

names many of which are undoubtedly synonyms and needs review. The gemmate *Sinistrella* Meyer (1887, p. 18), with two species, from the S. E. United States Eocene is also turrinine, having the sinus on the periphery. A left-handed species known only as *Pleurotoma sinistralis* (Petit, 1839, pl. 1) from the Senegal coast has a rather pupoid shell outline, the sinus near the periphery, and no axials. It was figured by Reeve (1843, pl. 10, sp. 81) and Tryon repeated Reeve's illustration (1884, pl. 13, fig. 64). The figure is poor but nevertheless differs from Petit's in showing what appears to be a beaded subsutural cord. Perhaps two species are involved. The species should be investigated. Reeve's illustration of Hind's *Conopleura striata* (1846, pl. 36, sp. 330a), unnecessarily renamed *partita*, is sinistral but in error. The species is dextral. Reeve makes no mention of the shell being sinistral and his other figure (sp. 330b) is dextral. Tryon (1884, pl. 8, fig. 7) continues the error, commenting that "one of Reeve's figures shows a reversed shell, a rarity in this genus". He recognizes Reeve's name as unnecessary.

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A NEW SPECIES OF *CATINELLA* (SUCCINEIDAE): PULMONATA FROM SOUTHERN MICHIGAN

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ABSTRACT

A new species of Catinella (Succineidae) with its shell characteristics, reproductive organs, pigmentation and habitat is described. It is known only from the type locality, Long Lake, Cass County, Michigan.

In the course of field studies on succineid gastropods in the midwestern states I found a

small, slender, hitherto undescribed species of *Catinella*.

***Catinella protracta* n. sp.**

(Figs. 1 and 2)

Description of holotype: Shell: (Fig. 1, A, B) Amber-colored, translucent, shining, imperforate, slender, elongate, composed of $3\frac{1}{4}$ inflated, tightly twisted whorls separated by a sharply incised suture; height 7.8 mm, width 4.2 mm. A knoblike nuclear whorl tops the turreted spire; whorls increase rapidly in size resulting in a tumid ultimate whorl. Ovate aperture equals about six-tenths of height of shell (Table 1). Sharply edged peristome very fragile. Very slender, amber columella follows inner border of peristome, curves as it disappears into the ultimate whorl (Fig. 1 B). Nuclear whorl finely wrinkled and pitted. Remainder of shell surface finely striated resulting in a shining appearance.

Body and Mantle Surfaces: Surface of head and body white, irregularly tuberculate. Superior (posterior) tentacles finely tuberculate. Pigmentation lacking from tentacles, dorsal and lateral surfaces of body. Genital aperture crescent-shaped, about 0.7 mm in length, situated on anterior right-hand side of body. On either side of body a pedal groove, continuous from labial palp to posterior tip of body, separates foot from lateral body wall; a suprapedal groove parallels the pedal groove. Shallow, vertical grooves incise the pedal and suprapedal grooves. These vertical grooves produce shallow scallops along the margin of foot and along the body wall especially when the animal is in a somewhat contracted state. Sole of foot white and unpig-

