ABSTRACT

Nineteen species of cheilostome bryozoans are herein described or listed from the McBean formation of the northeastern Georgia coastal plain. Of these, eight are described as new, and eight are redescribed. The McBean fauna shows greatest resemblance to the Castle Hayne bryozoans (upper Eocene) of North Carolina, which include six of the McBean species. The McBean is probably older than the Castle Hayne, but not as old as middle Eocene.

Eocene bryozoa from the McBean formation in Georgia

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INTRODUCTION

The richly fossiliferous McBean formation, comprising deposits of Eocene age exposed in the coastal plain of northeastern Georgia, has been made well-known in Tertiary stratigraphy through the work of Veatch and Stephenson (1911), Cooke and Shearer (1919), and Cooke (1943). The fauna of the McBean is equally well-known and includes more than 60 species of mollusks identified by T. W. Vaughan (in Veatch and Stephenson, 1911) and 82 species of foraminifera reported by Cushman and Herrick (1945). The bryozoan assemblage of the McBean was first mentioned by Veatch and Stephenson (1911, p. 238), but only one species, *Rimosocella laciniosa* (Canu and Bassler), has been identified from the formation so far (Cheetham, 1960). The present paper reports an additional 18 species from two McBean localities; eight of the species are described as new, eight are redescribed, and two are left *nomina aperta*. This study has been based on two samples of McBean material, both containing numerous bryozoans, made available to me through the courtesy of Drs. H. V. Howe and H. V. Andersen, Department of Geology, Louisiana State University. The localities from which these were collected are about 40 miles south of Augusta, Georgia; one is the type section in McBean Creek, and the other is about eight miles farther southeast on the Savannah River (see Herrick, 1960, for locality map).

Locality 1

Ditch along state highway 80 east of McBean, 0.4 mile east of bridge over McBean Creek, Richmond County, Georgia. This is station 1 of the McBean as given by Cushman and Herrick (1945) and bed 2 of the type section described by Cooke (1943). Collector: R. W. Stephens, Jr.

Locality 2

Shell Bluff on Savannah River, Burke County, Georgia. The sample was collected from below the *Ostrea gigantissima* bed in the section given by Cooke (1943). Collector: H. V. Howe.

AGE OF McBEAN ASSEMBLAGE

The McBean formation was originally described and named by Veatch and Stephenson in 1911, but it has been revised several times since, notably by Cooke and Shearer (1919) and Cooke (1943). As now used, the name refers to a unit about 80 feet thick consisting of soft marine sands, clays, and marls with discontinuous beds of hard limestone. Although the formation is fossiliferous, its age has long been held in controversy. Among the more than 60 species of mollusks identified by Vaughan, many, such as *Venericardia alticostata*, *Crassatella protexta*, *Ostrea sellaeformis*, and *Crepidula lirata*, indicate Claibornian (middle Eocene) age. The entire section at Shell Bluff, divisible into a lower *Ostrea sellaeformis* zone and an upper *Ostrea gigantissima* (called *O. georgiana* by Vaughan and many subsequent writers) zone, was considered by Vaughan to be part of the McBean. Cooke and Shearer (1919) later showed that the *O. gigantissima*-bearing beds belong to the Barnwell formation, usually considered to be of Jacksonian (upper Eocene) age.

The beds exposed in the type section in McBean Creek, the equivalents of the *Ostrea sellaeformis* zone of the Shell Bluff section, have yielded 32 species of foraminifera whose ranges indicate Jacksonian or younger age, 10 whose ranges indicate Claibornian or older age, and 29 species whose ranges include both Claibornian and Jacksonian (Cushman and Herrick, 1945). Among the nine species of cheilostome bryozoans recovered from the McBean samples, excluding the eight that are new and the two that were left *nomina aperta*, seven are known from Jacksonian and younger rocks and two from both Claibornian and Jacksonian. Six of the McBean bryozoan species occur in the Castle Hayne marl in North Carolina, the bryozoan fauna of which is probably upper Jacksonian (Cheetham, 1961), and at least four of the new species in the McBean are probably ancestral to Castle Hayne species. The ranges of the bryozoan species thus indicate that the McBean is older than the Castle Hayne, although probably not so old as Claibornian.

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My thanks are due Drs. H. V. Howe and H. V. Andersen for the samples of the McBean formation and to Mrs. Martha M. Deboo for the illustrations of the bryozoan species. Mrs. Deboo's work was financed through a grant from the Department of Geology, Louisiana State University.

SYSTEMATIC DESCRIPTIONS

The terminology of cheilostome bryozoans, long in a state of disorganization and confusion, has been somewhat standardized by the work of Bassler (1953), Brown (1952), and Lagaaij (1952). Because Brown and Lagaaij have adhered more strictly to terms conventional in describing cheilostomes, their authority is followed herein. Actually this terminology does not depart greatly from that sanctioned by Bassler.

Measurements of type specimens are indicated by conventional notation: Lz, lz, length and width of zooecium; ha, la, length and width of aperture; ho, lo, height and width of opesia or orifice; Lav, lav, length and width of avicularium; Lov, lov, length and width of ovicell; and Lv, lv, length and width of vibracularium. The number of specimens measured is placed in parentheses and is followed in order by the mean, the standard deviation, and the observed range. All of the type specimens are catalogued in the collection of the Geology Museum, Louisiana State University.

Order CHEILOSTOMATA Busk
Suborder ANASCA Levinsen
Family HINCKSINIDAE Canu and Bassler
Genus HINCKSINA Norman

Hincksina ocalensis Canu and Bassler
Plate 1, figure 1

Hincksina ocalensis CANU AND BASSLER, 1920, U. S. Nat. Mus., Bull. 106, p. 114, pl. 22, figs. 10–13.

Material: Specimen no. 7143, locality 1, McBean fm.

Diagnosis: Hincksina having encrusting zoarium, small zooecia with variable spines, of which the distal two are best developed, and mural rim crenulate on proximal margin.

Description: Zoarium encrusting with zooecia arranged in irregular longitudinal rows, those in adjacent rows alternating in position.

Zooecia rhomboidal to club-shaped, about two-thirds as wide as long, separated by distinct furrows. Distal margin rounded; proximal margin truncate. Gymnocyst smooth, short, slightly convex, on some zooecia swollen at proximal margin of aperture to form irregular tubercle. Mural rim wide, rounded, finely crenulate on proximal and proximolateral margins; sharper, narrower, and not crenulate on distal margin.

Aperture irregularly elliptical, evenly rounded, with a stout, erect, hollow spine at each distolateral corner, and, in some zooecia, a third spine or pair of spines on lateral margins. Avicularia lacking.

Ovicell endozooecial, inconspicuous, very slightly salient. Distal margin evenly rounded, buried beneath gymnocyst of distally adjacent zooecium. Labellum coincides with distal part of mural rim of gonozooecium. Outer surface smooth, imperforate.

MEASUREMENTS

Lz (10) 0.359 (0.048) mm., 0.25–0.44 mm.
lz (10) 0.224 (0.031) mm., 0.18–0.26 mm.
ha (10) 0.244 (0.023) mm., 0.20–0.27 mm.
la (10) 0.163 (0.016) mm., 0.14–0.18 mm.

Discussion: Hincksina ocalensis was described from the Ocala limestone (Jacksonian) at Bainbridge, Georgia, and was reported from the Ocala of western Florida and, doubtfully, from the Vicksburgian of Mississippi (Canu and Bassler, 1920). The McBean material, which displays slightly smaller measurements than the Ocala specimens, represents the only known occurrence of the species outside the Gulf Coast.

Occurrence: McBean formation, locality 1.

Family CALLOPORIDAE Norman
Genus MEMBRANIPORIDRA Canu and Bassler

Membraniporidra sp.
Plate 1, figure 2

Material: Specimen no. 7144, locality 1, McBean fm.

Discussion: One specimen, consisting of several zooecia, none with an ovicell, is referable to *Membraniporidra.* Although this specimen agrees in form of zoarium, size and shape of zooecia, and characters of gymnocyst, cryptocyst, and opesia with *Membraniporidra oecioporosa* Canu and Bassler, the absence of ovicelled zooecia makes positive identification impossible.

