

CREUSIA NEOGENICA, A NEW SPECIES OF  
CORAL-INHABITING BARNACLE FROM FLORIDA

NORMAN E. WEISBORD

DEPARTMENT OF GEOLOGY,  
FLORIDA STATE UNIVERSITY, TALLAHASSEE

While working on the collection of Florida invertebrates in the Department of Geology at Florida State University, the writer came upon an unlabeled specimen of stony coral in which are imbedded a number of unusual barnacles. Since there is no information of any kind concerning the specimen, it is the purpose of this paper to determine, from indirect evidence, the locality and geologic age of the host, and to describe the barnacle which inhabits it.

I have compared the coral in question with specimens of *Siderastrea pliocenica* Vaughan from the Caloosahatchee River, Florida, in both the United States National Museum and the Academy of Natural Sciences of Philadelphia, and it seems to be identical with that species. The barnacle, however, although close to *Pyrgoma prefloridanum* Brooks and Ross, is believed to be new, and for it the name *Creusia neogenica* is proposed. The generic classification as *Creusia* accords well with recent diagnoses of that taxon. The particular species is characterized by its distinct external radii, and is the first *Creusia* with such radii to be reported from the contiguous United States.

Over ten individuals of *Creusia neogenica* are domiciled in the corallum of *Siderastrea pliocenica*: six of them occur in a cluster with their compartments touching, and the largest and best preserved of these is designated the type. Partially or wholly, it is the shell or crown of the barnacle that protrudes through the surface of the corallum, and it is the elongated conical basis that is imbedded, generally in its entirety, within the corallum. In places even the orifice of the barnacle may be veneered over by the calicular surface of the host.

The coral *Siderastrea pliocenica* was reported by Vaughan from the Caloosahatchee River and Shell Creek in southern Florida, and it is suggested that the unlabeled specimen was also found somewhere in southern Florida. Evidence to support the assumed, but not necessarily exclusive South Florida occurrence, is the discovery by Joseph E. Banks of what I identify as *Siderastrea pliocenica* Vaughan in the Pinecrest Sand about four miles east of U.S. 301, Sarasota, Florida, in the Warren Brothers Pits. The particular specimen donated by Mr. Banks bears three deep conical cavities, not now containing, but suggesting the former presence of imbedded barnacles.

The age of Vaughan's Caloosahatchee Marl is not known with certainty as the term Caloosahatchee is today used in the sense of Group, and consists of a number of formations ranging in age from late Miocene to Pleistocene or Subrecent. In his "Caloosahatchee Marl," Vaughan (1919, p. 22) listed 19 species of corals, among them *Siderastrea pliocenica*. If all of Vaughan's corals came from a single formation its age would be pre-Pleistocene because 6 or 7 of the 19 corals have not survived to Recent time; were the corals Pleistocene, most or all of them would be living in the present. However, Dr. Emily Vokes (personal communication) suggests that Vaughan's "Caloosahatchee Marl" included both what is now termed the Caloosahatchee Formation and the Glades deposit which overlies it. Olsson (1969, pp. 125-133) considers the Caloosahatchee Formation as Pliocene and the Glades as Plio-Pleistocene. *Pyrgoma prefloridanum* Brooks and Ross occurs in both the Caloosahatchee Formation and Glades deposit, inhabiting the coral *Mani-*

*cina areolata* (Linnaeus). The coral *Siderastrea pliocenica* Vaughan occurs in both the Caloosahatchee Formation (Pliocene) and the Pinecrest beds (Mio-Pliocene)

According to Olsson and Petit (1964) who first described the unit, the "Pinecrest beds" immediately underlie the Caloosahatchee Formation and are late Miocene or Pliocene in age. Brooks in Eppert (1966), and Eppert (1966) recognized the presence of upper Miocene deposits in Sarasota County and referred to them as a lithosome of the Tamiami Formation. Hunter (1968), on the basis of certain distinctive species of *Pecten* and other mollusks, established the concurrent range zones of the Pinecrest Sand, Ochopee Limestone, and Buckingham Limestone in the upper part of the Tamiami Formation (upper Miocene), and stated that the Tamiami is probably equivalent to the Jackson Bluff Formation of North Florida, to the Duplin Marl of South and North Carolina, and to the Yorktown Formation of Virginia. Puri (1970-71, personal communication), who has also furnished me with corals from the Pinecrest Formation in the Warren Brothers Pits, measured and described the section there in mid-1970. That section and the fossil identifications as determined by Puri are reproduced below.

