

A NEW ECHINOID FROM THE LOWER CRETACEOUS (ALBIAN) OF KENT

by RAYMOND CASEY

ABSTRACT. *Holaster cantianus* sp. nov. is a large holasterid of Lower Cretaceous (Lower Albian) age and is found in the Lower Greensand (Folkestone Beds) of the Folkestone neighbourhood of Kent. It is designated type species of a new subgenus, *Labrotaxis*, to which is also referred the Upper Albian-Cenomanian *Holaster latissimus* J. L. R. Agassiz. The diagnostic feature of *Labrotaxis* is the primitive condition of the meridosternous plastron.

THE common occurrence of a large echinoid belonging either to *Holaster* or to *Cardiaster* in the Folkestone Beds (Lower Albian) of the Folkestone neighbourhood of Kent has long been known (Price 1874; Topley 1875; Casey 1949), but owing to the imperfect state of preservation of the specimens no attempt at specific determination or description has been hitherto made. The following account is based on material accumulated by the author over a period of many years and now incorporated in the collections of the Geological Survey Museum, London. The paper is published by permission of the Director of the Geological Survey and Museum.

Order HOLASTEROIDA Wyatt Durham and Melville 1957

Family HOLASTERIDAE Pictet 1857

Genus HOLASTER J. L. R. Agassiz 1836

Subgenus LABROTAXIS NOV.

Type species. *Holaster (Labrotaxis) cantianus* sp. nov.

Diagnosis. *Holaster* with well-developed frontal sulcus bounded by carinae. Plastron of primitive meridosternous type, the labrum spanning the oral margin of sternal 2' to make contact with sternal 2.

Remarks. Among the Spatangoida and the Holasteroida the structure of the plastron has high taxonomic value. In the former order it is of amphisternous type, characterized by the labrum being joined at its posterior end to two large, equally developed sternal plates (2', 2). The Holasteroida include those forms in which the plastron is meridosternous, with the labrum abutting against a single sternal plate (2'). Lambert (1893) showed that in *Holaster intermedius* (Münster), of very early Cretaceous (Neocomian)

EXPLANATION OF PLATE 44

Figs. 1-4, *Holaster (Labrotaxis) cantianus* sp. nov., Lower Greensand (Folkestone Beds), Folkestone, Kent. Author's collection, now in the Geological Survey Museum, London. 1, Adoral surface, the sutures inked-in. Zm 32, reduced $\times 0.8$. 2, Part of adapical surface showing pores and ornament. The apical system lies on the right-hand border of the photograph; the frontal sulcus runs obliquely upwards. G.S.M. 97304, enlarged $\times 5$. 3, Two of a group of three specimens (the third is on the other side), the larger being the holotype. G.S.M. 74118-19, natural size. 4, Smaller specimen illustrated in fig. 3 enlarged $\times 2$.

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age, the meridosternous type of plastron is already typically developed, the labrum being well separated from the second sternal plate (2). His illustrations of the plastron of *H. nodulosus* (Goldfuss), the type species of *Holaster*, from the base of the Upper Cretaceous, show this second sternal plate even farther removed from the labrum, its position behind sternal plate 2' foreshadowing the single row of plastronal plates peculiar to the subgenus *Sternotaxis*. On the other hand, the plastron of *Labrotaxis* (Pl. 44, fig. 1; text-fig. 1d), having the labrum just touching sternal plate 2, represents a more primitive stage in the evolution of the meridosternous condition than is seen in *H. intermedius*. In all other features, especially the intercalary type of apical system, *Labrotaxis* conforms to the Holasteridae. It lacks the ambital fasciole of *Cardiaster* and the sharp frontal carinae and unequal pores of *Pseudholaster*. An Upper Albian-Cenomanian form, *H. latissimus* J. L. R. Agassiz, is also referable to *Labrotaxis* and the scope of the subgenus may be expected to widen with increasing knowledge of the plastronal structure of other members of the genus.

Holaster (Labrotaxis) cantianus sp. nov.

Plate 44, figs. 1-4; text-fig. 1

Holaster sp., Price 1874, p. 140.