M. oecioporosa was described from the lower Jacksonian of Mississippi and has been reported from the upper Jacksonian of Georgia and from the Castle Hayne marl of North Carolina (Canu and Bassler, 1920).

Occurrence: McBean formation, locality 1.

Family ONYCHOCELLIDAE Jullien
Genus FLORIDINA Jullien

Floridina asymmetrica Canu and Bassler
Plate 1, figure 3

Floridina asymmetrica CANU AND BASSLER, 1920, U. S. Nat. Mus., Bull. 106, p. 224, pl. 35, figs. 6–8.

Material: Specimen no. 7145, locality 1, McBean fm.

Diagnosis: Floridina having encrusting zoarium, small zooecia with pyriform opesiae, onychocellaria slightly larger than zooecia, and onychocellarian opesiae oval.

Description: Zoarium encrusting, unilaminar, composed of longitudinal rows of zooecia, those in adjacent rows alternating in position. Basal side of zoarium irregularly undulatory; zooecial outlines distinct.

Zooecia irregularly rhombic to rhomboidal, about as wide as long, separated by distinct grooves. Distal margin rounded; proximal margin pointed or truncated. Gymnocyst lacking. Mural rim low, smooth, rounded, not distinct from cryptocyst; distal portion forms "half-collar" around opesia.

Cryptocyst smooth to finely granular, imperforate, sloping uniformly from proximal margin of zooecium about half zooecial length to greatest depth at proximal margin of opesia.

Opesia pyriform, symmetrical or slightly asymmetrical, strongly constricted at midlength by projecting ends of "half-collar." Distal portion evenly rounded, smaller; proximal portion nearly straight, larger, forming undifferentiated opesiular indentations.

Avicularia independent, onychocellarian, symmetrical, slightly longer and narrower than zooecia, but occupying same position in zoarial series. Outline rhombic, less rounded distally than zooecia. Cryptocyst like those of zooecia but channeled distally to form rostrum. Opesia oval, undivided, more broadly rounded proximally. Ovicell unknown.

MEASUREMENTS

Lz (10) 0.330 (0.041) mm., 0.26–0.39 mm.
lz (10) 0.303 (0.036) mm., 0.26–0.36 mm.
ho (10) 0.149 (0.014) mm., 0.13–0.17 mm.
lo (10) 0.135 (0.008) mm., 0.13–0.14 mm.
Lav (1) 0.43 mm.
lav (1) 0.24 mm.

Discussion: This species has been known heretofore only from the upper Jacksonian of southwestern Georgia (Canu and Bassler, 1920). It differs from *Floridina bifoliata* Canu and Bassler, its nearest relative, chiefly in zoarial form.

Occurrence: McBean formation, locality 1.

Family MICROPORIDAE Hincks
Genus RIMOSOCELLA Cheetham

Rimosocella laciniosa (Canu and Bassler)
Plate 1, figure 7

Quadricellaria? laciniosa CANU AND BASSLER, 1920, U. S. Nat. Mus., Bull. 106, p. 279, pl. 40, figs. 18–20.
Rimosocella laciniosa (Canu and Bassler). – CHEETHAM, 1960, Micropaleontology, vol. 6, p. 288, text-figs. 2–5.

Material: Specimen no. 7146, locality 1, McBean fm.

Diagnosis: Rimosocella having 16 or 17 pairs of slitlike opesiulae in young zooecia, but eight or nine pairs with two additional submedian rows of seven to nine slitlike pores each in mature zooecia; semicircular to semielliptical opesiae with rudimentary tubercles at proximolateral corners; and dependent vibracularia or avicularia paired and placed at proximodistal margins of each zooecium.

Discussion: This species has been redescribed recently (Cheetham, 1960). The new material is illustrated here chiefly because some of the zooecia possess avicularia with cross-bars in place of the vibracularia displayed by all of the previously described material. *R. laciniosa* was described from the Castle Hayne marl of North Carolina and has previously been reported from the McBean.

Occurrence: McBean formation, locality 1.

Family LUNULITIDAE Lagaaij

Genus **Oligotresium** Gabb and Horn

Oligotresium GABB AND HORN, 1862, Acad. Nat. Sci., Philadelphia, Jour. ser. 2, vol. 5, p. 139.

Type species: (By monotypy) *Lunulites vicksburgensis* Conrad, Vicksburgian, Mississippi.

Diagnosis: Lunulitidae having one vibracularium for every four zooecia, two zooecia diverging around its proximal margin and two converging around its distal margin. Heterozooecia, wider than autozooecia and with wider opesiae, usually present. Vibracularian condyles usually with pits on proximal sides. Ovicell lacking.

Range: Eocene—Oligocene, North America.

Discussion: Although this genus is very similar to *Lunulites* Lamarck in zoarial form and zooecial structure as well as in possessing vibracularia, the arrangement of the zooecia, particularly the grouping of zooecia around vibracularia, is quite distinctive. This arrangement was pointed out in *Woodipora* and *Smittipora* by Lagaaij (1952), who referred to it as a "nuclear" or "orienting" effect. Canu and Bassler (1920), who felt that this character is not of generic significance, considered *Oligotresium* a subgenus of *Lunulites*, and Bassler (1953) relegated the genus to synonymy with *Lunulites*.

In addition to its distinctive zooecial arrangement, *Oligotresium* differs from *Lunulites* in sometimes possessing heterozooecia and vibracularian condyles with proximal pits.

Oligotresium howei Cheetham, new species
Plate 1, figure 6

Material: Holotype no. 7147 and paratypes nos. 7148 and 7149, locality 1, McBean formation.

Diagnosis: Oligotresium having both heterozooecia and vibracularian condyles with proximal pits and zoarium with basal side uncalcified.

Description: Zoarium free discoidal, flat to gently convex transversely, thin; basal side uncalcified. Zooecia arranged in radial rows increasing in number distally by bifurcation; zooecia in adjacent rows either alternating or opposing. Independent vibracularia scattered seemingly at random over zoarial surface, one to each four zooecia; two zooecia diverging around proximal end of vibracularium, two converging around distal end. Occasionally, heterozooecia replace autozooecia.

Autozooecia asymmetrically club-shaped, about three-fourths as wide as long, separated by inconspicuous furrows. Distal margin rounded; proximal margin pointed, bluntly tapering, or truncated. Gymnocyst lacking. Mural rim thick, little salient, rounded, crenulate to finely granular.

Cryptocyst finely granular, imperforate, strongly concave, filling about one-half area enclosed by mural rim; deepest at proximal lip of opesia.

Opesia semielliptical to oval, evenly and narrowly rounded distally, broadly rounded proximally. Cryptocyst forms distinct, raised lip around opesia. Flat shelf occupies distal one-fourth of opesia. Opesiular indentations not differentiated.

Heterozooecia like autozooecia but symmetrical, nearly semicircular, wider and shorter. Distal margin rounded; proximal margin concave. Opesia semielliptical, rounded distally, nearly straight proximally, wider than that of autozooecia.

Vibracularia symmetrical, rhombic, about two-thirds as wide as long, acutely pointed proximally, rounded and channeled distally. Cryptocyst rudimentary, sloping inward from mural rim, granular to radially crenulate. Opesia oval, constricted slightly distal to midlength by a pair of strong condyles, each with a deep pit on its proximal side.

MEASUREMENTS

autozooecia

Lz (10) 0.327 (0.045) mm., 0.28–0.44 mm.
lz (10) 0.244 (0.022) mm., 0.20–0.27 mm.
ho (10) 0.164 (0.018) mm., 0.14–0.19 mm.
lo (10) 0.140 (0.009) mm., 0.13–0.15 mm.

heterozooecia

Lz (3) 0.259 (0.006) mm., 0.25–0.26 mm.
lz (3) 0.290 (0.022) mm., 0.27–0.32 mm.
ho (3) 0.168 (0.006) mm., 0.16–0.17 mm.
lo (3) 0.174 (0.006) mm., 0.17–0.18 mm.

vibracularia

Lv (5) 0.315 (0.019) mm., 0.30–0.34 mm.
lv (5) 0.178 (0.010) mm., 0.17–0.19 mm.