#### WARREN BROTHERS PITS Sarasota, Florida

4.5 miles east off U.S. 301, 17th Street, dead-end, turn left on paved road [Newburn Rd.], go 0.4 miles, pits on right.

BED	DESCRIPTION	THICKNESS [Ft.]
4	Pleistocene Sand Pinecrest Formation	+15
3	Oyster Biostrome, as bed 1 (delicate) <i>Pecten</i> sp., <i>Ostrea haitensis</i> (Sowerby) mostly articulated valves, <i>Conus</i> , sp.	4
2	Shell hash, sandy with few complete mollusks; top of the bed marked with <i>Mytiloconcha</i> sp. oriented as in life. Can be traced laterally around the pits.	1
1	Oyster Biostrome Light gray to green shell hash, quartz sand with <i>Ostrea haitensis</i> (Sowerby), <i>Pecten eboreus darlingtonensis</i> Dall, <i>Cancellaria propevenusta</i> Mansfield, <i>Murex globosus</i> Emmons, <i>Conus adversarius</i> Conrad.	3

The corals collected by Joseph E. Banks (including *Siderastrea pliocenica*) and by Harbans Puri occur in the oyster biostromes.

#### DESCRIPTION OF SPECIES

Family BALANIDAE Leach 1817

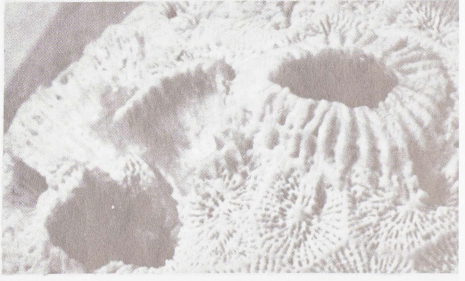
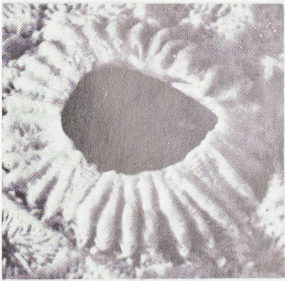
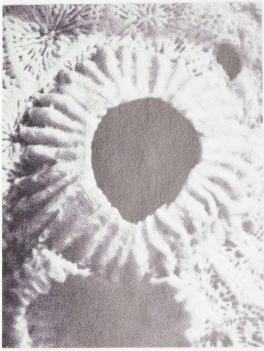
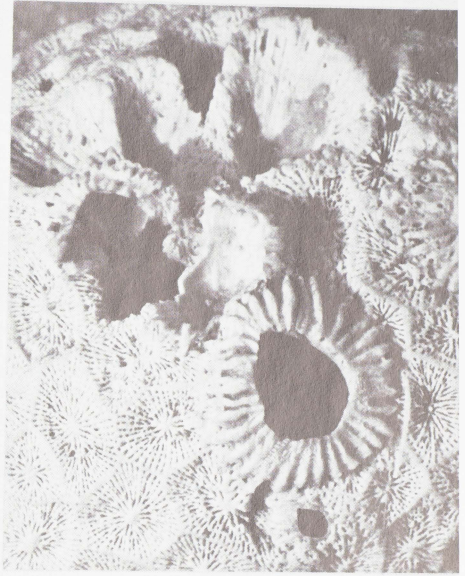
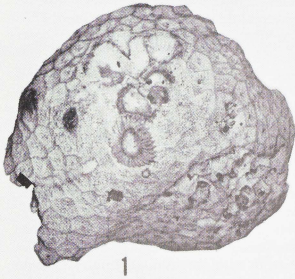
Subfamily CREUSIINAE

Baluck and Radwanski, 1967

#### CREUSIA NEOGENICA Weisbord, n.sp.

*Description:* The barnacle *Creusia neogenica* is domiciled in the coral *Siderastrea pliocenica* Vaughan (1919, pp. 437, 441, 442, pl. 118, figs. 2, 2a, 2b, 3). The shell or crown of the barnacle protrudes through the surface of the coral, but the basis is imbedded well within it. The shell is light tan in color, small, depressed-domal, broadly ovate in outline, and flattish above. The orifice is large and obtusely diamond-shaped, its length a little over half that of the shell. The compartments slope gently from the orifice but then steepen to nearly vertical at the basis, the basis separated from the shell proper by a fine but distinct seam. The basis itself is regularly conical and moderately long.

