightly patulous and thickest at the middle; pillar with two strong plaits, the body with comparatively little callus, only the oldest and most callous showing a parietal denticle, the outer lip extending in front of the pillar, the canal in the adult very narrow and oblique. The size varies. Latitude, 1 to 1.2; longitude, 1.5 to 2 mm.

Habitat.—Chipola beds (2212, 2213), Calhoun County, and Alum Bluff beds, at Oak Grove, Santa Rosa County, Florida.

Types.—No. 113111, U. S. N. M.; also specimens in the collections of Mr. Aldrich and the Geological Survey of Alabama.

This species appears to be rather rare; it most nearly resembles *R. guppyi*, Dall, which is grooved all over and has a less slender spire.

The parietal tooth in *R. guppyi* is rarely absent, even in specimens hardly mature; in *R. semilimata* only the very oldest and most callous specimen shows any trace of it.

RINGICULA CHIPOLANA, new species.

Shell small, elevated, slender, faintly grooved all over, with four and a half whorls; spire about equal to the aperture, which is longer than wide, with a callous body-lip and reflected margin. Longitude, 2.2; maximum diameter, 1.4 mm.

Habitat.—Chipola beds (2211); in the lower bed at Alum Bluff, Chattahoochee River, Florida.

Type.—No. 113865, U. S. N. M.

This species is intermediate in size between *R. floridana* and *R. guppyi*, and is sculptured like them, but has the form of *R. semilimata*, especially the elevated spire, but with a proportionately narrower mouth. It differs from the very similar *R. bipliata*, Lea, by the absence of any denticles or liræ on the outer lip when mature.

TORNATINA INCISULA, new species.

Shell small, subcylindrical, slightly larger anteriorly, aperture as long as the shell; spire coiled in one plane, so that in profile only the small bulbous nucleus projects above the last whorl; surface smooth, hardly polished, marked only with incremental lines, and in some specimens with a few faint incised spiral lines about the base; suture deeply channeled, its margins produced and sharp, forming the posterior end of the shell, except for the minute globular nucleus which, when not lost, is quite conspicuous; whorls, about four, the last enveloping; aperture very narrow and deeply notched at the suture, anteriorly rounded, the thin, sharp outer lip passing insensibly into the short, stout, arched pillar, which is bounded on the left by a sharp groove, sometimes deepened to a chink, and carries a single, oblique, sharp plait; a thin callus covers the body, and the outer lip is somewhat produced in the middle. Longitude of shell, 5.5; maximum diameter, 2.5 mm.

Habitat.—Chipola beds (2211, 2212, 2213), Florida, where it is abundant.

Types.—No. 113867, U. S. N. M.; and in the collection of T. H. Aldrich.

This species is more slender than *T. canaliculata*, Say, and has the spire so coiled as to be invisible, and the sutural channel extremely deep and sharp-edged.

TORNATINA MYRMECOÖN, new species.

Shell small, long-ovate, of three and a half whorls beside the minute globular nucleus; surface smooth or marked only by faint incremental lines and microscopic spiral striae; aperture slightly shorter than the

spire; suture narrow, deeply channeled; spire just visible above the sutural margin, toward which the posterior part of the last whorl is evenly rounded over; aperture narrow behind, with a deep sutural notch, the outer lip gently arched in the middle, thin and sharp, then receding and gently rounded into the broad, conspicuous pillar, which is obliquely arched and chiefly constituted by a single broad plait; the body whorl is covered at the aperture by a thin layer of callus; there is no notch or chink behind the pillar; the anterior end of the shell is rounded and attenuated in the same degree as the other end. Longitude of shell, 6; maximum diameter, 3 mm.

Habitat.—Duplin County, North Carolina (2279, 2280), at the Natural Well and elsewhere.

Types.—Nos. 113874, 113875, U. S. N. M.

This pretty species is recognizable by the evenly rounded ends and gently inflated form, which are not duplicated in any other of our Miocene species.

TORNATINA PERSIMILIS, new species.

Shell small, short, subcylindrical, of about three whorls beside the nucleus, the spire moderately prominent, somewhat variable as usual in this group, the suture distinct, bordered by a narrow, shallow channel; aperture narrow behind, wider in front; outer lip thin, prominently arched, and very slightly constricted in the middle; in front, rounding gently into the pillar, which has a groove behind it, and is chiefly composed of a single not much arched nor very prominent plait. Longitude of largest specimen, 3; maximum diameter, 1.25 mm.

Habitat.—Chipola beds (2213), Calhoun County, Florida; a young specimen from Oak Grove, Santa Rosa County, Florida, also probably belongs to this species.

Types.—No. 112607, U. S. N. M., and in the collection of Mr. Aldrich

This species is the precursor and probably the ancestor of *T. canaliculata*, Say, which appears in the Chesapeake Miocene and persists to the present day. It differs from it in its smaller size and by its (on the average) more cylindrical shape, most of the specimens of *canaliculata* showing a tendency to be widest at the shoulder of the whorl. The Chipola specimens are more uniform than the ordinary *canaliculata*, yet if they occurred in the same faunal horizon might fairly be regarded as a dwarf race of that species.

TORNATINA FISCHERI, new species.

Shell small, ovate, rounded at both ends, spire almost concealed, of two and a half whorls; body slightly wider behind the middle of the shell; aperture as long as the shell, deeply notched at the suture, which is channeled, but whose outer margins arch over and nearly conceal the spire, probably closing altogether in some specimens; aperture narrow, rather contracted in front, the outer lip thin, arched in the direction of

its growth and slightly incurved in the middle, sharp, anteriorly rounding into the short, spirally twisted pillar, which has a groove behind it and also a sharp, shallow groove on the plait, making it look double, though the distal end is single; the body shows a thin wash of callus; surface of the shell when perfect, brilliantly polished, smooth. Longitude, 2.5; maximum diameter, 1.25 mm.

Habitat.—Chipola beds (2213), Chipola River, Florida.

Types.—No. 113871, U. S. N. M., and in the collection of Mr. Aldrich. The groove on the plait is a characteristic feature.

This species is named in honor of Dr. Paul Fischer, the distinguished author of the *Manuel de Conchyliologie*.

TORNATINA (CYLICHNELLA) GABBI, Dall.

Cylichnella orum-lacerti, DALL, Trans. Wagner Inst., III, p. 15, 1890, *ex parte*.

Pliocene of the Caloosahatchie beds, Dall.

The reception by the National Museum of Mr. Guppy's collection of West Indian fossils has enabled a critical comparison to be made between the North American and Antillean fossils, which had been referred to his species. The result shows that the Pliocene shell differs from its Miocene forerunner, being larger, proportionately more slender, and somewhat more flaring at the base than the *T. (C.) bidentata*, Gabb and Orbigny. For this reason I propose for it the name of *Tornatina (Cylichnella) gabbi*. It reaches a length of 4.75 mm., and a maximum diameter of 2.5 mm.

TORNATINA (CYLICHNELLA) OVUM-LACERTI, Guppy.

Cylichna orum-lacerti, GUPPY, Geol. Mag., I, p. 437, pl. XVIII, fig. 22, 1874.