Discussion: The only other two species of *Oligotresium* known are *Lunulites vicksburgensis*, the type species, which is known to occur in the Vicksburgian of Mississippi, and *Lunulites contigua* Lonsdale, which is known only from the Castle Hayne marl of North Carolina. *O. howei* differs from the former species in possessing heterozooecia and from the latter in displaying vibracularian condyles with proximal pits. This species is named in honor of Dr. H. V. Howe.

Occurrence: McBean formation, localities 1 and 2.

Family FARCIMINARIIDAE Busk
Genus NELLIA Busk

Nellia tenella (Lamarck)
Plate 1, figures 4, 5

Cellaria tenella LAMARCK, 1816, Histoire Naturelle des Animales sans Vertèbres, tome 2, pl. 2, figs. 26, 27.
Nellia oculata BUSK, 1852, Catalogue of Marine Polyzoa in the Collection of the British Museum,, pt. 1, p. 18, pl. 64, fig. 6, pl. 65, fig. 4.
Farcimia tenella (Lamarck). – CANU, 1907, Annales de Paléontologie, tome 2, p. 60, pl. 2, figs. 1, 2.
Nellia oculata Busk. – CANU AND BASSLER, 1920, U. S. Nat. Mus., Bull. 106, p. 196, pl. 82, figs. 6–10.

Material: Specimens nos. 7150 and 7151, locality 1, McBean formation.

Diagnosis: Nellia having relatively small zooecia of same width on all four faces of zoarium and having a pair of small dependent, vestigial or functional avicularia, one at each proximolateral corner of gymnocyst.

Description: Zoarium erect, delicate, articulated, dichotomously branching at nodes. Internodes long, slender, square in cross section, with zooecia arranged in four longitudinal rows, those in adjacent rows alternating in position. Zooecia on all four faces of nearly equal size.

Zooecia elongate club-shaped, about one-half as wide as long, separated by distinct furrows. Distal margin rounded; proximal margin truncate. Gymnocyst smooth, convex, highest just proximal to aperture. Gymnocyst extends about half zooecial length from proximal end. Mural rim smooth, sharp, very slightly salient, especially on distal margin. Aperture elliptical, evenly rounded.

Cryptocyst rudimentary, forming crescent on proximal and lateral margins of aperture; widest on proximal margin. Cryptocystal surface smooth, slightly concave.

Avicularia small, dependent, paired, placed in proximolateral corners of gymnocyst. Avicularian chamber very small, circular to oval, probably nonfunctional, lacking condyles or cross-bar. Avicularian rostrum rudimentary, directed distolaterally and inclined downward. Small, circular, accessory pore developed proximal to avicularian chamber.

Ovicell endozooecial, inconspicuous, very slightly salient; distal margin evenly rounded, conforming to zooecial margin; labellum rounded. Outer surface smooth, ornamented with a single, large, crescent-shaped depressed area.

MEASUREMENTS

Lz (10) 0.389 (0.042) mm., 0.32–0.48 mm.
lz (10) 0.191 (0.016) mm., 0.18–0.20 mm.
ha (10) 0.263 (0.051) mm., 0.19–0.39 mm.
la (10) 0.126 (0.017) mm., 0.09–0.14 mm.

Discussion: This ubiquitous species occurs in Eocene-Pleistocene sediments throughout the tropical zone and

is still living in the Red Sea, the Indian Ocean, the Gulf of Mexico, the Atlantic Ocean, the Pacific Ocean, and the Mediterranean Sea. Tertiary specimens of *Nellia tenella* have shorter zooecia (Lz = 0.40–0.50 mm. for Vicksburgian specimens according to Canu and Bassler, 1920) than Recent material (Lz = 0.45–0.60 mm. for Pacific American forms according to Osburn, 1950), and the McBean specimens average smaller still. The McBean nellias resemble Harmer's (1926) "typical form" of *N. tenella* in having vestigial avicularia.

Occurrence: McBean formation, localities 1 and 2.

Suborder ASCOPHORA Levinsen
Family HIPPOPODINIDAE Levinsen
Genus HIPPOPODINA Levinsen

Hippopodina stephensi Cheetham, new species
Plate 1, figures 8–11

Material: Holotype no. 7152 and paratypes nos. 7153 and 7154, locality 1, McBean formation.

Diagnosis: Hippopodina having relatively small autozooecia with paired, proximolateral vibracularia and gonozooecia with large, globular ovicells and orifices much wider and higher than autozooecia.

Description: Zoarium erect, branching, bilaminar, compressed, with zooecia arranged in longitudinal rows, those in adjacent rows alternating in position. Number of zooecial rows increases distally by intercalation.

Zooecia rectangular to subhexagonal, nearly as wide as long, separated by distinct furrows. Distal margin convex, rounded; proximal margin concave, rounded. Frontal wall slightly but evenly convex, highest just proximal to orifice. Frontal surface tremocystal, smooth, evenly perforated with large, irregularly elliptical, funnel-shaped tremopores constituting about 25 percent of surface.

Orifice of autozooecia rounded triangular, approximately equilateral, with a pair of stout condyles nearer the proximal lip. Condyles directed inward, proximally, and slightly downward, in some zooecia nearly meeting. Orifice of gonozooecia elliptical, greatly widened and slightly heightened, condyles reduced and spread far apart.

Vibracularia small, dependent, paired, placed in proximolateral corners of frontal wall of each zooecium. Vibracularian chamber symmetrical or asymmetrical, divided by weakly developed condyles. Rostrum directed proximolaterally.

Ovicell endozooecial, very globular, its length approximately equal to that of gonozooecium. Interior divided by "false floor" extending from distal wall to distal lip of gonozooecial orifice. Outer surface very strongly and evenly convex, uniformly perforated with tremopores of same size and concentration as on zooecial frontal.

MEASUREMENTS

autozooecia
Lz (10) 0.564 (0.061) mm., 0.50–0.68 mm.
lz (10) 0.532 (0.128) mm., 0.32–0.68 mm.
ho (10) 0.174 (0.016) mm., 0.15–0.20 mm.
lo (10) 0.185 (0.011) mm., 0.17–0.20 mm.

gonozooecia
Lov (4) 0.731 (0.055) mm., 0.68–0.79 mm.
ho (3) 0.251 (0.019) mm., 0.24–0.27 mm.
lo (4) 0.351 (0.022) mm., 0.32–0.38 mm.

Discussion: Hippopodina vibraculifera Canu and Bassler, a species from the Castle Hayne marl of North Carolina and the Ocala group of southwestern Georgia and northwestern Florida, is the nearest relative of *H. stephensi*. In the former species, the autozooecia are nearly twice as large as in *H. stephensi* (Lz = 0.90–1.10 mm., lz = 0.80–1.00 mm., according to Canu and Bassler, 1920); the vibracularia are placed in the distolateral corners of the zooecia; the ovicell is rather flat and displays a strong median rib; and the orifice of the gonozooecia is only slightly wider than that of the autozooecia. Other, more modern species of *Hippopodina*, e. g., *H. feegeensis* (Busk), display avicularia instead of vibracularia.

It seems reasonable to suppose that *H. stephensi* is the ancestor of *H. vibraculifera*.

This species is named in honor of Dr. Raymond W. Stephens, Jr.

Occurrence: McBean formation, localities 1 and 2.

Family UMBONULIDAE Canu
Genus HIPPOPLEURIFERA Canu and Bassler

Hippopleurifera mcbeanensis Cheetham, new species
Plate 2, figures 1, 2

Material: Holotype no. 7155 and paratype no. 7156, locality 1, and paratype no. 7157, locality 2, McBean fm.

Diagnosis: Hippopleurifera having bilaminar zoarium, subcircular, mucronate orifice, oral spines, paired or single frontal avicularia with rostra directed proximally from proximolateral corners of orifice, and small, globular ovicell with a pair of large fenestrae.

