Some Fossil Echinoids (Echinodermata) from the Cenozoic of Jamaica, Cuba and Guadaloupe

STEPHEN K. DONOVAN

Department of Geology, University of the West Indies,
Mona, Kingston 7, Jamaica

ABSTRACT. – A ‘lost’ cidaroid test from Jamaica, formerly classified as Cidaris melitensis Wright (= Cidaris [Tretocidaris] anguillensis Cutress of Miocene age), is probably not nonspecific and may be Eocene. Echinometra Iucunter (Linne) from the parish of St. Elizabeth is either from a well-indurated reef limestone of Sangamonian age or a Holocene beach rock. Clypeaster duchassaingi Michelin is a rare example of a fossil echinoid from Guadaloupe. A mid-Cenozoic Clypeaster sp. from Cuba shows an unusual growth deformity, in which one plate column of most petals ceased growing prematurely and later re-initiated growth.

INTRODUCTION

The specimens documented herein are from the Museum of Comparative Zoology, Harvard, Massachusetts (MCZ). The MCZ has one of the largest and most important collections of fossil echinoids from the Caribbean, including those of Louis and Alexander Agassiz, R. T. Jackson and H. L. Clark, among others (Winsor, 1991). From this significant accumulation, certain Cenozoic specimens are presently redocumented because they are either of geographic or stratigraphic significance, or because they show unusual morphological features.


SYSTEMATIC PALEONTOLOGY

Class ECHINOIDEA Leske
Subclass CIDAROIDEA Claus
Order CIDAROIDA Claus
Family CIDARIDAE Gray
Genus Cidaris Leske
Subgenus Cidaris (Tretocidaris) Mortensen
Cidaris (Tretocidaris) sp. (Fig. 1A, B)
Cidaris melitensis Wright; Arnold and Clark, 1927:11, 12; Cutress, 1980:61.

Cidaris (Tretocidaris?) anguillensis Cutress, 1980:61.

Material, Locality and Horizon. — A single test, MCZ 3380, from Jamaica. Locality and horizon unknown. Arnold and Clark (1927: 11-12) noted that this specimen “... was picked up by a very small boy who was too bewilderd [sic] to remember where he found it, but its condition indicated soft earth, perhaps the remains of disintegrated strata now cultivated for bananas.”

Description. — Test rounded pentagonal in outline, but slightly crushed. Moderately high, with a rounded ambitus at about 50% of test height. Flattened adapically and adorally.

Apical system unknown, but large (about size of peristome) and rounded pentagonal in outline.

Ambulacra moderately broad (widest ambitally) and moderately sinuous, with about 33–35 primary tubercles (=plates) per plate column. Poriferous zones in shallow, depressed grooves. Pore pairs sunken, sub-conjugate (sensu Cutress, 1980), with interporal partition high adapically, but with a shallow groove adorally. Interporal partition separates pore pairs by one pore diameter or slightly less. Both adradial and perradial pores circular in outline. Adjacent pore pairs within columns separated by a low ridge, sloping perradially and...
orally, and connected to the interporal partition orally. Interporiferous zones about the width of one pore column. Primary (=marginal of Fell, 1966:Fig. 235.4) tubercles adjacent to sloping ridges, with one secondary (=internal of Fell, 1966) tubercle per ambulacral plate, offset to secondary of adjacent plate, producing a zigzag pattern. Ambulacral primary tubercles smaller than interambulacral scrobicular tubercles.

Interambulacra about three times wider than ambulacra ambitally and composed of 5-6 plates per plate column. Interambulacral plates higher than wide adapically, relatively lower and wider adorally. Primary tubercles conical, noncrenulate and perforate, with planar platforms and broad, circular (adaptally) to elliptical (adorally) areolae. Scrobicular tubercles circular in outline, surrounding primary tubercles as a continuous ring, and reaching to or close to the plate edges. Granular tertiary tubercles in angles of plate and, particularly, along the interradial margin.

Peristome large, more pentagonal in outline than periproctal opening and about half the diameter of the (crushed) test. Radioles not preserved.

Dimensions.—(Variations in measurements due to the test having been crushed.) Ambital test diameter = 12.4-14.0 mm; test height = 7.2 mm; peristome diameter = 5.0-6.1 mm; periproct diameter = 4.7-6.0 mm.