Cylichnella bidentata, GABB, Proc. Acad. Nat. Sci. Phila., 1872, p. 273 (not pl. 10, fig. 2); Trans. Am. Phil. Soc., XV, p. 246, 1873.

Cylichnella bidentata, DALL, Blake Gastr., p. 46, 1889, *ex parte*.

Cylichnella orum-lacerti, DALL, Trans. Wagn. Inst., III, p. 15, 1890, *ex parte*.

Not *Bulla bidentata*, ORBIGNY, Moll. Cuba, p. 125, pl. IV, figs. 13-16, 1841.

In my Blake report I followed Gabb in referring his Santo Domingo *Cylichnella bidentata* to the *Bulla bidentata* of Orbigny. It appears, however, that Gabb's Santo Domingo fossils are not identical with the species described by Orbigny, though the latter are also found fossil in our Miocene and Pliocene, both in the Chesapeake Miocene of Virginia, where it was described under the name of *Bulla biplicata* by Lea, and in the Chipola Miocene of the Alun Bluff beds, on the Yellow River at Oak Grove, Santa Rosa County, Florida.

The Santo Domingo fossil is a much larger and proportionately stouter shell and more distinctly spirally grooved all over, Orbigny's shell being often grooved only near the base. Gabb's shell measures 4 mm. long and 2 mm. in diameter; Orbigny's 3 mm. long by 1.25 mm. in diameter. For the former, Guppy's name must be adopted.

Gabb's types are in the Academy of Natural Sciences at Philadelphia; the National Museum possesses specimens (No. 113746) from Potrero, Rio

Amina, Santo Domingo, and the types of Mr. Guppy. It may be added that the figure given by Gabb in 1872 is not taken from one of his own specimens, but is a bad copy of one of Orbigny's figures, with the spiral striation drawn as if it ran obliquely. The Pliocene specimen referred to *C. ovum-lacerti* by me in 1890, when compared with Guppy's original, proves to be a larger and more slender shell, which will require a separate name.

RETUSA CHIPOLANA, new species.

Shell elongate-pyriform, posteriorly attenuated, smooth, except for lines of growth; spire sunken, with a small perforation over it; aperture very narrow, except in front, as long as the shell, produced behind the suture at the margin of the apical pit; outer lip thin, straight, rounded insensibly into the pillar in front; pillar lip simple, thin, reflected, with a groove behind it; body with little or no callus. Longitude, 5.5; maximum diameter, 2.25 mm.

Habitat.—Chipola beds (2213), on the Chattahoochee, and also at Oak Grove, on the Yellow River.

Types.—No. 113879 U. S. N. M., and in the collection of Mr. Aldrich.

SCAPHANDER LANGDONI, new species.

Shell small, rather slender for the genus, with the spire concealed and covered by a small, rather shallow pit; aperture wide, as long as the shell, with a wide sutural sinus, a straight outer lip, gradually rounded into the pillar in front; pillar simple, solid; body with little or no callus; surface polished, transversely marked by lines of growth and frequently by small, narrow, parallel waves, stronger toward the middle of the whorl; spiral sculpture of fine, rather distant, punctate, incised lines, uniformly disposed, but varying somewhat in different specimens; there is no constriction of the whorl in front of the sutural keel and no groove behind the pillar, the axis is widely pervious, revealing the spire. Longitude, 13; maximum diameter 6.5 mm.

Habitat.—Chipola beds (2211, 2213).

Types.—Nos. 113883, 113884, U. S. N. M.; also in the collection of Mr. Aldrich.

This species is more attenuated behind than *S. primus*, Aldrich, and less so than the recent *S. watsoni*, Dall; in proportions and sculpture and combination of characters this little species does not appear to agree closely with any of those previously known from the region. It is named in honor of Mr. D. W. Langdon, lately of the State survey of Alabama, and to whom are due the first section of the Alum Bluff locality and the discrimination of the Chattahoochee group of rocks.

ATYS ŒDEMATA, new species.

Shell small, inflated, rapidly attenuated in front and behind, periphery prominent; aperture as long as the shell, extending behind the

inner lip and descending, with a twist, upon the apical region of the concealed spire; the shell is sharply constricted just in front of the apex, and the vortex thus included is swollen and strongly transversely wrinkled; surface of the shell polished, spirally grooved toward each end, smooth toward the periphery; aperture rather narrow, somewhat angulated at both apices; pillar straight, reflected, with a narrow groove behind it; outer lip thin, simple. Longitude, 4.5; maximum diameter, 2.5 mm.

Habitat.—Chipola beds (2213), Chipola River, Florida.

Types.—No. 113889, U. S. N. M., and in the collection of Mr. Aldrich.

It is probable that all the specimens which have served for this description are immature, but it is quite certain they are not the young of any species of *Atys* now known from our Tertiary.

ATYS (ACROSTEMMA) GRACILIS, new species.

Shell small, slender, with the aperture longer than the body, which is obscurely enlarged about the middle, slopes biconically from this girdle above to the apex and below to the region just behind the upper end of the pillar, from whence it is more rapidly attenuated to the anterior end of the shell; spire sunken, the pit varying in size in different specimens, the margin slightly thickened and transversely striated; middle of the whorl smooth, but the distal portions more or less distinctly spirally grooved; the lines of growth are feeble; aperture narrow, especially behind, where it is a good deal produced above the apex, with its inner lip slightly twisted; in front the pillar is twisted and faintly grooved, with a shallow chink behind it; in front it is obscurely obliquely truncate where it joins the anterior curve of the outer lip. Longitude 5; maximum diameter, 2 mm.

Habitat.—Chipola beds (2211, 2213).

Types.—No. 113892, U. S. N. M., and in the collection of Mr. Aldrich.

M. Cossmann notes that this section forms a passage, as it were, from *Cylichna* to *Atys*, but it would seem to the writer that it is more nearly related to the latter, and should rank as a section of *Atys* rather than of *Cylichna*.

ATYS (ACROSTEMMA) SALINA, new species.

Shell small, rather slender, involved, with a polished surface, and the aperture produced in a point behind the spire; body of the shell wider anteriorly; sculpture of fine incised lines, closer and more numerous anteriorly, becoming sparse about the middle of the shell, and nearly absent toward the spire, except at the extreme end; surface otherwise smooth, except at the posterior end, where close-set, straight, sharp, rather deep axially directed grooves extend from the apex forward about one-fifth the length of the shell; aperture narrowest in the middle; outer lip axially straight, incrementally somewhat arched, behind produced beyond the spire to a rather narrow point, whence it returns with a twist on the body, covering the apical region with a rather

thick mass of callus, which is much thinned anteriorly; pillar thin, solid, arched, with a narrow, long chink behind it; aperture rounded in front; outer lip thin, sharp-edged, simple. Longitude of shell, 4.5; maximum diameter, 1.5 mm.

Habitat.—Lower Eocene, Lisbon horizon, at the head of Saline Bayou, St. Maurice, Winn Parish, Louisiana, collected by Johnson (station 2005).

Type.—No. 106971, U. S. N. M.; received from U. S. Geological Survey.