Figures 1-5. *Creusia neogenica* Weisbord, n.sp., imbedded in the coral *Siderastrea pliocenica* Vaughan. Fig. 1, about natural size, showing a cluster of *Creusia neogenica*. The type is the entire barnacle near the center of the corallum of *Siderastrea pliocenica*. Fig. 2, the same cluster of barnacles enlarged 4 X. The inner wall of the basis is shown in the specimen top center. Fig. 3, type enlarged 4.5 X, showing position of external radii. Fig. 4, type enlarged 5.5 X, showing growth laminations, internal sutures, and seam at the base. Fig. 5, enlarged 4.5 X, side view of type showing character of the seam. The specimen abutting the type on the left shows the sturdy laminae that connect the sheath (not present) to the wall. The specimen to the far left is the same as that in the top center of Figure 2, and shows the character of the internal ribs of the basis.





The four compartments are strongly ridged, the ridges radiating from the orifice. On the type there are 7 ridges on the carina and each of the lateral parietes, and 10 on the rostrum, or 31 in all not counting the ridge-like prolongation on the lower half of each radius. On immature specimens as few as 24 such ridges have been counted. The ridges are coarse, subequal, separated below by deep and wide interspaces, and rendered scabrous by concentric growth laminations which are arched upward in the interspaces but pointed sharply downward on the crest of the ridges.

The four external radii are not uniform although each of them is relatively small, horizontal at the summit, and traversed by prominent transverse riblets. The two radii on one side of the shell are broader than the two on the other. The anterior of the two broader radii is triangular, extends half way down the compartment, and is divided by a sulcus into two unequal segments, the larger prolonged below into a ridglet smaller than but similar to the ridges of the parietes. The posterior of the two broader radii is wedge-shaped and slightly convex, and extends two-thirds down from the orifice, the sides converging to form the radius ridglet below. The narrow anterior and posterior radii on the opposite side of the shell are divided by a fine, hardly perceptible, longitudinal incision, and extend down the compartment to near the seam where they merge with the nearest parietal ridge. On one shell other than the type, the narrow furrows between the transverse riblets of the radius are porose, the pores aligned in a single column on both sides of the smaller segment of the radius.

The clefts or sutures separating the compartments are seen on the underside of the radii just below the rim of the orifice along the alar edge of the sheath.

On the type, the sheath is thick and extends to about the basal margin of the compartments or to the seam which differentiates the shell from the basis; its height therefore is about the same as that of the shell but only one seventh of the shell and basis combined. In another specimen the sheath is about 2.5 mm high and extends part way down the basis. Except for the connective laminae, the lower portion of the sheath is free, leaving a space between it and the wall behind. The frontal surface of the sheath is scored by raised, closely spaced, subregular, concentric striae. The inner wall of the compartments back of the sheath is made up of broad, slightly raised, hollow longitudinal ribs, these extending well down the basis; they are gently concave along the middle and are crossed by irregularly spaced partitions, the ribs thus resembling the inner half of a shoot of bamboo, split lengthwise. Between each of the internal ribs is a narrow groove or furrow, and nestled into each groove is a sturdy lamina projecting thereto from the back of the sheath; each

lamina in turn connects through the wall with its respective external ridge on the outer surface of the parietes. The internal ribs extend to near the lower end of the basis which is thickly calcified and smooth, the original aperture at the bottom having been sealed over by carbonate deposit. The external surface of the basis—that is of the surface in contact with the coral—consists of prolongations of the same ridges that are present on the shell.

The opercular valves have not been recovered.

*Measurements.* The type specimen of *Creusia neogenica* is the largest and most complete of those in the cluster, and has the following dimensions: length of shell proper 9 mm, maximum width 7.8 mm, height from apex to seam 1.2 mm.; length of orifice 5 mm, maximum width 3.8 mm.; total height of shell and basis about 8 mm. The corallum of *Siderastrea pliocenica* is 50.5 mm in length, 46 mm in width, and 36 mm in height.

*Type specimen.* The coral and the barnacles inhabiting it are designated FLX-12. Present repository is the Department of Geology, Florida State University.

*Comparisons.* The relatively large orifice, the small but distinct external radii, and the strong, nearly equal radial ridges on the parietes are distinguishing characters of the new species. The four compartmental plates (visible in the interior) and the presence of four external radii on the exterior of the shell are indicative of the genus *Creusia* (see Baluk and Radwanski, 1967; and Newman, Zullo, and Withers, 1969, p. R287, fig. 18A, nos. 15a,b).