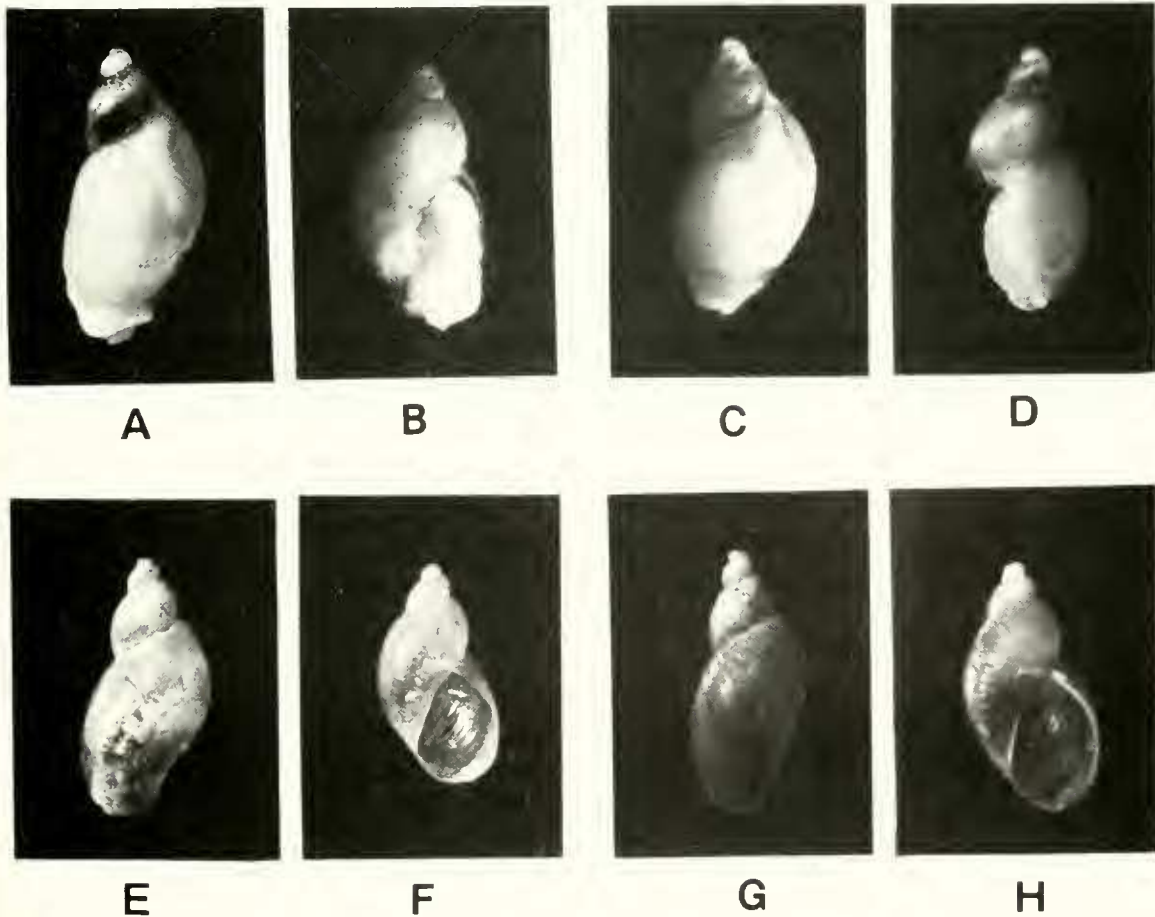


FIG. 1. A, B, *Holotype of Catinella protracta* n. sp. (Height 7.8 mm); *Paratypes of Catinella protracta* n. sp.: C, D (Height, 7.5 mm); E (Height, 9.1 mm); F (Height, 7.2 mm); G, H (Height, 7.0 mm).

TABLE 1. Dimensions of shells of *Catimella protracta* n. sp. The measurements are of the ten largest shells of each of the two series. In the 4th column of measurements are listed the ratios of the width of the shell over its height. In the last 3 columns are listed the ratios of the height of the aperture over the height of the shell, width of aperture over width of shell, width of aperture over height of aperture.