Remarks.—Arnold and Clark (1927) documented this specimen, the only one from Jamaica referred to *Cidaris melitensis* Wright, as being a “typical example” of the species, but without formal description or illustration. Although Cutress (1980:59) referred to Arnold and Clark (1927:Pl. 1, Figs. 12-17) as illustrating the specimen, this was a misreference to the Anguillian specimens figured by Jackson (1922). Cutress (1980) differentiated between the Maltese *C. melitensis* and the Caribbean *Tretocidaris anguillensis* Cutress, which had hitherto been identified as the same species. However, Arnold and Clark’s “... specimen could not be located at the Museum of Comparative Zoology or elsewhere...” (Cutress, 1980:61). This specimen was rediscovered by the present author in March 1993. It is important to illustrate (Fig. 1A, B) and describe this test for the first time, as it has been referred to a species that has not otherwise been reported from Jamaica. Indeed, *C. (T.) anguillensis* is unknown from outside the type area of Anguilla (Cutress, 1980:63), where it occurs only in the upper Lower Miocene.

MCZ 3380 differs in some important details from tests of *C. (T.) anguillensis* sensu stricto. The ambulae are gently sinuous, possibly close to what Jackson (1922:21) called “subundulate,” whereas Cutress (1980:59) considered them to be “nearly straight.” Interambulacral plates figured by both Cutress (1980:Pl. 1, Fig. 11) and Cotteau (1875:Pl. 1, Figs. 4, 8) have only a sparse covering of granular tubercles outside the scrobicular circle, unlike MCZ 3380. These same illustrations also show that the interporiferous zone between the marginal tubercles is moderately broad, whereas these tubercles are close together on the Jamaican specimen, even ambitally. These points combine to cast some doubt on the identity of this specimen, although these differences may be due to its small size (specimens examined by Cutress, 1980, had ambital test diameters between 17.5 and 26.5 mm).

The Jamaican Miocene is dominated by shallow-water limestones (Newport Formation), and deeper-water chalks with cherts, bentonites and bioclastic limestones presumably derived from a shallower-water environment by mass flow processes. Only clypeasteroids have been identified in the Newport Formation (Donovan, 1991), which is invariably well-indurated. The bioclastic limestones of the Montpelier Formation include a more diverse, albeit fragmentary, fauna (Donovan, research in progress), including cidaroids, but these appear to be closer to *Euclidaris Döderlein*. Furthermore, the matrix infilling MCZ 3380 is quite unlike either of these two formations. Rather, its colour is much more reminiscent of the Eocene Yellow Limestone Group. This would agree with Arnold and Clark’s (1927) deduction that this specimen came from “... soft earth,
perhaps the remains of disintegrated strata.

Of the two cidaroids described from the Yellow Limestone Group (Donovan, 1993), MCZ 3380 is closer to *Prionocidaris loveni* (Cotteau) than *Fellius foveatus* (Jackson), without being nonspecific.

In conclusion, MCZ 3380 is not sufficiently similar to *C, (T, ) anguillensis* to be considered nonspecific and it may be Eocene, rather than Miocene in age. It is left in open nomenclature until growth series of Jamaican Eocene and Miocene cidaroids are available for comparison.

Subclass EUECHINOIDEA Bronn
Order ECHINOIDA Claus

Family ECHINOMETRIDAE Gray
Genus *Echinometra* Gray

*Echinometra lucunter* (*Linné*, 1758)

(Fig. 1C)

*Echinometra lucunter* (*Linné*): Arnold and Clark, 1934:140; Gordon, 1991:38, Table 1, Fig. 2; Donovan, 1993:382,

For a more complete synonymy list of *E, lucunter*, see Weisbord (1969:302-308).

Material, Locality and Horizon. —A single test, MCZ 3499, from the parish of St, Elizabeth, southwest central Jamaica (precise locality unknown). Probably from the Falmouth Formation sensu lato, a last inter-
Fig. 2. Clypeaster spp. from the Caribbean. A, Clypeaster duckassaingi Michelin, MCZ 1418, apical view, from Guadaloupe. B, C, Clypeaster sp., MCZ 101624, 101625, apical views. B, specimen showing growth deformities in petals (arrowed). C, specimen without growth deformities. Specimens whitened with ammonium chloride. Scale bar represents 10 mm.
**Fig. 3.** *Clypeaster* sp., MCZ 101624, from Cuba. Growth deformities (arrowed) of ambulacral petals. A, ambulacrum IV, showing an early termination of petal growth in the anterior plate column, with a return to petal growth more adapically. B, ambulacrum V, with a displaced elliptical pore in the posterior plate column (*fifteenth plate of column, although some small plates may have been lost adjacent to the (missing) apical system). C, ambulacrum I, anterior plate column; compare with A, D and E. D, ambulacrum II, anterior plate column. E, ambulacrum III, petal. On the left (in diagram = right of fossil) one of the inner ambulacral pores is enlarged and obliquely sunken. On the right petal, growth seems to have stopped prematurely and later resumed. In all examples the apical system is towards the top of the page; except for B, the adoral termination of the petal is shown for at least one plate column. Dotted lines are interpreted as cracks in the test, not plate sutures. Dashed lines are inferred (but poorly preserved) plate boundaries.

