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Autor: Jung, Peter
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The Eocene genus *Sawkinsia* (Bivalvia: Tridacnidae)

By PETER JUNG¹⁾

ABSTRACT

The endemic Caribbean Eocene genus *Sawkinsia* Cox is redescribed. The stratigraphic range of its Jamaican type species *S. matleyi* Cox is established as middle to late Eocene (Claremont and Somerset Formations respectively) and a new species, *S. coxi*, is recorded from the middle Eocene Lézard Limestone Member of the St. Bartholomew Formation of St. Bartholomew, Lesser Antilles.

ZUSAMMENFASSUNG

Die im karibischen Eocaen endemische Gattung *Sawkinsia* wird neu definiert. Die stratigraphische Verbreitung ihrer Typusart *S. matleyi* Cox aus Jamaica reicht vom mittleren (Claremont Formation) bis ins obere Eocaen (Somerset Formation). *S. coxi*, eine neue Art aus dem mitteleocaenen Lézard Limestone Member der St. Bartholomew Formation von St. Bartholomew, Kleine Antillen, wird beschrieben.

Introduction

The material from the White Limestone of Jamaica on which Cox (1941, p. 140) based the description of his genus *Sawkinsia* consisted of internal casts and impressions. In order to recognize details of sculpture and the dentition of the hinge he had artificial casts made, but even so there was no specimen showing the dentition of the right valve clearly. Since that time no additional material has been recorded. In 1968 and 1969 I had the opportunity to make collections in Jamaica which yielded a considerable number of specimens of *Sawkinsia* both from the Claremont area, St. Ann, and the Stony Hill area near Kingston. Silicone rubber casts of some of these specimens show features not previously seen in *Sawkinsia*. In June 1969 collecting together with E.H. and H.E. Vokes of New Orleans from the Somerset Formation along the Hermitage Dam Road, Stony Hill area, yielded a few more useful specimens.

A second species of *Sawkinsia*, which is described below, was found in collections from the St. Bartholomew Formation of St. Bartholomew, Lesser Antilles, made by P. T. Cleve in 1869 and Captain Molander, probably the oldest collections ever made there. This material was discovered, when the large collections of Mayer-Eymar were deposited in Basel in 1966.

¹⁾ Naturhistorisches Museum, Augustinerasse 2, CH-4051 Basel, Switzerland.

All the material on which this paper is based is deposited at the Natural History Museum Basel (NMB).

Systematics

Family *Tridacnidae* LAMARCK, 1819

Tertiary Tridacnidae from the Caribbean faunal province are very rare. The first species belonging to this family was described from the early Miocene Tampa Limestone of Florida by MANSFIELD (1937, p.258) as *Hippopus ? gunteri*, a taxon recognized as valid by ROSEWATER (1965). In 1941 COX described *Avicularium trechmanni* from the middle Eocene Claremont Formation of Jamaica, which is the first species of the genus recorded outside Europe. In the same paper COX described a new genus, *Sawkinsia*, with its type species *S. matleyi* from the middle Eocene Claremont Formation of Jamaica. At that time COX assigned *Sawkinsia* to the Cardiidae, although he realized that the hinge did not fit the general arrangement of teeth in the Cardiidae. STASEK (1962, p.33) considered *Sawkinsia* to be close to the Tridacnidae, but it was not until ROSEWATER (1965) cited an unpublished mimeographed compilation of 1953 by Vokes that *Sawkinsia* was recognized as a tridacnid. This assignment was later confirmed by VOKES (1967, p.273) in his "Genera of the Bivalvia". In the Treatise on Invertebrate Paleontology, Part N, Mollusca 6, Bivalvia (1969), on page N 595 *Sawkinsia* is also listed by KEEN under the Tridacnidae. She gave the stratigraphic range of *Sawkinsia* as late Eocene to late Oligocene, and this despite the fact that at that time it was known only from one species occurring in one formation.

STASEK (1962, pp.18–20) as well as ROSEWATER (1965, p.353) discussed the gradual increase of the dorso-ventral angle of the valves of various tridacnid genera. As a result the Recent genera *Hippopus* and *Tridacna* have to be oriented differently than "normal" bivalves (ROSEWATER 1965, p.350). The byssal orifice in Recent *Tridacna* is situated close (posterior) to the umbo and the hinge is therefore positioned ventrally in the living animal. In *Hippopus* the umbo has also a ventral position, although only young individuals of *H. hippopus* are byssally attached. The mode of life of species of *Sawkinsia* and therefore their living position are not known. For this reason the terminology used in the following descriptions is that of "normal" bivalves in which umbo and hinge are situated dorsally.

Genus *Sawkinsia* Cox, 1941

Cox, 1941, Proc. malac. Soc. London 24/4, p. 140.

Type species (by original designation): *Sawkinsia matleyi* Cox (Eocene, Jamaica).