Description: Zoarium erect, bilaminar, compressed; zooecia arranged in longitudinal rows, those in adjacent rows alternating in position.

Zooecia club-shaped, about half as wide as long, separated by faint furrows. Distal margin rounded, proximal margin truncate. Frontal wall moderately convex, highest just proximal to orifice, and projecting slightly over proximal lip of orifice in small mucro. Frontal surface finely granular, pleurocystal, tending to form interareolar costules, with two rows of small areolae.

Number of areolar rows reduced to one on distal parts of some zooecia and expanded to three on proximal parts of some.

Orifices of autozooecia and gonozooecia alike, subcircular, evenly rounded, with pair of minute condyles developed nearer proximal lip. Distolateral margins of orifice with three slender, hollow spines each. Oral spines not apparent in gonozooecia.

Avicularia small, dependent, single or paired, placed proximolaterally to orifice. Avicularian chamber drop-shaped, symmetrical, without condyles or cross-bar; rostrum directed proximally.

Ovicell hyperstomial, globular, its length about one-fourth that of gonozooecium. Outer surface convex, smooth, with pair of large fenestrae near middle and several smaller areolae around distal and lateral margins within distinct rim.

MEASUREMENTS

Lz (4) 0.705 (0.031) mm., 0.68–0.74 mm.
lz (6) 0.365 (0.031) mm., 0.29–0.44 mm.
ho (5) 0.164 (0.109) mm., 0.14–0.19 mm.
lo (5) 0.150 (0.012) mm., 0.14–0.17 mm.
Lov (3) 0.103 (0.007) mm., 0.09–0.11 mm.

Discussion: H. mcbeanensis is intermediate between *H. rotula* (Canu and Bassler) from the lower Jacksonian of the eastern Gulf Coast and *H. capitimortis* (Canu and Bassler) from the Vicksburgian. It resembles *H. rotula* in zoarial form, shape of orifice, nature of frontal, and shape and placement of avicularia, whereas its ovicell is very similar to that of *H. capitimortis*.

Occurrence: McBean formation, localities 1 and 2.

Family GIGANTOPORIDAE Bassler
Genus SEMIHASWELLIA Canu and Bassler

Semihaswellia rectifurcata (Canu and Bassler)
Plate 1, figure 16

Tremotoichos rectifurcatum CANU AND BASSLER, 1917, U. S. Nat. Mus., Bull. 96, p. 59, pl. 6, fig. 1.

Material: Specimen no. 7158, locality 1, McBean fm.

Diagnosis: Semihaswellia having zoarial branches at nearly right angles to main stem and ascopores offset laterally from zooecial midlines and lacking avicularia on reverse side of zoarium.

Description: Zoarium erect, cylindrical, with branches emanating at nearly right angles to main stem; zooecia arranged in two to four longitudinal rows, those in adjacent rows alternating in position; orifices opening on only one face of zoarium.

Zooecia more or less urn-shaped, without definite boundaries on surface of zoarium. Frontal wall moderately convex, highest just proximal to peristome. Frontal surface reticulate, tremocystal, perforated with longitudinally elongate tremopores constituting about 20 percent of surface. Tremocyst continues over reverse side of zoarium without interruption. Ascopore circular, very slightly larger than tremopores, placed just proximal to peristome and toward outer margin of zooecium.

Orifice semielliptical, rounded distally, straight proximally, hidden at base of long, tubular peristome. Secondary orifice subcircular.

Avicularium small, dependent, placed on proximal margin of peristome near midline. Avicularian chamber subcircular, undivided by condyles or cross-bar.

MEASUREMENTS

(ho and lo for secondary orifices)

Lz (10) 0.563 (0.066) mm., 0.46–0.65 mm.
ho (10) 0.077 (0.006) mm., 0.07–0.09 mm.
lo (10) 0.080 (0.018) mm., 0.07–0.09 mm.

Discussion: S. rectifurcata was described from the Castle Hayne marl of North Carolina and was reported from the Jacksonian of South Carolina and Florida (Canu and Bassler, 1917, 1920). Canu and Bassler's specimens have slightly larger zooecia (Lz = 0.70 mm.) but are otherwise very similar to the McBean material. Canu and Bassler (1917) erected the genus *Tremotoichos* for this species, separating it from *Semihaswellia* because of the asymmetrical disposition of the ascopores and the lack of avicularia on the reverse side of the zoarium. These seem to be small differences on which to base a monotypic genus.

Occurrence: McBean formation, locality 1.

Family STOMACHETOSELLIDAE Canu and Bassler
Genus METRADOLIUM Canu and Bassler

Metradolium areolatum Cheetham, new species
Plate 2, figure 3

Material: Holotype no. 7159, locality 1, and paratype no. 7160, locality 2, McBean formation.

Diagnosis: Metradolium having small zooecia with well-developed spiramen on both autozooecia and gonozooecia, paired, dissimilar frontal avicularia, gonozooecial secondary orifices smaller than autozooecial secondary orifices, and ovicell with irregular small pores and larger marginal areolae.

Description: Zoarium erect, bilaminar, compressed, with zooecia in longitudinal rows, those in adjacent rows alternating in position.

Zooecia club-shaped, about half as wide as long, separated by faint furrows. Distal margin rounded; proximal margin truncate. Frontal wall very thick, strongly convex, highest at proximal margin of peristome. Frontal surface reticulate, tremocystal, perforated by irregularly elliptical tremopores constituting about 25 percent of surface.

Orifices of autozooecia and gonozooecia alike, hidden at base of long, oblique peristome. Proximal part of peristome very broad, supporting two dependent avicularia with spiramen or, rarely, rimule-spiramen between. Secondary orifice of autozooecia subcircular, greatly inclined distally. Secondary orifice of gonozooecia smaller, semicircular, only slightly inclined.

Avicularia dependent, paired, immersed in proximolateral corners of peristome, of unequal size. Larger avicularium, usually on left, with deep, symmetrical, oval chamber divided by small condyles; rostrum directed laterally. Smaller avicularium with shallow, circular to elliptical chamber; rostrum directed distolaterally.

Ovicell hyperstomial, its length about one-half that of gonozooecium. Outer surface flat, irregularly perforate in central part and areolate around distal margin. Labellum coincides with distal margin or peristome.

MEASUREMENTS

(ho and lo for secondary orifices)

autozooecia

Lz (10) 0.566 (0.043) mm., 0.51–0.65 mm.
lz (10) 0.275 (0.017) mm., 0.26–0.31 mm.
ho (5) 0.126 (0.007) mm., 0.12–0.14 mm.
lo (5) 0.150 (0.014) mm., 0.13–0.16 mm.

gonozooecia

Lov (4) 0.244 (0.015) mm., 0.22–0.26 mm.
ho (4) 0.092 (0.009) mm., 0.09–0.10 mm.
lo (4) 0.128 (0.007) mm., 0.12–0.14 mm.

Discussion: *M. dissimile* Canu and Bassler, from the Castle Hayne marl of North Carolina and Jacksonian deposits in South Carolina and Georgia, is the nearest known relative of *M. areolatum*. The former species has larger zooecia (Lz = 0.74–0.76 mm., lz = 0.40–0.50 mm., according to Canu and Bassler, 1920), gonozooecial secondary orifices crescentic and wider than autozooecial secondary orifices, and finely perforate ovicell lacking areolae. *M. areolatum* may be the ancestor of *M. dissimile*.

The name of this species is derived from the Latin *areolatum*, with small spaces, in reference to the areolate ovicell.

Occurrence: McBean formation, localities 1 and 2.

Genus OCHETOSELLA Canu and Bassler

Ochetosella parva Cheetham, **new species**
Plate 2, figures 6, 7

Material: Holotype no. 7161 and paratypes nos. 7162 and 7163, locality 1, Mc Bean formation.

Diagnosis: *Ochetosella* having small zooecia with relatively thin frontal walls, primary orifices with well-defined sinuses, and oral avicularia almost always present.