This species is remarkable for the combination of characters ordinarily regarded as subgeneric or sectional. It has the form of *Bullinella*, but the posterior extension of the aperture is narrowed to a rounded point, the spire is concealed, not marked by any pit or perforation, but covered by a short, thick mass of callus; finally, the shell is very narrowly umbilicate, with a slender, arched, uniplicate pillar, twisted, but without the short, strong twist of typical *Atys*. When fully developed the fringe-like grooved area at the apical end is a strongly marked character.

ATYS OBSCURATA, new species.

Shell small, wider than *A. gracilis*, and differing from it in having the lateral profile evenly curved, so that no indication of the equatorial swelling is visible in it; the aperture is proportionately wider and less produced behind, the inner lip above the spire is more strongly twisted; there is a shallow pit, but no perforation, at the spire, nor is there any thickened striated rim at the margin of the pit; the spiral grooving, though similarly distributed, is rather sharper than in *A. gracilis*, and the pillar less obviously twisted; it is obliquely truncate, narrow, and has behind it a narrow but obvious groove. Longitude, 4; maximum diameter, 2 mm.

Habitat.—Lower bed at Alum Bluff (2211) and the Miocene marl of Bowden, Jamaica (Bland).

Types.—Nos. 61563, 113893, U. S. N. M.

Only two specimens were obtained at Alum Bluff, but the species does not seem to stand in with any of the others. It is a typical *Atys*, and not an *Acrostemma*.

RETUSA (CYLICHNINA) DECAPITATA, new species.

Shell small, subcylindrical, smooth, except for lines of growth, generally polished, with a few revolving striae on the base; spire sunken, perforate, below a very shallow pit with the edge more or less rounded over; aperture as long as the shell, narrow; the outer lip sharp, simple, straight, with a deep sutural sinus and anteriorly receding and then rounding imperceptibly into the pillar; pillar twisted, obscurely ridged, with a minute chink behind it; the body with a thin wash of callus. Longitude, 5.25; maximum diameter, 2 mm.

Habitat.—Chipola beds (2213).

Types.—Nos. 113886, U. S. N. M., and in Mr. Aldrich's collection.

This species is very close to the recent *Cylichna verrillii*, Dall, from which it is only distinguished by having the posterior commissure of the aperture more produced and the shell a trifle more evenly cylindrical toward the apex.

RETUSA (CYLICHNINA) QUERCINENSIS, new species.

Shell small, resembling *C. decapitata*, but smaller, more solid than *C. decapitata* of the same size, and proportionately a good deal shorter, the apical pit wider, the posterior commissure of the aperture less produced, the pillar shorter and more oblique and twisted, and with a more distinct furrow behind it; the young *C. decapitata* is attenuated anteriorly, but the *C. quercinensis*, which is evidently adult, is not so; the anterior spiral striation is barely perceptible with a glass. Longitude, 2.5; maximum diameter, 1.25 mm.

Habitat.—Alum Bluff beds, at Oak Grove, Yellow River, Santa Rosa County, Florida, L. C. Johnson.

Type.—No. 131528, U. S. N. M.

This species is small, but can not be referred to the young of any of the other species known from the region.

RETUSA (CYLICHNINA) DUPLINENSIS, new species.

Shell cylindrical, surface marked with lines of growth, which are slightly elevated where they pass over the ridge into the apical perforation, and with fine spiral striae, which on and near the base are alternated with sharper grooves; aperture narrow, as long as the shell; the outer lip straight, behind but little produced, and moderately receding to the suture; in front the outer lip recedes and joins the pillar evenly; pillar very oblique, strong, with an obscure plait, a small chink behind the anterior end; body short, with a little wash of callus; apex of the shell gently rounded over to a cylindrical perforation, with little or no funicular border. Longitude, 6.75; maximum diameter, 2.5 mm.

Habitat.—Carolinian marl, at the Natural Well, Duplin County, North Carolina (2279), Buhs.

Type.—No. 113876, U. S. N. M.

This species differs from *C. decapitata* by its greater stoutness, the absence of a funicle on the spire and most obviously by its stronger, more oblique, and differently plaited pillar. The latter character also separates it from *C. verrillii*, which differs further in having a well-marked funicle around a proportionally small perforation.

RETUSA (CYLICHNINA) MICROTREMA, new species.

Shell small, slender, somewhat roundly pointed at both ends, smooth except for lines of growth; body whorl, except distally, quite cylindrical; aperture narrow, little produced behind, recurved directly into the apical perforation without funicular fasciole or decided notch; body with a slight wash of callus; pillar nearly straight, not twisted,

without perceptible keel or plait, and with only the merest trace of a groove behind it; outer lip straight. Longitude, 3.2; maximum diameter, 1 mm.

Habitat.—Natural Well, Duplin County, North Carolina (2279).

Type.—No. 113887, U. S. N. M.

This species only fails of being a *Volvula* by having a subcylindrical perforation in the place of a projecting point. I have not seen anything like it in the recent fauna.

Genus BULLINA, Férussac.

Bullinula, BECK: type, *Bullina scabra*, GMELIN + *lineata*, GRAY.

Section ABDEROSPIRA, Dall.

In the typical *Bullina* the spire is exposed or even elevated; in the fossil about to be described the apex of the spire is hidden, as in *Bulla*, and marked only by a perforation. This difference seems worthy of sectional discrimination. Type *B. (A.) chipolana*, Dall.

BULLINA (ABDEROSPIRA) CHIPOLANA, new species.

Shell small, ovate, strongly sculptured, umbilicated, with a perforate apex and hidden spire; surface sculptured with numerous sharp spiral grooves with wider polished interspaces, crossed by distinct, equally spaced incremental lines, more feeble on the interspaces, but reticulating or punctuating the grooves; aperture as long as the shell; outer lip axially nearly straight, incrementally slightly arched, thin, with a simple edge and smooth internal surface; posterior sinus with a moderate notch, anterior end rounded; pillar thin, emarginate, with a deep groove behind it, outside of which is a well-marked ridge bounding a narrow, but deep umbilicus; body with a thin wash of callus; apex perforate, much as in *Bulla striata*. Longitude, 4.5; maximum diameter, 3 mm.

Habitat.—Chipola beds (2213), Chipola River, Florida, collected by Burns; and near Gatun, Isthmus of Darien, by Rowell.

Types.—No. 113894, U. S. N. M.; and in Mr. Aldrich's collection.

HAMINEA POMPHOLYX, new species.

Shell small, thin, subglobular; widest behind the middle; surface marked with fine incremental lines and spiral striae, hardly visible except under a glass; apex impressed, aperture wide, outer lip thin, arched axially and incrementally, receding in front and imperceptibly merging with the oblique, slightly thickened, twisted pillar, which from below is pervious; body with a thin wash of callus; shell slightly narrowed in its anterior third. Longitude, 6.5; maximum diameter, 5.5 mm.

Habitat.—Chipola beds (2211, 2213), Florida.

Types.—Nos. 113895–113897, U. S. N. M.; and in the Aldrich collection.

This species is shorter and more globose than any of the recent forms of the coast.

Genus TEREBRA, Bruguière.