? *Holaster*, Topley 1875, p. 138.

Cardiaster ? sp., *ibid.*, p. 413.

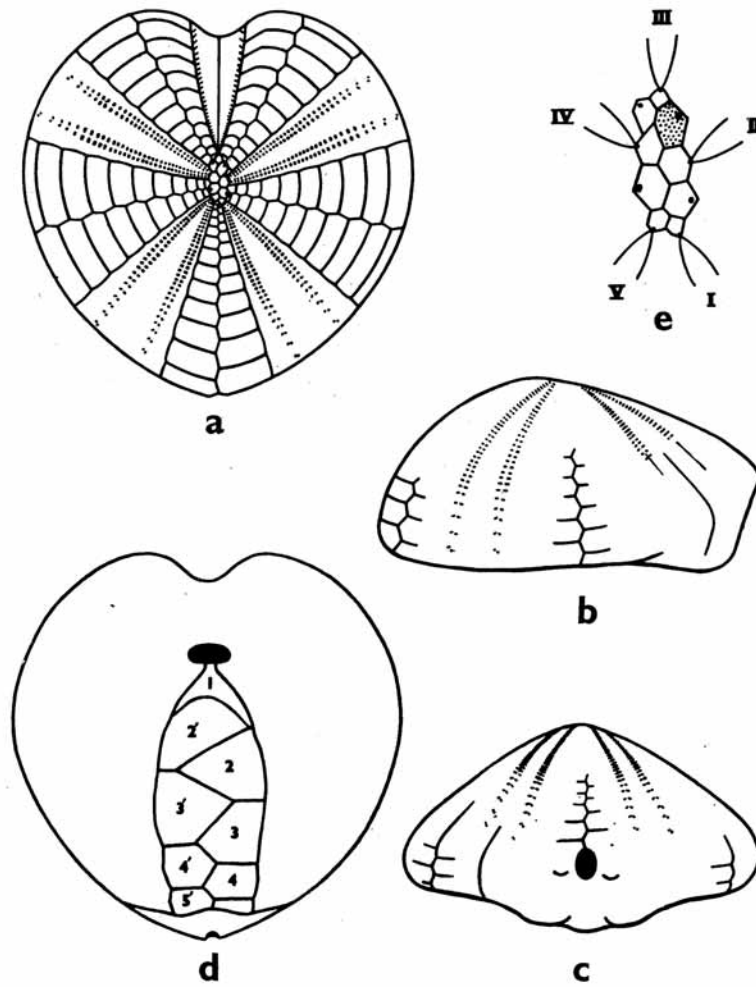
Holaster, large undescribed species, Casey 1949, p. 225.

Holotype. G.S.M. 74118, Lower Greensand (Folkestone Beds) (Lower Albian, *tardefurcata* Zone, *regularis* Subzone), East Cliff, Folkestone, Kent.

Description. Test large (up to 70 mm. long), fairly thin, of heart-shaped outline, widest at the anterior three-fifths of the length and contracting posteriorly, the length slightly exceeding the width. Adapical surface elevated, the highest point of the test placed well forward, at the apical system or just in front of it. From the anterior border the profile makes a sweeping curve to the summit and thence declines in a gentle curve to the posterior border, which is truncated either vertically or obliquely downwards and inwards. A cross-section of the test through the summit is subtriangular in outline, with the sides and base nearly flat, but rounded at the ambitus and the apex. Posterior to the summit the sides of the test are gently vaulted, the line of their convergence being marked by a faint carina extending from the centre of the disk to the posterior extremity. Anterior border indented by the frontal sulcus, which is defined by two blunt carinae diverging at an angle of 25° from their point of origin at the apical system. Periproct oval, placed high in the concave posterior face.

Adoral surface more or less flattened, depressed around the peristome, which is very eccentric anteriorly, transversely oval and without a labral process. Plastron tumid, increasing in elevation posteriorly, with about seven ill-defined nodules connected into a zigzag. Nodules also on either side of the periproct and at the base of the posterior face and a line of them, albeit faint, is traceable on each of the frontal carinae.