Description: Zoarium erect, dichotomously branching, subcircular in cross section, with zooecia arranged in four to eight longitudinal rows, those in adjacent rows alternating in position; orifices open on all faces of zoarium.

Zooecia elongate club-shaped, about half as wide as long, separated by thick, low threads. Distal margin rounded; proximal margin truncate. Frontal wall relatively thin, strongly convex, highest at proximal lip of peristome. Frontal surface pleurocystal, finely granular, perforated by single marginal row of large, subcircular areolae. Interareolar costules lacking.

Orifice strongly inclined distally, oval, more broadly rounded distally, with broad, shallow sinus proximally. Orifice not visible frontally, hidden at base of long, oblique peristome. Secondary orifice inclined, oval, broadly rounded distally, with broad, poorly defined sinus proximally.

Avicularium single, dependent, placed on lateral margin of peristome partly within secondary orifice. Avicularian chamber deep, elongate, curved, with poorly defined rostrum pointing distally. Condyles or cross-bar not apparent.

Ovicell hyperstomial, elongate, not deeply embedded in distal zooecium. Frontal surface not preserved.

MEASUREMENTS

(ho and lo for secondary orifice)

Lz (6) 0.712 (0.028) mm., 0.68–0.76 mm.
lz (6) 0.342 (0.019) mm., 0.32–0.38 mm.
ho (5) 0.159 (0.019) mm., 0.13–0.17 mm.
lo (5) 0.130 (0.028) mm., 0.11–0.15 mm.

Discussion: Canu and Bassler described two species of *Ochetosella* from Eocene deposits in the southeastern United States, *O. jacksonica* in 1917 and *O. robusta* in 1920. The first of these species is common in Claibornian deposits in Alabama and in Jacksonian deposits from Mississippi to South Carolina, whereas the second is known only from the Castle Hayne marl of North Carolina. Inasmuch as *O. robusta* has a tremocystal frontal wall, which excludes it from the genus *Ochetosella*, the genealogy of *O. parva* lies with *O. jacksonica*. The latter species has larger zooecia (Lz = 1.10–1.20 mm., lz = 0.50 mm.), much thicker frontal wall, and less consistently occurring oral avicularia. In addition, Canu and Bassler (1917) described the primary orifice of *O. jacksonica* as "semicircular," although all of the specimens I have examined possess oval orifices (plate 2, figure 8). The small size of the zooecia of *O. parva* might seem to indicate that it is the more primitive species, but its primary orifice is definitely more advanced than that of *O. jacksonica*.

Occurrence: McBean formation, localities 1 and 2.

Family SCHIZOPORELLIDAE Jullien
Genus SCHIZOPORELLA Hincks

Schizoporella mcbeanensis Cheetham, new species

Plate 1, Figure 12

Material: Holotype no. 7164 and paratypes nos. 7165 and 7166, locality 1, McBean formation.

Diagnosis: Schizoporella having bilaminar zoarium, zooecia only one-third as wide as long separated by distinct furrows, very faintly developed peristome, and paired avicularia on lateral margins of orifice.

Description: Zoarium erect, bilaminar, compressed, with zooecia arranged in longitudinal rows, those in adjacent rows alternating in position.

Zooecia elongate rectangular, about one-third as wide as long, separated by distinct furrows. Distal margin rounded; proximal margin straight. Frontal wall gently convex, highest slightly proximal to orifice. Frontal surface tremocystal, finely granular, evenly perforated with irregularly disposed, elliptical tremopores of variable size constituting about 20 percent of surface.

Orifice semicircular; distal margin rounded; proximal margin straight but interrupted medially by narrow, deep, rounded sinus. Peristome rudimentary.

Avicularia small to large, dependent, usually paired, regenerated from tremopores at proximolateral corners of orifice. Paired avicularia commonly of unequal size. Avicularian chamber elliptical, deep, with rostral channel usually prominent and directed distally and medially around lateral margin of orifice. Condyles or crossbar not apparent. Ovicell unknown.

MEASUREMENTS

(ho includes oral sinus)

Lz (4) 0.761 (0.033) mm., 0.72–0.79 mm.
lz (4) 0.270 (0.026) mm., 0.24–0.29 mm.
ho (4) 0.109 (0.005) mm., 0.10–0.11 mm.
lo (4) 0.107 (0.005) mm., 0.10–0.11 mm.

Discussion: Schizoporella linea (Lonsdale), a species very similar to *S. mcbeanensis*, has wider zooecia (lz = 0.45–0.65 mm.), a more prominent peristome, and avicularia directed more obliquely toward the zooecial midline (Canu and Bassler, 1920). *S. linea* is very common in Jacksonian deposits in South Carolina and occurs also in the Castle Hayne marl of North Carolina. It seems probable that *S. mcbeanensis* is ancestral to *S. linea.*

Occurrence: McBean formation, locality 1.

Genus HIPPOPORINA Neviani

Hippoporina vespertilio (Canu and Bassler)
Plate 1, figures 13–15

Hippodiplosia vespertilio CANU AND BASSLER, 1920, U. S. Nat. Mus., Bull. 106, p. 394, pl. 52, figs. 5–12.

Material: Specimens nos. 7167 and 7168, locality 2, McBean formation.

Diagnosis: Hippoporina having relatively small autozooecia with high, narrow orifices and paired oral avicularia, and gonozooecia with smooth ovicells displaying a distal row of large areolae.

Description: Zoarium erect, bilaminar, compressed, with zooecia in longitudinal rows, those in adjacent rows alternating in position.

Zooecia club-shaped, about half as wide as long, separated by distinct furrows. Distal margin rounded; proximal margin truncate. Frontal wall moderately convex, highest near middle of proximodistal axis. Frontal surface reticulate, tremocystal, evenly perforated with irregularly elliptical to polygonal tremopores constituting about 20 percent of surface.

Orifices of autozooecia and gonozooecia alike, elongate-ovate, more broadly rounded distally than proximally, with pair of weakly developed condyles placed close to proximal lip. Secondary orifice elliptical, formed by very wide, salient peristome higher on proximal side.

Avicularia small, dependent, paired, placed on peristome near midpoints of lateral margins of orifice. Avicularian chamber oval, symmetrical, with mandibular condyles in some zooecia; rostrum directed proximally and inward.

Ovicell hyperstomial, globular, its length about one-third that of gonozooecium. Labellum coincident with distal margin of peristome. Outer surface smooth, convex, with row of large areolae around distal margin.

MEASUREMENTS

Lz (10) 0.618 (0.023) mm., 0.58–0.68 mm.
lz (10) 0.314 (0.024) mm., 0.27–0.34 mm.
ho (10) 0.143 (0.009) mm., 0.13–0.16 mm.
lo (10) 0.104 (0.005) mm., 0.09–0.11 mm.
Lov (10) 0.257 (0.011) mm., 0.24–0.27 mm.

Discussion: H. vespertilio was described by Canu and Bassler (1920) from the Castle Hayne marl at Wilmington, North Carolina, and was reported by them from the Jacksonian of South Carolina also. The type specimens exhibit much narrower zoaria than those from the McBean, but there seems to be no constant difference between the collections from the two stratigraphic levels.

H. petiolus (Lonsdale) and *H. falcifera* (Canu and Bassler) are Eocene species of *Hippoporina* that differ from *H. vespertilio* markedly in the form of avicularia and other characters.

Occurrence: McBean formation, localities 1 and 2.

Genus SCHIZOMAVELLA Canu and Bassler

Schizomavella porosa (Canu and Bassler)
Plate 2, figure 5

Metroperiella porosa CANU AND BASSLER, 1920, U. S. Nat. Mus., Bull. 106, p. 362, pl. 47, figs. 7–11.

Material: Specimen no. 7169, locality 1, McBean fm.

Diagnosis: Schizomavella having erect, bilaminar zoarium, zooecia with large tremopores and elongate frontal avicularia, and usually some zooecia with orifices modified to avicularian form.

Description: Zoarium erect, bilaminar, compressed, with zooecia arranged in longitudinal rows, those in adjacent rows alternating in position.