This genus is one of the most difficult to handle from the inexhaustible tendency to variation the species exhibit, and which renders it frequently almost impossible to come to any satisfactory conclusion as to the relative rank and permanency of the mutations exhibited. Our east American fossil species may be arranged in three series; *Terebra* proper, with large, strong shells, the pillar with a single strong anterior keel; *Hastula*, Adams, with the pillar smooth, the canal straight, and the subsutural band absent, feeble, or not set off by a sulcus; *Aeus* Adams, with the band and sulcus more or less distinct, a tendency to reticulated sculpture, and the pillar with a flat callus at the aperture, which usually bears farther back two more or less distinct plaits or keels. The two latter may be regarded as subgenera. It is proper to observe that nearly all the diagnoses of the groups in Terebridae contain a proportion of error in matters of fact. This is especially the case with *Hastula* and *Aeus*, Adams, whose arrangement is so generally followed.

In the Eocene we have *T. (Hastula) venusta*, Lea, of which *T. perlata*, Conrad, *T. mitis*, de Gregorio, and *T. inula*, de Gregorio, are synonyms or mutations; *T. houstonia* (Harris, MS.), new species; and *T. (Aeus) polygyra*, Conrad, of which *T. audregu* and *T. ignara*, de Gregorio, are mutations. These species are all Claibornian, or older. In the later Eocene of Vicksburg we have *T. (Aeus) divisura*, Conrad, and its variety or mutation *T. mirula*, de Gregorio, and *T. (Aeus) tantula*, Conrad, which extends up into the older Miocene of Haiti, the Orthanlax bed at Tampa, Florida, and the Alum Bluff beds at De Funiak Springs.

In the Miocene the genus is more numerously represented. Typical *Terebra* appears in the Haitian old Miocene, which contains *T. gabbii*, Dall (*robusta*, Gabb, not of Hinds), and *T. haitensis*, Dall, new species. In the Chesapeake Miocene we have the *T. unilineata*, Conrad, a well-marked species.

Aeus is represented in the old or Chipola Miocene by *T. curvilineata*, new species, from Shiloh, New Jersey, and Easton, Maryland; *T. bipartita*, Sowerby (1849, not of Deshayes, 1859), *T. sulcifera*, Sowerby, *T. inaequalis*, Sowerby, and *T. langdoni*, Dall, new species, all of which are common to Haiti and the Floridian Chipola beds; also *T. perpunctata*, Dall, new species, and *T. chipolana*, Dall, new species, of the Chipola beds. Later species of *Aeus* are *T. dislocata*, Say (*indenta*, Conrad, *ex parte*, *indentata*, Meek, by a typographical error, and *ziga*, de Gregorio), which extends from the Chesapeake Miocene to the recent fauna; *T. earolinensis*, Conrad, of the newer Miocene, at the Duplin Natural Well, North Carolina; *T. emmonsii*, Dall (*neglecta*, Emmons, 1858, not of Michelotti, 1847), of the Carolinas; *T. concava*, Say, ranging from the newer Chesapeake Miocene to the recent fauna, and *T. proterta*, Conrad, from the Pliocene to the recent fauna; *T. curvilirata*, Conrad, and *T. poly-*

gonata, new species. *Hastula*, both fossil and recent, has few American species. *T. evansi*, Gabb, in the older Miocene of Chiriqui, Central America, seems to be an analogue of *T. simplex*, Conrad, of the Chesapeake Miocene of Maryland. The latter is abundant in the beds of St. Mary's River, where it is accompanied by a variety *altior*, Dall, and by a small, smooth species common to the older beds at Shiloh, New Jersey, for which the name *iuornata* is proposed.

In early publications on our Tertiary, species were sometimes described as *Terebra* which should now be referred to other families. Such are *T. costata*, I. Lea, 1833 (not of Borson, 1823, + *leai*, de Gregorio), *T. gracilis* and *T. multiplicata*, I. Lea; and also *T. clavula* and *constricta*, H. C. Lea, which belong to the Cerithiacea. There are also a number of catalogue names or synonyms, such as *T. perlata*, Conrad (= *venusta*, Lea); *T. pectitii*, Kiener (= coarse var. of *T. dislocata*); *T. loxonema*, Conrad (probably intended for one of the varieties of *T. simplex*, but never described or figured); *T. subvirata*, Conrad (a catalogue name here revived), and *T. tuberosa*, Nelson (unfigured, 1870) which is not the *tuberosa* of Hinds (1843).

TEREBRA (HASTULA) HOUSTONIA, Harris, new species.

This species differs from *T. venusta* by its less rectilinear sides, its more inflated whorls, and drawn-out spire of somewhat pupiform appearance, its straight and simple pillar, its more arched longitudinal riblets, which are usually obsolete on the last whorl, and by its feebler spiral striation. Longitude, 29; maximum diameter, 5 mm., in a specimen having ten whorls beside the smooth, small, pointed nucleus of three and one-half whorls.

Types.—No. 6034, U. S. N. M.; Claiborne, Alabama.

The species will be fully described and illustrated by Mr. G. D. Harris in his report on the Texas Tertiary fauna. It is found in the lower bed (Lisbon horizon) at Claiborne Bluff, and also in the Texas Eocene.

TEREBRA GABBI, Dall.

Terebra robusta, GABB, Geol. Santo Domingo, p. 224, 1873; not of HINDS, Proc. Zool. Soc., Lond., p. 149, 1843.

Shell large, strong, with a slender, strongly sculptured spire, and later smoother, rapidly enlarging whorls, with a nearly peripheral, narrow, spiral color band, which, even in the fossil, sometimes is clearly perceptible; on the earlier whorls the upper half is occupied by a wider sutural and an anterior narrower elevated band, separated from each other by a well-marked sulcus; they are crossed obliquely by fine, sharp, regularly spaced elevated lines with wider interspaces, which on the rest of the whorl have a vertical or axial direction to the suture; in the specimen before me about a dozen (partly decollate) whorls exhibit this sculpture, the whole shell being microscopically spirally striated; the sculpture then becomes obsolete, the following four whorls being

nearly smooth, except for incremental lines, while they rapidly become more rounded; suture distinct; aperture with the outer lip somewhat receding in the middle; inner lip moderately callous; pillar half a turn inside the aperture showing a prominent basal keel; canal twisted, with a distinct fasciole. Diameter of spire at decollation, 2.75; maximum diameter of twelfth subsequent whorl, 24; longitude of (decollate) shell, 70 mm.

Habitat.—Older Miocene of Santo Domingo at the Potrero, River Amina, Bland; Gabb, various localities on the same island.

Types.—No. 113751, U. S. N. M.; and in the Academy of Natural Sciences, Philadelphia.

This species has hardly more in common with the Pacific *T. robusta*, Hinds, than the fact that the sculpture is obsolete on the later whorls. It grows much larger than the dimensions given above, and the last whorls become much swollen.

TEREBRA HAITENSIS, new species.

Shell slender, acute, all the whorls sculptured, the early whorls with a double subsutural band, as in the last species, but with the riblets crossing the wider band vertically, becoming oblique on the anterior band, where they are almost nodulous, and forming arched waves on the rest of the whorl to the suture, but becoming suddenly obsolete at about the line of revolution of the suture and thence over the base to the canal; aperture rather short; pillar short, twisted, with a single basal keel, which falls short of the aperture; canal short, sharply recurved; spiral striation obsolete or none. In a specimen of 24 whorls, excluding the nucleus, the total length is 62, the maximum diameter 11.5 mm.