Ambulacral areas fairly wide, the paired ambulacra subpetaloid. Near the apex the ambulacral plates are raised a little at the median vertical sutures, giving a sunken appearance to the poriferous avenues on that part of the test. The pairs of poriferous avenues have a simple adoral divergence, and the pores are uniserial, subequal, and feebly conjugate. Pore-pairs in ambulacra I, II, IV, and V close to the adradial suture



TEXT-FIG. 1. *Holaster (Labrotaxis) cantianus* sp. nov. *a, b, c*, diagrammatic representation of specimen viewed from top, side, and posterior end; based on G.S.M. 74118-21. *d*, under surface showing plating of the plastron, with the labrum (1) spanning the oral margin of sternal plate 2' and touching sternal plate 2; G.S.M. Zm 32. *e*, apical system; G.S.M. 97304. *a-d* approximately natural size, *e* $\times 4$.

near the apex, remote at the ambitus, the pores slit-like and nearly horizontal, becoming rapidly smaller, closer, and circumflex towards the ambitus. Poriferous avenues in ambulacra II and IV unequal, the anterior series having smaller and more approximated pores. Poriferous avenues of ambulacrum III lodged in the sides of the sulcus and adjacent to the adradial suture, the pores minute and oblique.

Apical system elongate, composed of angular plates flush with the surrounding corona. Oculars II and IV meet in the mid-line and separate the anterior from the posterior genitals. Oculars II and IV and genitals 1 and 4 each support a tubercle. Madreporite covers all of genital 2.

Interambulacral areas built up of long curved plates, averaging eleven plates to a column from apex to ambitus. Plastron composed of a series of alternating cuneiform plates surmounted by an asymmetric, subtrigonal labrum, conforming to the characters of the subgenus.

All plates finely granulate, those of the upper surface studded irregularly with very small tubercles which become larger and more thickly clustered towards the anterior carinae and around the apical system, and larger still along the sides of the sulcus. A line of miliaries, sometimes irregular or failing at the ambitus, runs vertically up the sulcus, parallel and close to each of the inner lines of pores in ambulacrum III. Most of the lower surface is covered with primary tubercles. On the plastron the tubercles are crowded and are graduated in size, the smallest at the centre of the plastron, the largest at the margins. Periplastron areas devoid of tubercles. The tubercles have crenulated bosses, perforated summits, and wide scrobicular circles limited by the granules.

Remarks. This echinoid is ubiquitous in the Folkestone Beds of the Folkestone district, ranging from the *jacobi* Subzone of the *nodosocostatum* Zone to the *mammillatum* Zone. The holotype is one of three specimens found in association in the *regularis* Subzone, on which horizon the species reaches its maximum. Specimens used in this account are listed below under the registration numbers of the Geological Survey Museum:

- 97304 *mammillatum* Zone (top stone band), Copt Point, Folkestone, Kent.
 74118-20; 74121 *tardefurcata* Zone (*regularis* Subzone, 15-25 ft. below 97304), East Cliff, Folkestone.
 Zm 32, 35 *tardefurcata* Zone (*regularis* Subzone, bottom stone band), as before.
 97305 *tardefurcata* Zone (*regularis* Subzone), Mill Point, Folkestone.
 97306 *tardefurcata* Zone (*trivialis* Subzone), Sandling Junction sandpit, Hythe, Kent.
 Zm. 522, 653 *nodosocostatum* Zone (*jacobi* Subzone, Red Bed), as before.