Zooecia rhomboidal, half as wide as long, separated by distinct threads. Distal margin rounded; proximal margin truncated. Frontal wall flat; frontal surface reticulate, tremocystal, perforated by large, irregularly elliptical to polygonal tremopores constituting 40 percent of surface.

Orifice oval, more broadly rounded distally, with pair of small condyles placed just proximal to midlength. Condyles directed inward, proximally, and slightly downward. Peristome very narrow, not raised, indistinct from frontal surface.

Avicularium small, dependent, elongate, placed halfway between proximal and distal margins and halfway between lateral margins of frontal. Avicularian chamber drop-shaped, elongate, symmetrical, divided by cross-bar. Rostrum elongate, directed proximally.

Ovicell not present in material examined.

MEASUREMENTS

Lz (10) 0.612 (0.043) mm., 0.55–0.68 mm.
lz (10) 0.320 (0.031) mm., 0.26–0.38 mm.
ho (10) 0.132 (0.004) mm., 0.13–0.14 mm.
lo (10) 0.126 (0.006) mm., 0.12–0.14 mm.

Discussion: S. porosa was described from the Jacksonian of South Carolina and was reported from the Castle Hayne marl of North Carolina (Canu and Bassler, 1920). It differs from *S. biplanata* (Canu and Bassler) from the Castle Hayne in having more elongate frontal avicularia and larger tremopores. The ovicells and "avicularian" zooecia of *S. porosa* (Canu and Bassler, 1920) have not been observed in the McBean material.

Occurrence: McBean formation, localities 1 and 2.

Family SMITTINIDAE Levinsen
Genus SMITTINA Norman

Smittina denticulifera (Canu and Bassler)
Plate 2, figures 13, 14

Porella denticulifera CANU AND BASSLER, 1920, U. S. Nat. Mus., Bull. 106, p. 485, pl. 63, figs. 1–5.

Material: Specimens nos. 7170 and 7171, locality 1, McBean formation.

Diagnosis: Smittina having bilaminar compressed zoarium, few, large tremopores, salient avicularian umbo, and avicularium with denticulate oral end.

Description: Zoarium erect, bilaminar, compressed, branching; zooecia arranged in longitudinal rows, those in adjacent rows alternating in position. Few nonoriented, cumulate zooecia present on some fragments.

Zooecia irregularly rhombic to rhomboidal, about three-fourths as wide as long, separated by inconspicuous grooves or threads. Frontal wall thick, convex, highest at avicularian umbo. Frontal surface smooth, tremocystal, perforated with large, irregularly elliptical tremopores making up about 30 percent of surface. Some tremopores project above frontal surface as short tubules.

Orifice semicircular, just visible at base of peristome, broadly rounded distally, straight proximally, with small, pointed lyrule at midline of proximal margin. Peristome broad, not salient, developed by frontal thickening around orifice.

Avicularium dependent, of variable size, placed on umbo at midline of proximal margin of secondary orifice partly obscuring lyrule. Avicularian umbo very salient, ornamented with tremopores except at tip. Avicularian chamber oval, with pivotal bar and rounded rostrum. Chamber placed nearly perpendicularly to frontal surface. Rostrum coincides with tip of umbo. Oral end of avicularium sometimes denticulate.

Ovicell hyperstomial, small, elongate-globular; distal margin and labellum evenly rounded. Surface ornamented with numerous, irregular, scattered, small pores.

MEASUREMENTS

Lz (10) 0.458 (0.072) mm., 0.38–0.62 mm.
lz (10) 0.238 (0.024) mm., 0.19–0.26 mm.
ho (10) 0.103 (0.007) mm., 0.09–0.11 mm.
lo (10) 0.115 (0.005) mm., 0.11–0.12 mm.

Discussion: This species was described from the Gosport sand (Claibornian) of Alabama and was listed from the lower Jacksonian of Mississippi (Canu and Bassler, 1920). It differs from the more common Jacksonian species, *S. jacksonica* (Canu and Bassler,) chiefly in having larger, less numerous tremopores and a denticulate avicularium. The McBean specimens of *S. denticulifera* are somewhat smaller than those studied by Canu and Bassler.

Occurrence: McBean formation, localities 1 and 2.

Genus PLAGIOSMITTIA Canu and Bassler

Plagiosmittia porelloides Canu and Bassler
Plate 2, figures 4, 9, 10

Plagiosmittia porelloides CANU AND BASSLER, 1920, U. S. Nat. Mus., Bull. 106, p. 472, pl. 61, figs. 14–18.

Material: Specimens nos. 7172, 7173, and 7174, locality 1, McBean formation.

Diagnosis: Plagiosmittia having relatively small zooecia with small, oral avicularium displaced only slightly from midline of peristome.

Description: Zoarium erect, bilaminar, compressed, with zooecia in longitudinal rows, those in adjacent rows alternating in position.

Zooecia elongate club-shaped, about one-third as wide as long, separated by very faint furrows. Distal margin rounded; proximal margin truncate. Frontal wall barely convex. Frontal surface reticulate, tremocystal, evenly perforated with irregular tremopores constituting 25 to 40 percent of surface.

Orifices of autozooecia and gonozooecia alike, oval, more broadly rounded distally than proximally, with pair of stout condyles near proximal margin. Orifice not visible from exterior, hidden at base of deep peristome. Secondary orifice asymmetrically oval, defined by thin, little protuberant peristome supporting asymmetrically disposed avicularium on proximal lip.

Avicularium small, dependent, placed on, and partly within, peristome to right or, more commonly, to left of midpoint of proximal lip of secondary orifice. Avicularian chamber oval, asymmetrical, undivided by condyles or cross-bar.

Ovicell hyperstomial, globular, its length about one-third that of gonozooecium. Interior of ovicell opens into peristome at base of lamina formed by descending labellum. Outer surface of ovicell not preserved.

MEASUREMENTS

Lz (10) 0.515 (0.080) mm., 0.41–0.65 mm.
lz (10) 0.186 (0.030) mm., 0.14–0.24 mm.
ho (10) 0.084 (0.004) mm., 0.08–0.09 mm.
lo (5) 0.089 (0.004) mm., 0.08–0.09 mm.
Lov (7) 0.142 (0.011) mm., 0.03–0.15 mm.

Discussion: P. porelloides was described from the Castle Hayne marl of North Carolina and was reported from the Jacksonian of South Carolina (Canu and Bassler, 1920). It differs from *P. regularis* Canu and Bassler, a widespread Jacksonian species, in having smaller zooecia and in having the oral avicularium nearer the midline of the proximal lip of the peristome.

Occurrence: McBean formation, localities 1 and 2.

Family CHEILOPORINIDAE Bassler
Genus CHEILOPORINA Canu and Bassler

Cheiloporina anderseni Cheetham, new species
Plate 2, figures 11, 12

Material: Holotype no. 7175 and paratypes nos. 7176 and 7177, locality 2, McBean formation.

Diagnosis: Cheiloporina having bilaminar zoarium, relatively small autozooecia, subcircular orifices, avicularia with cross-bars, and ovicells with slit-like pores arranged in distally diverging lines.

Description: Zoarium erect, bilaminar, compressed, with zooecia arranged in longitudinal rows, those in adjacent rows alternating in position.

Zooecia rhombic, nearly equilateral, about three-fourths as wide as long, separated by slightly raised threads. Frontal wall very gently convex, highest just proximal to orifice. Frontal surface tremocystal, smooth, evenly perforated with large, irregularly elliptical, funnel-shaped tremopores constituting about 30 percent of surface.

Orifice of autozooecia subcircular, more broadly rounded distally than proximally, with pair of stout condyles

PLATE 1

All figures, except 16, are magnified × 65.

1 *Hincksina ocalensis* Canu and Bassler
Four zooecia, one ovicelled, specimen no. 7143, locality 1.

2 *Membraniporidra* sp.
Five zooecia, one abortive, specimen no. 7144, locality 1.