Habitat.—Older Miocene of Santo Domingo at the Potrero, River Amina, Bland; Gabb, various localities on the same island.

Type.—No. 113753, U. S. N. M.

This species differs from the preceding by not losing its slender form, by preserving its sculpture, by details of the sculpture, and by its more numerous whorls in the same length.

TEREBRA (HASTULA) INORNATA, new species.

Shell small, slender, nearly smooth, without any sutural band or spiral sculpture, and with about a dozen whorls; early whorls with a few obsolete transverse riblets, other whorls with no sculpture except the somewhat irregular incremental lines; whorls rather flat, suture distinct, closely appressed; aperture longer than wide: outer lip thin, nearly straight, simple; pillar short, simple, twisted; the canal moderately wide; base rounded, without a carina. Longitude, 18; maximum diameter, 4 mm.

Habitat.—Older Miocene of Shiloh, New Jersey, and St. Mary's River, Maryland; collected by Burns and others.

Types.—Nos. 106953–106955, U. S. N. M.

A single specimen was found with the fossils from the lower bed at Alum Bluff (2211), but as some St. Mary's fossils had been standing close by on the same table before sorting I believe that this single specimen is probably an estray. The species is readily recognizable and most nearly allied to the slender form of *T. simplex*, Conrad, found in the same bed at St. Mary's River, but which may be distinguished by its more conical form and larger size when adult. The name of *inornata* was applied by Professor Whitfield to the New Jersey form in his report on the Gastropods of the Miocene marls of New Jersey.¹ It is still more abundant in Maryland, and as the specimens do not appear to differ in any essential way, I adopt Professor Whitfield's name for the species.

TEREBRA (ACUS) POLYGYRA, Conrad.

Terebra polygyra, CONRAD, Journ. Acad. Nat. Sci. Phila., VII, p. 156, 1834.

This form, described from Claiborne by Conrad, was not figured by him, and seems to have been forgotten both by Conrad and Meek in making up their check lists. It has since been redescribed by de Gregorio, who has figured it as *T. andrega*, and probably as *T. ignara*. It is a small shell, prefiguring *T. divisa*, Conrad, from the young of which it can hardly be distinguished, except as more slender. I have thought it well to direct attention to it, as it is clearly distinct from *T. renusta*.

TEREBRA (ACUS) TANTULA, Conrad.

This species, described from the Vicksburgian Eocene, appears also in the older Miocene of Santo Domingo, of the Tampa Orthaulax bed, and of the Alum Bluff beds at De Funiak Springs, Florida. It may be distinguished from *T. polygyra* and other similar species by its spiral striation.

TEREBRA (ACUS) CURVILINEATA, new species.

Shell acute-conic, solid, with 12 to 14 moderately convex whorls; early whorls more flatsided, with numerous narrow, transverse, slightly waved riblets, extending from suture to suture, with about equal interspaces; suture very distinct; sutural band formed by a vaguely limited constriction, not a groove; a short distance in front of the suture the ends of the ribs thus delimited from the rest have a tendency to coronate the whorl; on the later whorls the ribs become less regular and somewhat less prominent; aperture longer than wide; outer lip simple; pillar elongated, twisted, smooth; siphonal fasciole very distinct. Longitude, 27; maximum diameter, 9.5 mm. in a specimen of 14 whorls.

Habitat.—Older Miocene of Jericho, New Jersey, and Easton, Maryland, Burns and Harris. The specimens from Maryland are larger and in better preservation than those found in New Jersey.

Types.—Nos. 106952, 111648, U. S. N. M.

¹ Moll. and Crust. Mioc. N. J., p. 114, pl. xx, figs. 11-13, 1894.

The name *curvilineata*, by a typographical error, appears in Meek's Miocene check list for *T. curvilirata*, Conrad, a species from St. Mary's River, Maryland; but it has never been applied to any described species from our Tertiary heretofore. The species has something in common with the more rugose specimens of *T. (Hastula) simplex*, Conrad, but is perfectly distinct.

TEREBRA (ACUS) CURVILIRATA, Conrad.

Terebra curvilirata, CONRAD, Proc. Acad. Nat. Sci. Phila., I, p. 327, 1843.

This is an old species of Conrad's, which does not appear to have been figured. The shell is small, not exceeding 30 mm. in length, with rather swollen whorls constricted narrowly above, much as in *Pleurotoma* of the section *Cymatosyrinx*. The ribs are about 12 to the whorl and most prominent at the periphery; their posterior ends are constricted off near the suture without any distinct groove or incised line; they are strongly curved in front of the constriction; the surface has extremely faint, obsolete spiral sculpture, only visible with the aid of a lens; the pillar thin, simple, and twisted, rather short; the nucleus is conical, of four smooth whorls like a small, very much elevated *Calliostoma*, except that the whorls are rounded. A specimen 15 mm. long had ten whorls, exclusive of the nucleus, and a maximum diameter of 4.75 mm.

Habitat.—Miocene of St. Mary's River, Maryland. Types in Academy of Natural Sciences; specimens in U. S. National Museum (Nos. 106956, 106957).

TEREBRA (ACUS) SINCERA, new species.

Shell small, thin, acute-conic, flat-whorled, with feeble sculpture; whorls ten, without the nucleus; anterior half of the whorls, with fine, feeble, spiral threading overrunning the ribs, posterior half without spirals, but divided into two equal parts by a spiral groove visible between the ribs; transverse sculpture of fine, low, even, narrow, arched riblets, with wider interspaces, extending clear across the whorls; suture distinct, sutural band obscure, not swollen; aperture longer than wide, outer lip thin, arched in harmony with the ribs; pillar short, smooth, or faintly excavated; canal recurved, not contracted. Length, 22; maximum diameter, 5 mm.

Habitat.—Miocene of St. Mary's River, Maryland.

Types.—No. 11873 a, U. S. N. M.

This species is quite distinct from the others of the St. Mary's horizon, and when perfect is easily recognized. When superficially eroded the ribs are more prominent, as is the succeeding whorl at the suture, and the whorls may have a slightly turritid appearance.

TEREBRA (ACUS) BIPARTITA, Sowerby.

Terebra bipartita, SOWERBY, Quart. Journ. Geol. Soc. London, VI, pt. 1, p. 47, 1849. Not = *T. bipartita*, DESHAYES, 1859.

Habitat.—Old Miocene of Santo Domingo, at Ponton, and in the Chipola beds (2213), Calhoun County, Florida. Specimens in the Academy of Natural Sciences and the U. S. National Museum (Nos. 113653, 113910).

Variety *bipartita*, s. s.—Shell acute, with the sutural sulcus prominent and set off by a deep sulcus, which cuts ribs and all, from the rest of the whorl, where the spiral threading is remarkably clear-cut, uniform, and elegant, not overriding the narrow, sharp-edged ribs. Santo Domingo and Chipola. Longitude, 23; maximum diameter, 5.5 mm.

The pillar of this form seems to be simple and smooth in all the specimens I have seen.