**Description.** —See Donovan (1993:381-382).

**Remarks.** —While *Echinometra lucunter* is a common, extant, shallow-water species in the Caribbean, its fossil record is relatively poor due to various environmental and taphonomic factors (Gordon, 1991; Greenstein, 1991; Donovan and Gordon, 1993). Thus, the precise horizon that yielded this unusually well-preserved specimen (Fig. 1C) is of some interest. The test is preserved in a small block of porous, grey limestone (grainstone) in which corals are the dominant bioclast. This lithology is similar to certain of the well-lithified limestone facies of the last interglacial raised reefs of Jamaica that are included within the Falmouth Formation sensu late, Upper Coastal Group. However, while fragments of *Echinometra* spp. are locally common in this unit (Gordon, 1991), tests are rare and none are otherwise known from such a well-lithified limestone. The alternative possibility is that this specimen is cemented into beachrock, giving it a Holocene age. While this is considered less probable, rare echinoids do occur in beachrock (Donovan et al., 1993).
Order CLYPEASTEROIDA A. Agassiz
Family CLYPEASTERIDAE L. Agassiz
Genus Clypeaster Lamarck
Clypeaster duchassaingi Michelin, 1861
(Fig. 2A)

Material, Locality and Horizon. —A single test, MCZ 1418. The label reads “Guadeloupe. Collected by Duchassaing. L. Agassiz Coil. 1859.” The precise locality and horizon is unknown, but Mortensen (1948:31) regarded this species as Pliocene and it is limited to the “formations madreporiques” of Michelin (1861:107; cited by Jackson, 1922:43). This specimen undoubtedly came from Grande-Terre, which is completely capped by Pliocene-Quaternary limestones, rather than the igneous island of Basse-Terre (Andreieff and Cottez, 1976; Maury et al., 1990).

Remarks. —Jackson (1922:9) noted the difficulty of obtaining definitive information on the fossil echinoids of Guadaloupe and only one test from this island was found in the collections of the MCZ. Hence, it was considered important to figure this specimen, despite its somewhat poor preservation. The specimen agrees well with published diagnoses of C. duchassaingi (Jackson, 1922:43; Mortensen, 1948:31), being domed apically, flattened orally, with petals (admittedly somewhat worn) flush with the test surface and a well-developed (although somewhat obscured by limestone) peristome.

Clypeaster sp.
(Fig. 2B, C)

Material, Locality and Horizon. —Collection of 12 tests, labelled “Clypeaster. Oligocene. Finca Santa Ines. Barrio Majagua, Jatibonico, Camagüey, Cuba. From Mario Sánchez Roig, 1940.” Rocks of the Oligocene outcrop in the region near Jatibonico and Majagua in western De Avila province (Jimenez et al., 1970), which was part of Camagüey province prior to 1959 (Draper and Barros, 1994:Fig. 4.1). However, Kier (1984:6) noted that many Cuban localities that were previously regarded as Oligocene have now been revised as Miocene. The dating of this sample is further confused by a collection of Oligopygus sp. in the MCZ, apparently from the same locality. Oligopygus de Loriol is considered to be Eocene (Kier, 1967), while Clypeaster in the Caribbean is Oligocene to Recent (Podubiuk, 1985).

Remarks. —While Clypeaster spp. are widespread and common in the fossil record of the Caribbean, one of the Cuban specimens is notable in showing obvious growth deformities in all ambulacral petals (Figs. 2B, 3; compare with Fig. 2C). In most instances this has involved a premature termination of the petal in one ambulacral column, followed by a re-initiation of the petal more proximally. This is best seen in ambulacra IV and I (Figs. 2B, 3A, C). The only petal not effected is V, where the only break in the normal pattern of growth is a slight deflection of one pore pair (Fig. 3B). The anterior ambulacrum has one enlarged and sunken pore (Fig. 2B, 3E). There is no obvious sign of predation or parasitism, and the reason for these abnormalities is not apparent.

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LITERATURE CITED
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