	No. of Whorls	Height	Width	Width/Height	Height of Aperture	Width of Aperture	H. Ap./H. Shell	W. Ap./W. Shell	W. Ap./H. Ap.
Holotype	3 1/4	7.8 mm	4.2 mm	.538	4.7 mm	3.1 mm	.602	.738	.659
Type Locality	3 1/4	9.1	5.1	.560	6.0	3.8	.659	.745	.633
Field #D.S.F.-359	3 1/2	8.0	4.2	.525	4.6	3.2	.575	.761	.695
Long Lake	3 1/2	8.0	4.0	.500	4.5	2.8	.562	.700	.622
Cass Co., Michigan	3 1/4	7.8	4.4	.564	4.8	3.0	.615	.681	.625
July 15, 1975	3 1/4	7.7	4.0	.519	4.2	2.8	.545	.700	.666
	3 1/4	7.6	4.9	.644	4.5	3.1	.592	.632	.688
	3 1/4	7.5	4.0	.533	4.7	3.0	.626	.750	.638
	3 1/4	7.5	4.2	.560	4.5	3.1	.600	.738	.688
	3 1/4	7.4	4.1	.554	4.2	2.9	.567	.707	.690
Range (59 shells)	3-	5.7-	3.2-	.50-	3.5-	2.2-	.542-	.632-	.560-
	3 1/2	9.1	5.1	.666	6.0	3.8	.701	.794	.731
Median		6.7	3.8	.552	4.1	2.7	.611	.702	.65
Field #359	3 1/2	8.0 mm	4.4 mm	.550	4.6 mm	3.0 mm	.575	.681	.652
Long Lake	3 1/4	7.8	4.2	.538	4.4	3.0	.564	.714	.681
Cass Co., Michigan	3 1/4	7.8	4.6	.589	5.5	3.2	.705	.695	.581
July 14, 1967	3 1/4	7.5	4.0	.533	4.5	3.0	.600	.750	.666
	3 1/4	7.5	4.2	.560	4.5	3.1	.600	.738	.688
	3 1/2	7.4	4.2	.567	4.3	3.0	.581	.714	.697
	3 1/4	7.2	3.9	.541	4.4	2.7	.611	.692	.613
	3 1/4	7.1	4.0	.563	4.7	3.0	.661	.750	.638
	3 1/4	7.1	3.8	.535	4.0	2.5	.563	.657	.625
	3 1/4	7.0	4.0	.571	4.5	2.9	.642	.725	.644
Range (33 shells)	3-	5.4-	3.2-	.492-	3.5-	2.4-	.563-	.648-	.581-
	3 1/2	8.0	4.6	.615	5.5	3.2	.705	.843	.714
Median		6.7	3.8	.565	4.1	2.8	.611	.714	.658

mented. Mantle collar and transparent mantle are unpigmented.

Colors of some of the viscera seen through the mantle and translucent shell: the elongate crescent-shaped, light golden nephridium; the slightly darker golden digestive gland; an irregularly-shaped, netted, brown band located on the body along the anterior and posterior borders of the second body whorl.

Holotype: Catalogue No. FMNH 205821. Paratypes No. FMNH 205822, Molluscan Collection, Field Museum of Natural History, Chicago, Illinois. Additional paratypes in the private collection of the author.

Description of Paratypes: Shell; (Fig. 1, C, D, E, F, G, H) Shells of mature snails attaining a height of 9.1 mm are comprised of 3 - 3½ inflated whorls. Dimensions of the ten largest shells of the two series included in this study, number of shells measured and the median of each series measured are recorded in Table 1. Of the ten largest shells of the two series the range of height is 7.0 - 9.1 mm; the range of the width is 3.8 - 5.1 mm; the largest apertures occupy from 54.5 to 70.5 percent of entire height of shell; the median of width/height are: 1967, .565, of 1975, .552. Other dimensions and relative dimensions are also to be noted.

A SEM photograph of a nuclear whorl (Fig. 2) shows the surface to be finely wrinkled and pitted. Granules of sand and/or soil are frequently adherent to the shell.

Body, mantle and viscera: The white body, mantle collar and mantle are usually unpigmented. On some individuals scattered black flecks occur on body wall, mantle collar, mantle and sole of foot. Occasionally part of edge of sole of foot is tinted with black pigment. There is an absence of patterns of pigmentation as observed in other species of *Catinella*: *C. parallela* Franzen (Franzen, 1979, p. 64); *C. vagans* (Pilsbry) and *C. waccamawensis* Franzen (Franzen, 1981, pp. 118, 121). The transparent membrane of the floor of the mantle cavity is sometimes pigmented with small brown flecks. A broad, irregularly shaped, netted, brown band is located on the body along the posterior and anterior borders of the second body whorl; the anterior (lower) band is frequently the larger of



FIG. 2. Scanning-electron-photomicrograph of the nuclear whorl of *Catinella protracta* n. sp.

the two. Color of viscera (seen through mantle and shell): the elongate, crescent-shaped, cream or light to darker golden colored nephridium is not outlined by a band of pigment characteristic of other species of *Catinella*; the digestive gland varies from a cream color to a golden brown; the gut twines around lobes of the digestive gland.