Variety *spirifera*, Dall.—Shell with the ribs feeble, the spiral sculpture more prominent than the ribs, especially two rather narrow spirals just in front of the sutural band, and overriding the ribs with close-set, even, distinct, coarse, rounded threads, which fail on the canal; pillar distinctly grooved or biplicate. Longitude, 30; maximum diameter, 8 mm. Ponton, Santo Domingo.

This form is larger, and the shell increases in diameter more rapidly than in the type. It may prove to be worthy of specific rank with more material, in which case the varietal may be used as a specific name. No. 113654, U. S. N. M.

It recalls, in its relation to the type, the relation of *T. indenta*, Conrad, to *T. dislocata*, Say.

Variety *oligomitra*, Dall.—Shell slender, with 12 or more whorls, crossed by numerous very sharp, thin, sigmoid ribs, with wider interspaces, over which lie (between the sutures four and on the base four smaller) strap-like, flat spirals, with much wider interspaces, failing on the pillar; the whole surface is also finely spirally striate; the pillar long, twisted, biplicate; the suture very distinct. Longitude, 38; maximum diameter, 8.5 mm. River Amina, Santo Domingo.

This form is more slender, the spirals are sparse and strap-like, instead of crowded and rounded; the fine spiral striation is not seen on the previously mentioned forms. No. 113756, U. S. N. M.

Variety *cirrus*, Dall.—Shell much smaller and proportionally more slender; spirals flat, strap-like, irregular, with narrower interspaces, overrunning very low and narrow sharp ribs with wider interspaces; whorls, 12 or more, flattish; pillar sharply biplicate. Longitude, 25; maximum diameter, 5.5 mm. River Amina, Santo Domingo. No. 113752, U. S. N. M.

This bears to the variety *oligomitra* much such a relation as *T. protexta*, Conrad, does to the more delicate types of *T. dislocata*, Say. It may prove to be worthy of specific rank.

The preceding varieties would by most writers be regarded (and with some reason) as species, but the differences they exhibit are for the most part such as I find between the different races of *T. dislocata*, when a sufficient geographic series is compared. In the absence of large suites of the Santo Domingo fossils, it seems more prudent for the present to assign them varietal rank.

TEREBRA (ACUS) AMITRA, new species.

Shell small, acute, slender, of 10 whorls without the nucleus; whorls flattish, crossed by about 17 prominent, straight, rounded, even ribs with slightly wider interspaces; spiral sculpture of sparse, sharp, incised lines, more numerous and closer on the base, eight or nine in all; sutural band absent, or not set off by sulcus or constriction; aperture longer than wide, outer lip straight incrementally; canal wide; pillar straight, smooth, with its anterior edge prominent; canal short, wide; siphonal fasciole distinct. Longitude, 9.5; maximum diameter, 2.5 mm.

Habitat.—Potrero, River Amina, Santo Domingo.

Type.—No. 113755, U. S. N. M.

This little species, though represented by only a single specimen, seems clearly distinct.

TEREBRA (ACUS) LANGDONI, new species.

Shell small, slender, of 13 whorls beside the nucleus, which is small, conical, and of three whorls; sculpture reticulated transversely by 16 low, narrow, rounded, slightly flexuous ribs, with wider interspaces, the posterior ends of the ribs not cut off by the deep sulcus which defines the sutural band in front; transverse sculpture of this sulcus visible between the ribs, and four flattish spirals, separated by narrower grooves, between the sulcus and the next suture, and seven or eight narrower spirals on the base; aperture longer than wide; pillar simple, smooth; canal rather long, twisted and recurved. Longitude, 20; maximum diameter, 4 mm.

Habitat.—Chipola beds (2211, 2212, 2213), Calhoun County, Florida, Burns.

Type.—No. 113913, U. S. N. M.

Variety *perpunctata*, Dall. Shell with the spiral sculpture replaced by fine spiral striae, obsolete or irregular, except the sulcus in front of the sutural band, which is represented between the ends of each pair of ribs near the suture by a deep, generally rounded, puncture or pit. Found with the type in the Chipola beds (2213).

This well-marked and rather abundant little species is dedicated to Mr. D. F. Langdon, late of the Alabama State geological survey.

TEREBRA (ACUS) CHIPOLANA, new species.

Shell small, slender, obsoletely sculptured, with a pupoid nucleus of four whorls and about a dozen subsequent whorls, the earlier of which

are slightly smaller than the last two nuclear turns; sides flattish, suture distinct; sutural band conspicuous, set off by a deep sulcus; the band is without nodules or marked sculpture, except on the last whorl; the whorls are feebly transversely wrinkled by obsolete riblets, which on the last whorl in the type specimen take a more definite shape, but fade out on the periphery; spiral sculpture of obsolete grooves on the anterior half of the whorl, two of which on the base are more distinct than the others; aperture longer than wide; pillar simple, smooth, twisted, little recurved; siphonal fasciole with a sharp posterior keel. Longitude, 12; maximum diameter, 2.5 mm.

Habitat.—Chipola beds (2213). A single specimen (No. 113912) in the National Museum.

This little species is sufficiently unlike the others to require but little in the way of comparison. A dwarf *T. langdoni* var. *perpunctata*, with the ribs almost wholly obsolete and the sulcus continuous instead of broken into punctures, would be something like it.

TEREBRA (ACUS) NEGLECTA, Emmons.

Terebra neglecta, EMMONS, N. C. Geol. Surv., p. 258, 1858.

This unfigured species appears to have been lost sight of, though apparently well characterized. At first sight it would recall *T. dislocata*, but on inspection it is found to differ materially. The sutural band is marked in front by a constriction, not a sulcus, toward which the transverse sculpture becomes obsolete, while the front part of each whorl is somewhat swollen, with the ribs strongest on the periphery. In many specimens the ribbing on the sutural band alternates with that on the whorl. The posterior half of the whorl is smooth or only faintly spirally striated; on the anterior half the spirals, though fine and close, are well marked. The pillar is smooth and without plaits, while in *T. dislocata* it is biplicate. The shell reaches about 32 mm. in length and 7.5 in maximum diameter, with 15 whorls. The taper of the tip of the spire is more rapid than the rest, instead of being uniformly conical. It was described by Emmons from the Miocene of North Carolina, but was not found by Burns in the Duplin beds. We have it in the National Museum (No. 11461) from the Chesapeake Miocene (1521) of South Carolina, on the authority of Whitfield.

TEREBRA (ACUS) DISLOCATA, Say; var. INDENTA, Conrad.

Terebra dislocata (SAY) CONRAD, Sill. Am. Journ. Sci. XLI, p. 343, 1841.

Terebra indenta, CONRAD, Proc. Acad. Nat. Sci. Phila., 1862, p. 565, 1863.

Terebra indentata, MEEK, Miocene check list, p. 18, No. 603, 1864.

Habitat.—Duplin beds at the Natural Well, Duplin County, North Carolina.

The species *T. dislocata* in the Miocene has some varieties which are not reproduced in the recent fauna, as well as some that are. Of the former, *T. indenta*, Conrad (*indentata* of Meek by a typographical error), is the most marked. It differs from the typical *T. dislocata* by its feebler and closer transverse sculpture, and its stronger, close-set, cord-like

spirals, which are more conspicuous than the riblets which they overrun. In full-grown specimens the diameter of the base is proportionately greater than in *T. dislocata*, and the surface is less polished. The young *T. indenta* resemble an exceptionally stout *T. protexta*, Conrad. The variety, which, when well developed, often seems perfectly distinct from typical *T. dislocata*, nevertheless grades insensibly into the latter in a large collection from one locality, and it can not be regarded as a mutation of more than varietal rank.