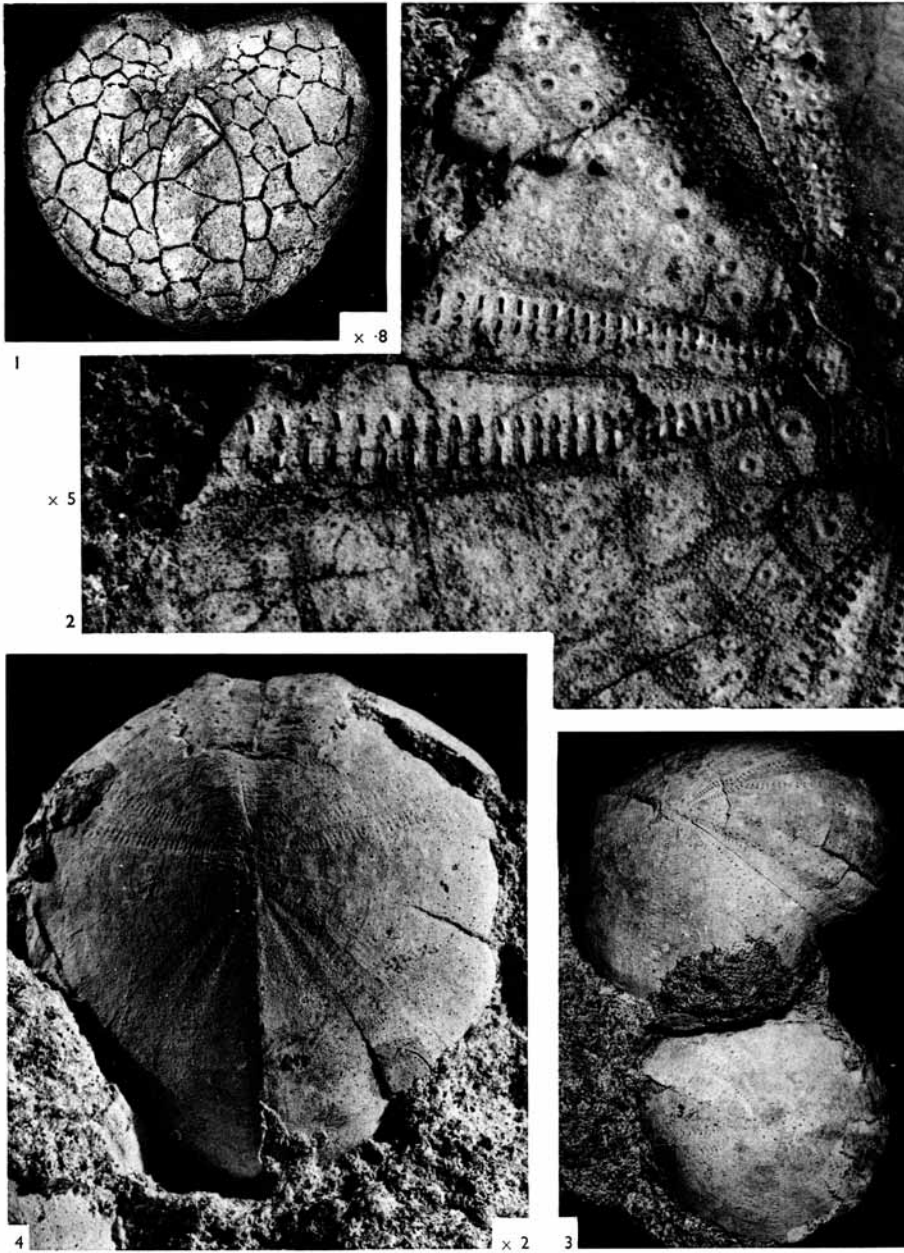
Holaster (Labrotaxis) latissimus Agassiz is a more orbicular species with rather more pronounced anterior carinae; the profile lacks the posterior descent of *H. (L.) cantianus*, tuberculation is not so strong on the apex, and the ambulacral plates are more numerous, the poriferous avenues generally narrower. Unlike the Cenomanian form figured by d'Orbigny (1853, pl. 387-8), the English Upper Albian specimens of this species are less elevated than *H. cantianus* (cf. Wright 1878, pl. 67, fig. 2b). *Holaster amplius* d'Orbigny, described from the Albian of Grandpré (Ardennes), France, and united with *H. latissimus* by Desor (1858, p. 337), is an orbicular, depressed form with long, sloping posterior end. The earlier Lower Greensand forms, *H. benstedii* Forbes (Lower Aptian) and *H. wrighti* Lambert (Upper Aptian), like the foreign Aptian *H. cordatus* Dubois and *H. prestensis* Desor, are much smaller and more rotund.

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