Reproductive System: (Fig. 3) The albumin gland (AG) triangular, composed of fine acini, enclosed within a thin, transparent, unpigmented sheath, seminal vesicle (SV) elongate, subequally bilobed, enclosed within a thin sheath

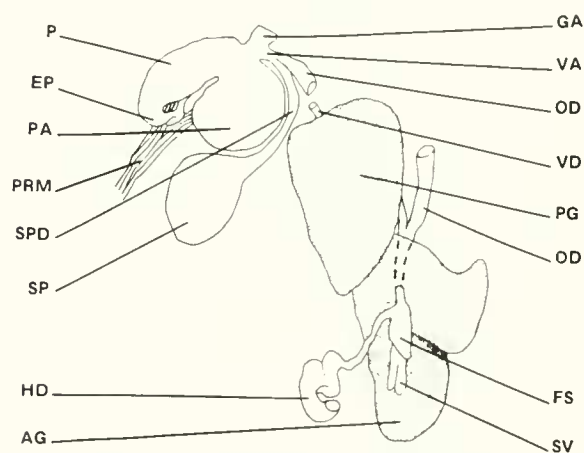


FIG. 3. Reproductive organs of *Catinella protracta* n. sp. P, penis; EP, epiphallus; PA, penial appendage; PRM, penial retractor muscle; SPD, spermathecal duct; SP, spermatheca; HD, hermaphroditic duct; AG, albumin gland; GA, genital atrium; VA, vagina; OD, oviduct; VD, vas deferens; PG, prostate gland; FS, fertilization sac; SV, seminal vesicle.

sparingly pigmented with brown flecks. The hermaphroditic duct (HD), sparsely pigmented with brown flecks, and the seminal vesicle join to form the fertilization sac (FS) from which a duct divides to form the convoluted oviduct (OD) which leads to the vagina (VA) and the sperm duct (SD) which leads into the prostate gland (PG). The oval prostate gland (PG), enclosed within a thin, transparent, unpigmented sheath, is composed of small acini slightly larger than those of the albumin gland. As the vas deferens approaches the penis (P) from the prostate gland it follows the penis along its dorsal surface and enlarges to form the epiphallus (EP) which enters the distal end of the unsheathed penis. The penis enlarges immediately into an elongate cylindrical form. The penial appendage (PA) is spherical; its base less than half the length of the penis; the vertical dimension is almost twice the body of the penis. Penial retractor muscle (PRM) is broad; its fibers insert onto the epiphallus, penis and penial appendage.

The globular spermatheca (SP) is connected to the vagina by an elongate, slender, spermathecal duct (SPD). The short vagina (VA) expands as it enters into the genital atrium (GA).

Radula and Jaw: Radulae of three paratypes were mounted and stained. The number of rows of teeth occurring on the radulae examined range from 93 to 95. There are few teeth on the anterior-most rows; the number increases rapidly posteriorly. The number of marginals and laterals of representative rows of those radulae are recorded in Table 2.

The characteristics of the teeth of *Catinella protracta* n. sp. are described as follows and illustrated in Fig. 4A. The central tooth (C) bears a broad, long basal plate having a posterior serrated margin flanked on either side by a rounded boss. The pointed mesocone extends downward to about the lower fourth or beyond the basal plate. A short, pointed ectocone flanks the mesocone on either side. The laterals (2-L-L, 5-L-L) have a pointed mesocone varying in length from a short structure (probably worn) to many extending downward to the posterior margin of the basal plate. The mesocone is flanked medially by a small, pointed endocone and laterally by a larger, undivided, pointed ec-

TABLE 2. Formulae of representative rows of teeth of *Catinella protracta* n. sp. from two specimens, field no. 359, Long Lake, Cass County, Michigan.

Slide	No. of Rows of Teeth	Row	M	L	C	L	M
A	95	20	7	- 9	- 1	- 7	- 6
		30	8	- 9	- 1	- 8	- 7
		50	9	- 8	- 1	- 8	- 8
		55	8	- 9	- 1	- 8	- 8
		60	9	- 8	- 1	- 8	- 8
		66	9	- 8	- 1	- 8	- 8
8	93	30	9	- 9	- 1	- 8	- 10
		31	10	- 8	- 1	- 9	- 9
		35	10	- 8	- 1	- 8	- 10
		40	9	- 9	- 1	- 9	- 9
		45	9	- 8	- 1	- 9	- 9
		50	9	- 9	- 1	- 9	- 9
		59	9	- 9	- 1	- 9	- 9
		70	10	- 8	- 1	- 9	- 9

tocone. The basal plate of the outermost laterals is shorter than of the more medial laterals. The marginals (1-L-M, 4-L-M, 6-L-M) smaller than the laterals have a short basal plate which is broader than long, especially true of the outermost marginals. The small endocone is pointed. The larger, pointed mesocone extends to or beyond the posterior margin of the basal plate. The ectocone of the inner-most marginals is divided into two, that of the outermost into