3 *Floridina asymmetrica* Canu and Bassler
Three zooecia, one onychocellarium, specimen no. 7145, locality 1.

4, 5 *Nellia tenella* (Lamarck)
4, internode showing parts of eight zooecia, specimen no. 7150; 5, internode showing parts of seven zooecia, two ovicelled, specimen no. 7151; locality 1.

6 *Oligotresium howei* Cheetham, n. sp.
Seven zooecia, one heterozooecium, three vibracularia, holotype no. 7147, locality 1.

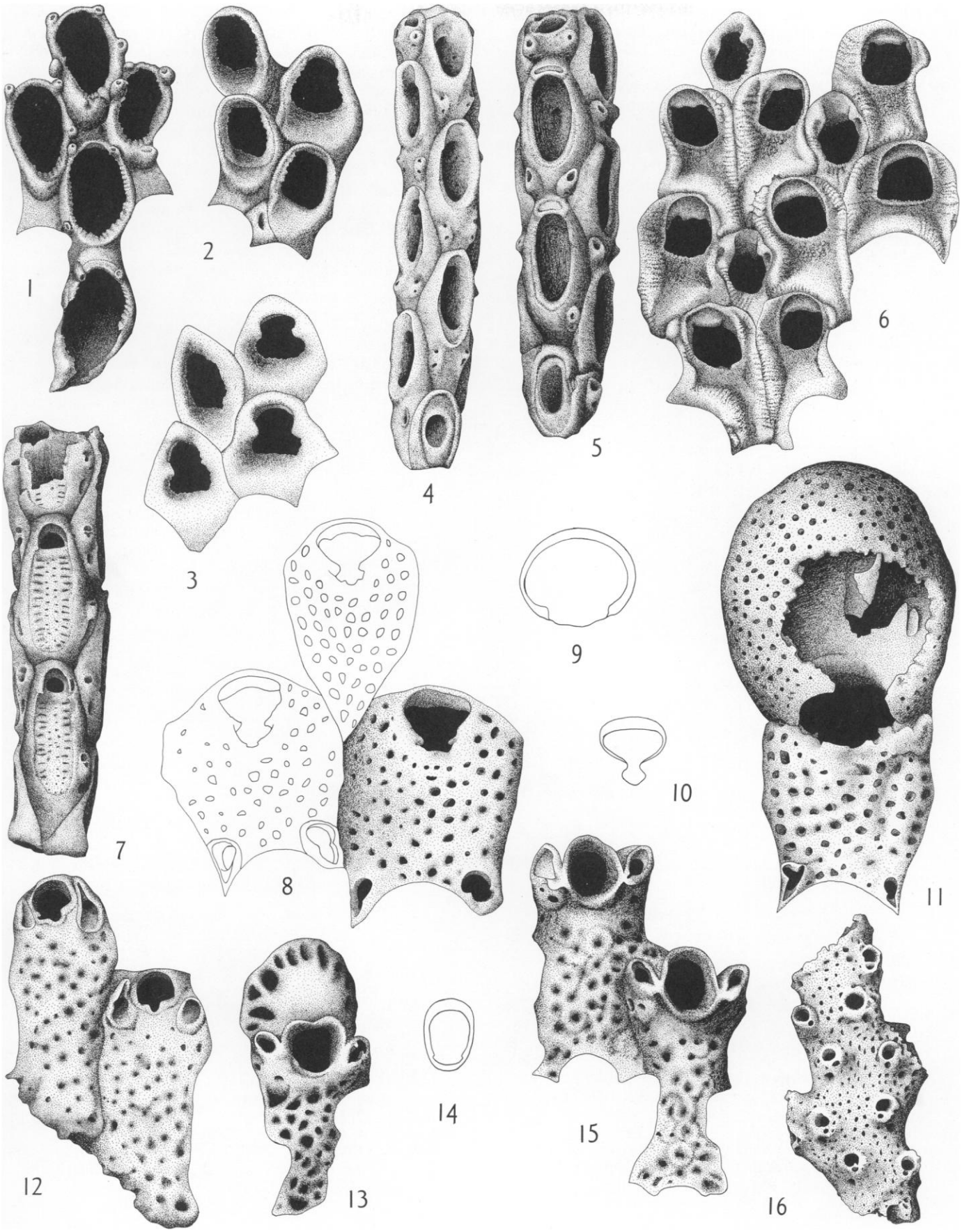
7 *Rimosocella laciniosa* (Canu and Bassler)
Internode showing parts of three zooecia, specimen no. 7146, locality 1.

8–11 *Hippopodina stephensi* Cheetham, n. sp.
8, three zooecia; 9, outline of orifice of ovicelled zooecium; 10, outline of orifice of zooecium; 11, ovicelled zooecium; holotype no. 7152, locality 1.

12 *Schizoporella mcbeanensis* Cheetham, n. sp.
Two zooecia, holotype no. 7164, locality 1.

13–15 *Hippoporina vespertilio* (Canu and Bassler)
13, ovicelled zooecium, specimen no. 7167; 14, outline of orifice of zooecium, specimen no. 7168; 15, two zooecia, specimen no. 7168; locality 2.

16 *Semihaswellia rectifurcata* (Canu and Bassler)
Zoarial fragment showing parts of 10 zooecia, specimen no. 7158, locality 1, × 33.



slightly nearer proximal lip. Condyles directed inward, proximally, and slightly downward. Peristome narrow, slightly raised distally, broader and lower proximally. Orifice of gonozooecia elliptical, greatly widened and slightly heightened; condyles well-developed but spread far apart.

Avicularia small, dependent, paired, placed in lateral corners of frontal of each zooecium just proximal to orifice. Avicularian chamber circular, with cross-bar approximately parallel to proximodistal axis of zooecium.

Ovicell endozooecial, only slightly convex, its length about half that of gonozooecium. Distal margin Gothic-arch-shaped; labellum rounded, marked by distinct rim. Outer surface ornamented with closely-spaced, slit-like pores arranged in lines diverging distally from labellum.

MEASUREMENTS

autozooecia
Lz (10) 0.838 (0.103) mm., 0.72–1.03 mm.
lz (10) 0.501 (0.040) mm., 0.45–0.56 mm.
ho (10) 0.184 (0.011) mm., 0.17–0.20 mm.
lo (10) 0.170 (0.009) mm., 0.15–0.19 mm.
gonozooecia
Lov (3) 0.376 (0.034) mm., 0.34–0.41 mm.
ho (2) 0.222 (0.036) mm., 0.20–0.25 mm.
lo (2) 0.278 (0.006) mm., 0.27–0.28 mm.

Discussion: Canu and Bassler (1920) described five species of *Cheiloporina* from the Castle Hayne marl of North Carolina and two additional species from Jacksonian deposits in South Carolina. Several of these occur also in the Ocala group of southwestern Georgia and northwestern Florida. Among the known species of *Cheiloporina*, *C. transversa* (Canu and Bassler) from the Castle Hayne is closest to *C. anderseni* in shape and arrangement of zooecia and form of avicularia and ovicells but differs markedly from the latter species in size of zooecia (Lz = 1.00 mm., lz = 0.70–0.90 mm., according to Canu and Bassler, 1920) and in shape of orifices of both autozooecia and gonozooecia. Moreover, the ornamentation of the ovicell in *C. anderseni* is unique for the genus.

This species is named in honor of Dr. H. V. Andersen.

Occurrence: McBean formation, localities 1 and 2.

Family PHYLACTELLIDAE Canu and Bassler
Genus PERIGASTRELLA Canu and Bassler

Perigastrella sp.
Plate 2, figure 15

Material: Specimen no. 7178, locality 2, McBean fm.

Discussion: Only one specimen, consisting of three broken zooecia, of *Perigastrella* has been recovered from the McBean material. The zooecia are small (Lz = 0.43 mm., lz = 0.43 mm.) but otherwise rather like those of *P. hexagonalis* Canu and Bassler, a species from the Castle Hayne marl of North Carolina (Canu and Bassler, 1920). Because of the broken nature of this

PLATE 2

All figures, except 7, are magnified × 65

1, 2 *Hippopleurifera mcbeanensis* Cheetham, n. sp.
1, ovicelled zooecium, paratype no. 7157, locality 2; 2, parts of four zooecia, holotype no. 7155, locality 1.