Genus CONUS, Linnæus.

The species of this genus are separated when belonging to the recent fauna largely by their color-pattern, and in the absence of this and they are doubly difficult to discriminate. In general the rule that local faunæ are derived from preexisting faunæ of the same general region is a good guide, and a careful comparison of the fossils with the recent types will often assist materially in determining the relations of fossil forms. The identifications which travel to distant faunæ for representatives—as, for instance, the Indo-Pacific fauna for Haitian fossils—are usually wrong, and all Gabb's identifications of this sort will be modified by further and more careful study. Analogous characteristics are often purely dynamic in forms of different lineage, subjected to similar conditions in widely distant localities. Where modern faunæ differ in the races of any genus which they contain, the antecedent fossils in the same regions are not likely to be much more nearly related.

The Mediterranean and African cones belong to groups which are not effectively represented in American waters; hence it is probable that none of the identifications of American with European Tertiary cones have the weight of probability in their favor. The same type may be represented in both faunæ, but this is only exceptionally the case, and is not to be taken for granted.

In de Gregorio's useful but rather slipshod work on the Alabama Eocene fossils the common *Conus sauridens* of Conrad is referred to *C. diversiformis* of Deshayes, an Eocene cone of the Parisian basin. They are in fact very similar species, but if identical, *C. sauridens*, being the older name, must be applied to the French species and not the French name to the American species. I think, however, the two species are not identical. *C. diversiformis* is a much thinner and lighter shell, with a proportionally wider aperture, and does not show the remarkable plait at the end of the pillar, the formation of which announces maturity in *C. sauridens*. The latter species, though rather rare at Claiborne, is only varietally separated from the Jacksonian *C. tortilis* and the Vicksburgian *C. alveatus*, while the old Miocene *C. planiceps*, Heilprin, forms the culmination of the series. Very young *C. sauridens* (like many other immature cones) show small nodules at the shoulder or just below it; these are the *C. parrus*, H. C. Lea. *C. protractus*, Meyer, and *C. pulcherrimus*, Heilprin, with a probably new

but undescribed form from Vicksburg, complete the list of our known Eocene cones. *C. gyratus*, Morton, and *C. elaibornensis*, Lea, are unrecognizable, and should be dropped. *C. subsauridens* does not appear to differ from *C. sauridens*, Conrad. *C. granopsis*, de Gregorio, appears to be identical with *C. protractus*, Meyer, but the type of *C. granopsis* is only 4 mm. long, and it may be a young *C. sauridens*. *C. improridus*, de Gregorio, from an unmentioned (American?) locality, is not like anything known from Claiborne in American collections.

Only three species of cones are yet known from the Chesapeake Miocene: *C. adversarius*, Conrad; *C. diluvianus*, Green, and *C. marylandicus*, Green. The original locality of the latter is not known, and it has not recently been collected in Maryland, but occurs in Duplin County, North Carolina, and has by some accident been figured by Tuomey and Holmes, under the name of *C. diluvians*, from South Carolina.

The cones of the old Miocene of Florida do not include any of the Antillean species described from the equivalent horizon, which is rather a surprise, but we find the three forms here described, with several well-marked varieties.

CONUS CHIPOLANUS, new species.

Shell double-conic, with a rather elevated spire of nine normal and about three lucid nuclear whorls; profile of the spire somewhat concave, turritid shoulder of the whorls sharply keeled, concave between the keel and the suture, without spiral grooving, but showing faint microscopic spiral scratches, the prominent sculpture of this area being the delicately arched lines of the anal fasciole, which are sometimes very conspicuous; the keel is wholly without nodules; sides in front of the keel straight, slightly concave toward the canal, smooth, except for incremental lines, polished anteriorly, with about nine sharp, channeled spiral grooves, besides some striations on the canal; the grooves are separated by wider interspaces and crossed by numerous elevated lines of growth, which only appear in the channels; each channel in the fully adult shell has a spiral row of faint, round tubercles close to its anterior margin; in the young the grooves sometimes cover the whole shell before the keel, and the nodules are often absent; in the adult the grooves cover somewhat less than half the whorl, while on the smooth part traces of five narrow, revolving color bands are sometimes visible, with wider interspaces; anal notch only moderately deep; outer lip thin, only moderately arched; aperture narrow, with nearly parallel sides; the pillar straight, thin, slightly twisted. Longitude of shell, 32; of spire, 7.5; maximum diameter, 15.5 mm.

Habitat.—Chipola beds (2213), Chipola River, Florida.

Types.—No. 113985, U. S. N. M.; and in the collection of Mr. Aldrich.

This species recalls *C. interstinctus*, Guppy, of the Haitian Miocene, but is a smaller, more slender, and more delicate shell, without any grooving in the sutural fasciole. It is more nearly related to *C. mary-*

landicus of the newer Miocene, and to *C. floridanus*, Pliocene and recent, than to any of the Antillean fossils with which I have compared it.

CONUS ISOMITRATUS, new species.

Shell small, solid, short, stout, with a rather low spire of eight or nine whorls beside the nucleus; a single elevated thread runs at the shoulder, on which the suture is laid; between the sutures, which are deep and distinct, the whorl is convex, turgid, with only incremental lines; in front of the shoulder the sides are slightly swollen, the posterior half obsoletely spirally striate or smooth, anteriorly with distinct spiral threads and equal interspaces crossed by conspicuous lines of growth; the siphonal fasciole distinct, swollen, showing as a rounded ridge; outer lip straight, thin, sharp; anal notch shallow, aperture narrow, siphonal notch deep; pillar with the edge thickened and twisted, forming in well-developed specimens with the siphonal fasciole two obscure plaits: body with little or no callus. Longitude of shell, 28; of spire, 5; maximum diameter, 13 mm.

Habitat.—Chipola beds (2212, 2213), Chipola River, Florida, and Alum Bluff beds near De Funiak Springs (2238).

Types.—No. 113980, U. S. N. M.; and in the collection of Mr. Aldrich.

The young of this species have nine or ten deep grooves, with narrower interspaces, covering a little more than the anterior half of the shell. These grooves during growth become gradually modified to the adult sculpture.

CONUS ISOMITRATUS var. **SULCULUS**, Dall.

Shell resembling the type, except that the sutural border or shoulder of the shell is flattened or excavated with a few or numerous spiral grooves upon its surface. It is also larger. Longitude of spire, 5; of shell, 38; diameter, 24 mm.

Habitat.—Chipola beds (2212, 2213), Chipola River, Florida.

Types.—No. 113924, U. S. N. M.

The transition from a concave to a turgid sutural border, from smooth to spirally grooved, is quite gradual, though the extremes have a very different aspect, and would, by some writers, be put in different sections of the genus. This species recalls *C. mus* of the recent fauna as much as any species. It is much shorter and stouter than the line which begins with *C. sauridens* et al., and is represented in the present fauna by *C. daucus*.