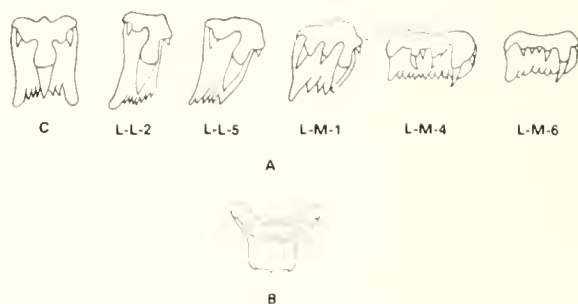


FIG. 4. A: Representative radula teeth of *Catinella protracta* n. sp. C, central tooth; L-L-2, 2nd left lateral; L-L-5, 5th left lateral; L-M-1, 1st left marginal; L-M-4, 4th left marginal; L-M-6, 6th left marginal. B: A jaw of *Catinella protracta* n. sp.

three, four or five cusps. The distinction between the laterals and marginals is not always clear because a tooth with a relatively short basal plate whose ectocone is divided into two cusps may be flanked on either side by one whose ectocone is undivided, or a tooth with a relatively long basal plate may have an ectocone divided into two cusps.

The structural details of the teeth of *Catinella protracta* n. sp. compare with those of the species of the genus, namely (1) the ratio of the laterals to the marginals approximates 1:1 and (2) the short basal plate of the marginals is broader than long. Such features of the genus were noted by Quick to be true of *Catinella (Succinea) arenaria* ("B.-Ch.") (Quick, 1933, Fig. 4, p. 296) and by Franzen of *C. parallela* Franzen (Franzen, 1979, p. 66, Table 2; p. 67, Fig. 3A); of *C. vagans* (Pilsbry) Franzen, 1981, p. 120, Table 2 and Fig. 3; of *C. waccamawensis* Franzen (ibid, p. 122, Table 4; p. 123, Fig. 6A).

The jaw (Fig. 4B) is amber colored. Anteriorly the collar has a median, bluntly pointed fold. The median indentation of posterior edge of collar is flanked on either side by a lesser indentation.

Geographic Distribution and Habitat: *Catinella protracta* n. sp. known only from type locality. Type locality: Field No. D.S.F. 359; Long Lake, Cass County, Michigan, Sunset Boulevard, 0.4 mi S of U.S. Hwy 12, west shore of north end of lake. The locality, an unimproved portion of the shore. Just beyond the collecting site a point of land extended into the lake. July 14, 1967: *C. protracta* n. sp. found living on and under boards of a broken dock and on wet ground at base of and among roots of sedges and reeds. The area, unshaded. July 15, 1975: *C. protracta* n. sp. was living on wet (soggy) ground under matting of dead sedges as was, also, *Oxyloma retusa* (Lea).

Distinctive Features: Shell: Comprised of 3-3½ inflated, tightly coiled, sharply incised whorls, attaining a height of 9.1 mm; spire elongate. As shown in Table 3 comparisons of ratios of height of aperture to height of shell of three species of *Catinella* verify that the shell of *C. protracta* n. sp. is comparatively narrower and the spire relatively longer. Comparative data

TABLE 3. Comparisons of ratios of shell dimensions of four species of *Catinella*.