*Creusia neogenica*, n. sp., resembles the cosmopolitan and variable *Creusia spinulosa* Leach (see Darwin, 1854, pp. 376-382) but differs from all of the variants of that species in having a larger orifice, and from some of the variants in its coarse parietal ridges of nearly equal size. Another similar species is *Creusia barbadensis* Withers (1926) from the Pleistocene of Barbados, but the Barbados form is smaller, subcircular rather than subovate in outline, and with parietal ridges that are less regular in size than on *Creusia neogenica*. Externally the shell of both species seems to be formed of a single sutureless piece, but

unlike older shells of *C. barbadensis* the Floridan *C. neogenica* does not exhibit the two external sutures at the carinal end.

So far as I am aware there are only two coral-inhabiting barnacles in the subfamily Creusiinae reported from the United States, and both of them are from Florida. The first is the Recent *Pyrgoma floridanum* Pilsbry (1931) from off the west coast of Florida, and this differs from *Creusia neogenica* in showing "no traces of radii or sutures" on the exterior, in having a smaller and more ovate orifice, and in having fewer (28) and narrower radial ridges on the compartments of an adult specimen 9 mm in diameter.

The second related species is the Neogene *Pyrgoma prefloridanum* Brooks and Ross from the Bee Branch Member of the Caloosahatchee Group of Florida. *Pyrgoma prefloridanum* inhabits the coral *Manicina mayori* (Wells) [= *Manicina areolata* (Linnaeus) *fide* Wells in Weisbord, 1968, p. 52], and as there is a large specimen of *Manicina areolata* in the Florida State University collection from the Caloosahatchee River "2.5 miles west of La Belle" with more than 30 individuals of *Pyrgoma prefloridanum* imbedded in it, a direct comparison between *Creusia neogenica* and *Pyrgoma prefloridanum* can be made. There is considerable resemblance between the two species of barnacles although important differences are also discernible. First, Brooks and Ross do not mention or illustrate, nor have I observed, external radii on *Pyrgoma prefloridanum*, whereas they are a distinct feature of *Creusia neogenica*. Second, *P. prefloridanum* inhabits the coral *Manicina* but *C. neogenica* is domiciled in the coral *Siderastrea*, and since the corals are wholly dissimilar, the selectivity of the barnacle species may also be related to their genetic differentiation. Third, although both barnacle species are marked by strong radial ridges on the parietes, those of *P. prefloridanum* are intercalated by secondary ones whereas the ridges of *C. neogenica* are all primaries and nearly equal in size. Unfortunately the opercular valves cannot be compared as they have not been recovered from *Creusia neogenica*.

Baluk and Radwanski (1967) place *Pyrgoma floridanum* and *Pyrgoma prefloridanum* in the genus *Creusia* Leach, and assign to *Creusia* a geologic range of Miocene to Holocene. The same authors place *Pyrgoma* Leach s.s. in a taxon in which the shell is constructed of a single compartment, and state that there are four known species, all of them Recent.

*Coral hosts:* Both the Recent *Pyrgoma floridanum* Pilsbry and the Neogene *Pyrgoma prefloridanum* Brooks and Ross are domiciled in the coral *Manicina*, probably *Manicina areolata* (Linnaeus) which ranges from Miocene to Recent. *Creusia neogenica*, n. sp., inhabits the coral *Siderastrea pliocenica* Vaughan of late Miocene to Pliocene age. *Creusia sanctacrucensis* Baluk and Radwanski (1967, p. 470), a Miocene barnacle from central Poland, is found imbedded in the coral *Tarbellastrea reussiana* (Edwards and Haime). Another coral-inhabiting barnacle, *Balanus (Hexacreusia) durhami* Zullo (1961), ranging in age from Pleistocene to Recent, occurs in the Gulf of California region of Mexico, and resides in the coral *Porites*. The subgenus *Hexacreusia* is a six-plated balanid with solid parietes and radii.

#### ACKNOWLEDGMENTS

I wish to express my appreciation to Dr. Emily Vokes of Tulane University for her careful review of the manuscript and for sending me certain coral-inhabiting barnacles which enabled me to insure the validity of the new species. I also wish to thank Dr. Fritz Cramer of the Department of Geology, Florida State University and Gerrit Mulders of Tallahassee for the photographs accompanying this paper.

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November 28, 1972

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