CONUS DEMIURGUS, new species.

Shell large, elongate, with a large, somewhat bulbous, nucleus, and about 10 subsequent whorls: spire low, in the young nearly flat, with a distinct but not channeled suture; shoulder of the whorl angular, the space between the sutures flattish or feebly excavated, sculptured with obvious lines of growth, crossed by few, faint, obsolete, spiral, traces;

sides of the whorl smooth, except for obsolete spiral lines, rather wide and irregularly spaced; in the anterior third they are stronger, but even there not very marked; some specimens seem to indicate a faded color-pattern of continuous, narrow, spiral lines, rather evenly and uniformly spaced; aperture narrow, of equal width, or nearly so; the anal notch moderately deep, the pillar straight, with a narrow callous part not showing any ridge or plait. Longitude of spire, 5; of shell, 65; diameter, 35; width of aperture, 6 mm.

Habitat.—Chipola beds (2211–2213), Florida.

Types.—No. 113920, U. S. N. M.; and in the Aldrich collection.

This species is the largest yet found in these beds, and among recent species finds its nearest analogue in *C. papilionaceus*, Hwass. It is a more slender shell than the latter, with more flattened spire and larger nucleus. It is a shell without striking characteristics, yet which will not fit in with any of the other forms of this horizon.

PTEROPURPURA POSTII, new species.

Shell of moderate size, with five whorls, beside the (decollate) nucleus, with three sharp, continuous varices extending down the spire and a single prominent intervarical nodule on the interspaces of the whorls; the last varix broader than any of the others, with a posterior angle, the front sculptured with fine crenulate imbricated lamellæ, the back smooth, except for the ends of the spiral ribbing; spiral sculpture of (about 15 on the last whorl) low spiral ribs most prominent on the varices and on the intervarical nodules, the rather wide interspaces finely spirally striate; aperture small, subovate, the outer lip with about seven strong teeth; the body with a thin, smooth callus; suture appressed, obscure; canal open, narrow, not quite as long as the aperture; on the siphonal fasciole a single projecting remnant of an earlier canal is visible. Length, 38; of last whorl, 28; of aperture, 14; diameter of shell, 20 mm.

Habitat.—Ballast Point, Tampa, Florida, old Miocene silex beds: a single specimen collected by E. J. Post.

Type.—No. 130349, U. S. N. M.

It is possible this should be referred to *Pterorhytis* rather than *Pteropurpura*, but there does not appear to be any long tooth on the edge of the outer lip as usual in the former genus.

Genus GYRODES, Conrad.

Subgenus GYRODISCA, Dall.

Shell like *Gyrodex*, but small, without any channel in front of the suture, the umbilical angle crenate by the transverse lamellar or fibrous sculpture: the nucleus small, prominent, glassy, the shell otherwise

earthy or porcelainous; the operculum like that of *Sigaretus*. Type, *Adeorbis depressus*, Jeffreys.¹

Sigaretus problematicus and *Gibbula mitis* of Deshayes, from the Paris basin Eocene, appear from the figures to be referable here. The Cretaceous species, upon which *Gyrodes* was founded, are considerably larger, and the sutural sulcus, though not absolutely constant, gives them a different aspect. There are several Tertiary and one or two recent species which belong to the subgenus as restricted.

GYRODES (GYRODISCA) DUPLINENSIS, new species.

Shell small, with a small glassy nucleus and somewhat more than three whorls, the last much the largest; the nucleus prominent above the rather depressed spire; whorls rounded, suture very deep; base rounded; umbilicus wide, its border hardly angular; sculpture of numerous, flexuous, subequal, regular, transverse, lamellar riblets, with wider, faintly spirally striate interspaces; aperture large, very oblique, pointed above, rounded below, not interrupted by the preceding whorl; lip simple, sharp, rather flexuous, the inner one receding. Width, 3.6; height, 2.75 mm.

Upper Chesapeake Miocene of Magnolia, Duplin County, North Carolina, Burns.

Type.—No. 114430, U. S. N. M.

This species differs from most of those belonging to the subgenus by the obsolescence of the umbilical angle, though this may be, and probably is, an individual rather than a specific characteristic.

Genus UMBONIUM, Link.

UMBONIUM (SOLARIORBIS) FLORIDANUM, new species.

Shell small, depressed, three-whorled, with a smooth, glossy nucleus, the subsequent whorls depressed and tricarinate; one carina is at the periphery, one on the base, and the least prominent between the suture and the periphery; the latter fails on the last part of the last whorl, and is more or less nodulous or undulated by faintly elevated but distinct radiating ridges, which begin weak, are strongest on the keel, and die out before reaching the periphery; the base shows radiating ridges, rather stronger than those on the spire, but which do not crenulate the strong basal keel; umbilicus moderate, with a single spiral thread above the angular margin: aperture entire, oblique, the edge simple, but modified by the intersection of the keels. Diameter, 1.6; height, 1 mm.

Habitat.—Pliocene of the Caloosahatchie beds, Dall.

Type.—No. 113596, U. S. N. M.

This very small species appears adult, and has a rather solid and strong shell.

¹ Jeffreys, Proc. Zool. Soc. Lond., 1885, p. 41, pl. IV, figs. 8, 8a; Dall, Blake Gastr., p. 298, 1889.

UMBONIUM (SOLARIORBIS) UNDULA, new species.

Shell small, solid, of three and a half whorls, depressed, dome-like, strongly keeled at the periphery, with a round-edged, broad carina, above and below which the whorl is more or less compressed; transverse sculpture of about a dozen rounded ripples between the suture and the periphery, the nucleus and the last half of the last whorl being free from them; these ripples cross the whorl in a flexuous manner, and differ in strength in different specimens: the base also shows radiating flexuous sculpture, but more feeble and obscure; the spiral sculpture consists of the peripheral carina, and of oblique incised lines, which are absent near the suture and umbilicus, but sharp and distinct peripherally; they cut the surface at a slight angle with the plane of the periphery; base flattish, slightly rounded in the middle, the umbilicus moderate, without any well-marked angle or internal sculpture; aperture oblique, nearly circular, produced at the upper angle; peristome simple, entire. Diameter, 2.5; height, 1 mm.

Habitat.—Miocene of the Natural Well, Duplin County, North Carolina; Burns, collector.

Type.—No. 11446, U. S. N. M.

UMBONIUM (SOLARIORBIS) DUPLINENSE, new species.

Shell small, solid, of three and a half whorls, rather depressed; sculpture on the spire of rather even, rounded, oblique, subequal, transverse riblets, with narrower interspaces, crossed by fine, sharp, close-set, spiral striae; an incised line in front of the suture cuts off a narrow border, except on the smooth nuclear whorls; the periphery is formed by a strong, blunt-edged keel; the base is rather full, with two more rather strong keels with reticulate sculpture between them, the spirals predominating near the umbilicus and the radials near the periphery; umbilicus small, with an angular border and a single spiral thread within; aperture rounded, oblique, produced on the body whorl, entire. Diameter, 2; height, 0.75 mm.

Habitat.—Miocene of the Natural Well, Duplin County, North Carolina; Burns, collector.

Type.—No. 11445, U. S. N. M.

Though so small, the sculpture is very elegant.