	Width Height		H. of Aperture H. of shell	
	Range	Median	Range	Median
<i>C. protracta</i> n. sp.	.50 - .66	.552	.542 - .701	.611
	.492 - .615	.565	.563 - .705	.611
<i>C. waccamawensis</i> Franzen	.58 - .68	.647	.655 - .75	.69
<i>C. vagans</i> (Pilsbry)	.567 - .663	.619	.726 - .797	.766
	.585 - .679	.632	.720 - .819	.777
<i>C. parallela</i> Franzen	.56 - .62	.59	.66 - .72	.67
	.53 - .628	.573	.623 - .711	.67
	.49 - .64	.59	.56 - .70	.64
	.474 - .643	.597	.528 - .658	.577
	.518 - .645	.60	.606 - .711	.653

taken from Franzen, 1979, p. 65; 1981, pp. 118, 121.

The specific name *protracta* refers to the comparatively narrower and relatively longer or protracted spire as noted above.

Pigmentation: A pattern of pigmentation on the mantle, head, dorsal and lateral body surface lacking which is in contrast to characteristic patterns of other species of *Catinella* noted by Franzen: *C. parallela* Franzen (Franzen, 1979, p. 64); *C. vagans* (Pilsbry) and *C. waccamawensis* Franzen (Franzen, 1981, pp. 118, 121). Sometimes scattered flecks of black pigment are present on head, body and sole of foot. The nephridium not outlined by a black band such as noted to be present in the above listed species.

Pigmentation of the sheath covering seminal vesicles, fertilization sac, and oviduct are lightly pigmented with brown flecks. A broad, irregularly-shaped, netted brown band is located on the body along the posterior and anterior borders of the second body whorl. The conspicuous band is seen through the shell.

Reproductive System: Prostate gland equal in size to, or larger than, albumin gland. Seminal vesicles elongate, bilobed, subequal in length. Penial appendage large, inflated, spherical.

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NEW RECORDS OF INDO-PACIFIC MOLLUSCA FROM COCOS ISLAND, COSTA RICA

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In April of this year, Captain Richard Callaway, of Balboa, Panama, and I spent 6½ days SCUBA diving for mollusks at Cocos Island, approximately 300 miles south by southwest of Puntarenas, Costa Rica. Dives were made from the *Victoria*, an 82 foot motor-schooner based at Puntarenas, Costa Rica.

On my return to the Costa Rican mainland, I met Dr. Michel Montoya, who has a paper in press titled, "Los Moluscos de la Isla del Coco, Costa Rica. Lista Anotada de Especies."

His paper is a complete literature review listing 16 species of bivalves, 89 gastropods, 4 chitons, and 9 cephalopods. No scaphopods or nudibranchs have been reported from the island. This is a total of only 118 species.

Dr. Montoya, who also spent 6½ days diving at Cocos Island, in June, and I, are now preparing our own check-list which will add approximately 100 additional molluscan species to the known Cocos Island marine fauna.

The new Indo-Pacific records that we found at Cocos Island are:

Viriola abbotti (Baker and Spicer, 1935)

Scalenostoma subulata (Broderip, 1832)

Cypraea (n. sp.) Burgess, 1983—in press (Venus)

Charonia tritonis (Linnaeus, 1758)

Favartia garretti (Pease, 1868)

Persicula pulchella (Kiener, 1834)

Spondylus nicobaricus Schreiber, 1793. (Syn: *S. histrix* Röding, 1798)

Viriola abbotti was described from Samoa, and has recently been reported living in Hawaii. A single dead specimen was found.

Scalenostoma subulata has, according to Warén, 18 synonyms. It has been reported in all tropical seas except for the eastern Pacific.

A single live specimen of *Charonia tritonis* was taken at 40 meters. A previously unreported *Charonia tritonis* from the Galapagos is cited in a letter dated August 26, 1965, from Mrs. Carmen Angermeyer to William Old at the American Museum of Natural History. Mrs. Angermeyer purchased this shell from Jorge Pincay, who collected it in 2 meters of water just north of Punta Mangle, Fernandina Island. Mr. Pincay was a crew member of the Charles Darwin Research Station's vessel, *Beagle*.

Favartia garretti, has up until now, been known only from the Hawaiian Islands. Numerous specimens were taken at Cocos Island, under dead coral at depths of 13-26 meters. I have had an unidentified *Favartia* in my collection from La Cruz de Huantecoxtle, which is approximately 30 miles north of Puerto Vallarta, Mexico. It appears to be this species.

The *Persicula pulchella* was a single dead specimen.