3 *Metradolium areolatum* Cheetham, n. sp.
Four zooecia, two ovicelled, holotype no. 7159, locality 1.

4, 9, 10 *Plagiosmittia porelloides* Canu and Bassler
4, two ovicelled zooecia, specimen no. 7172; 9, interior of zooecium, specimen no. 7173; 10, four zooecia, specimen no. 7174; locality 1.

5 *Schizomavella porosa* (Canu and Bassler)
Three zooecia, specimen no. 7169, locality 1.

6, 7 *Ochetosella parva* Cheetham, n. sp.
6, outline of primary orifice; 7, zoarial fragment showing parts of six zooecia (× 33); holotype no. 7161, locality 1.

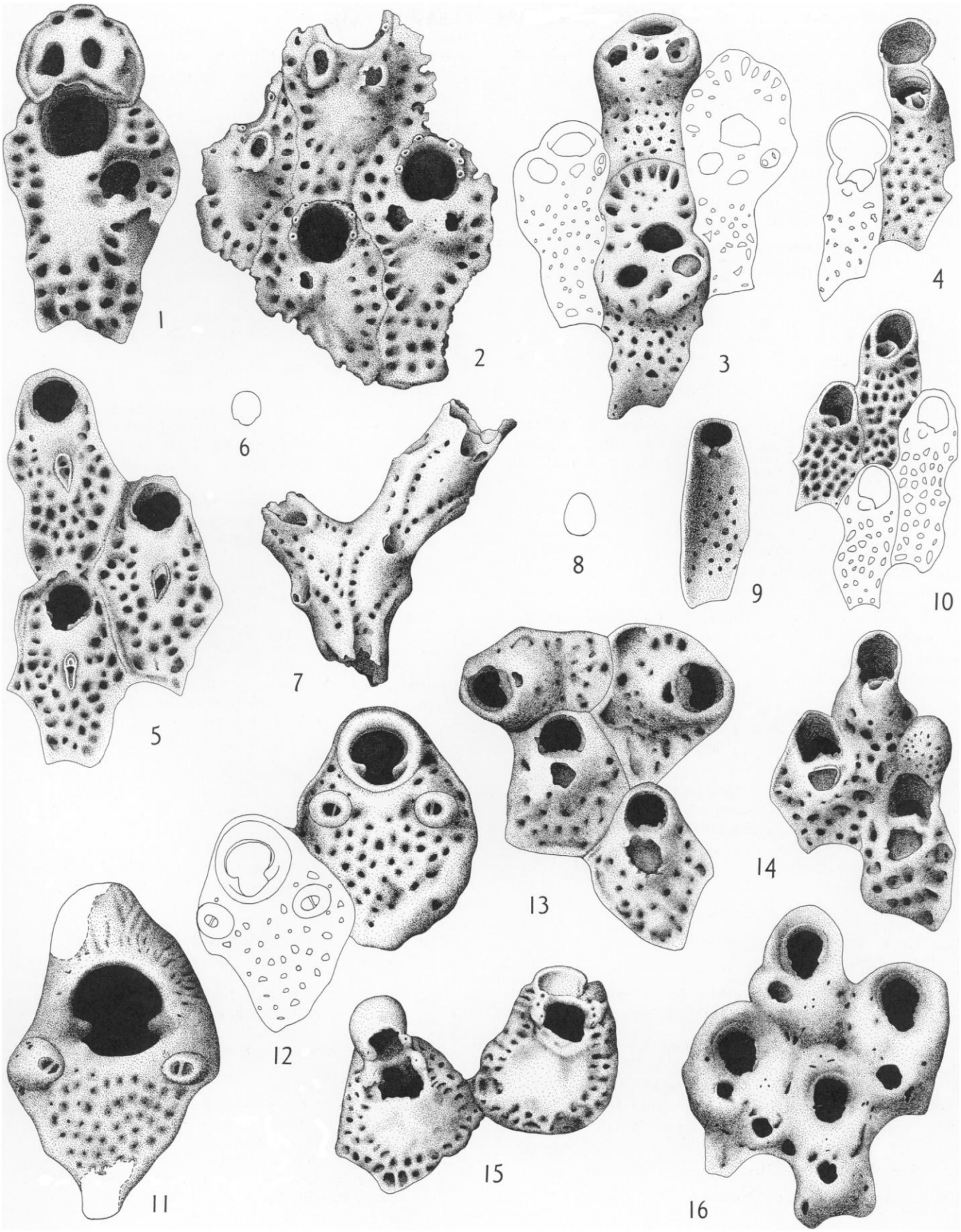
8 *Ochetosella jacksonica* Canu and Bassler
Outline of primary orifice, specimen no. 7183, Moodys marl, upper Eocene, Claiborne Bluff, Alabama River, Monroe County, Alabama.

11, 12 *Cheiloporina anderseni* Cheetham, n. sp.
11, ovicelled zooecium, paratype no. 7176; 12, two zooecia, holotype no. 7175; locality 2.

13, 14 *Smittina denticulifera* (Canu and Bassler)
13, four zooecia, including two non-oriented zooecia, specimen no. 7170; 14, three zooecia, one ovicelled, specimen no. 7171; locality 1.

15 *Perigastrella* sp.
Two zooecia, both ovicelled, specimen no. 7178, locality 2.

16 *Kleidionella mcbeanensis* Cheetham, n. sp.
Three oriented zooecia, holotype no. 7179, locality 1.



material, especially inasmuch as the features of the orifice are not clearly preserved, it seems advisable to leave the species *nomen apertum* until additional material is recovered.

Occurrence: McBean formation, locality 2.

Family CELLEPORIDAE Busk
Genus KLEIDIONELLA Canu and Bassler

Kleidionella mcbeanensis Cheetham, new species
Plate 2, figure 16

Material: Holotype no. 7179 and paratype no. 7180, locality 1; paratypes nos. 7181 and 7182, locality 2, McBean formation.

Diagnosis: Kleidionella having few cumulate zooecia, small oriented zooecia with one or two frontal avicularia, and orifice with condyles. Interzooecial avicularia lacking.

Description: Zoarium erect, bilaminar, compressed, branching, forming large, flabellate fronds; zooecia arranged in longitudinal rows, those in adjacent rows alternating in position. Few non-oriented, cumulate zooecia present on larger fragments.

Zooecia rhombic to club-shaped, about three-fourths as wide as long, separated by shallow, indistinct grooves. Frontal surface smooth, olocystal, irregularly perforated with few, scattered, minute pores on general surface and few larger areolae at margins.

Orifice oval, broadly rounded distally, narrowly rounded proximally, with pair of weakly developed condyles slightly nearer proximal margin. Condyles directed inward and proximally.

Dependent avicularia variable in position and development, either one or two occurring on each zooecial frontal. Some zooecia possess a lateral oral avicularium at proximolateral border of orifice on either right or left side; others have a proximal avicularium on midline of proximal margin of zooecium; still others display both oral and proximal avicularia. Avicularian chamber circular to elliptical, without rostrum or cross-bar. Interzooecial avicularia lacking. Ovicell unknown.

MEASUREMENTS

Lz (10) 0.441 (0.031) mm., 0.41–0.51 mm.
lz (10) 0.274 (0.024) mm., 0.24–0.30 mm.
ho (10) 0.137 (0.011) mm., 0.12–0.15 mm.
lo (10) 0.112 (0.006) mm., 0.10–0.12 mm.

Discussion: This species differs from *Kleidionella lobata* Canu and Bassler, its nearest relative, in having only one or two frontal avicularia, in lacking interzooecial avicularia, and in having oral condyles. *K. lobata* occurs in the Castle Hayne marl of North Carolina and in Jacksonian deposits in South Carolina and Georgia (Canu and Bassler, 1920).

Occurrence: McBean formation, localities 1 and 2.

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