Description. – Shell of medium to large size, solid. Outline rhomboid to somewhat elongated. Umbones prosogyrate. Exterior of valves divided into three portions by two crests which extend from the umbo to the postero-ventral and antero-ventral margins respectively. All the three parts are sculptured by radial ribs, and the central part is characteristically concave. Valves not gaping. Inner margins

of valves with coarse denticulations. Left hinge consists of a prominent cardinal tooth with a socket behind it, a posterior lateral tooth with a socket above it, and an anterior lateral tooth with a large socket above it. The right hinge has got two cardinals the anterior one being only rudimentary; between the two there is the socket for the left cardinal. The right anterior lateral is prominent and has a small socket on its antero-ventral side. Right posterior lateral small, with a small socket below it for the left posterior lateral. Pallial line entire. Posterior adductor muscle scar situated on a thickened part of the shell just below the posterior lateral tooth. There is no anterior adductor scar.

Remarks. - *Sawkinsia* is an endemic genus of the Caribbean Eocene. It includes two species: the type species which occurs in the middle and late Eocene of Jamaica and *S. coxi* n. sp. which is so far known only from its type locality (middle Eocene of St. Bartholomew). Fig. 1 shows the distribution of the genus. The two occurrences lie at about the same geographical latitude, i.e. in an east-west belt extending from St. Bartholomew through Puerto Rico and Hispaniola to Jamaica. It is most likely that *Sawkinsia* will be found at other localities of comparable age within this belt such as the Plaisance Limestone of the Republic of Haiti.

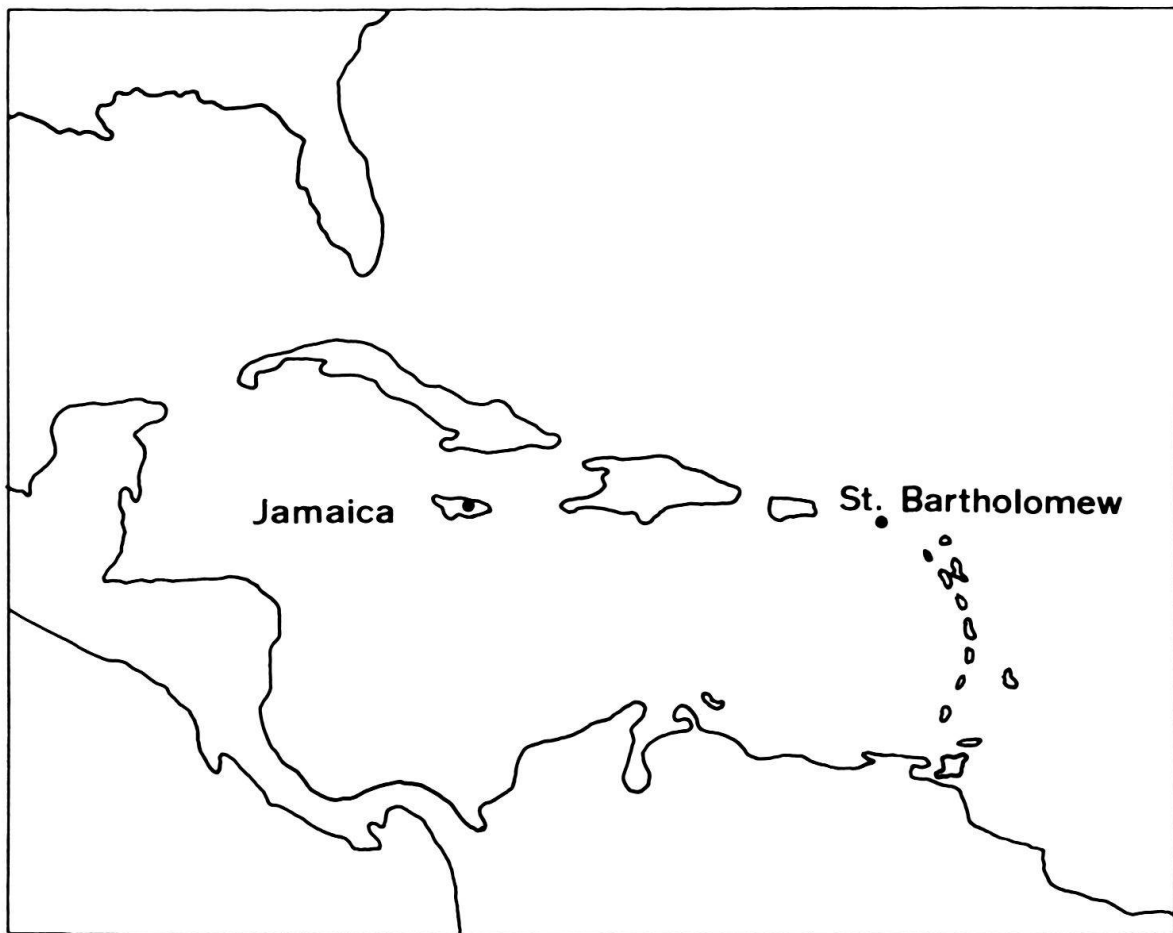


Fig. 1. Distribution of *Sawkinsia*: *S. matleyi* in Jamaica and *S. coxi* in St. Bartholomew. Note that both localities lie at about the same geographical latitude.

Sawkinsia matleyi COX

(Fig. 2; Pl. I, Fig. 1-5; Pl. II, Fig. 1-5; Pl. III, Fig. 3-5)

1941 *Sawkinsia matleyi* COX, Proc. malac. Soc. London 24/4, p. 140, Pl. 9, Fig. 7-9, Pl. 10, Fig. 10-13.1972 *Sawkinsia matleyi* COX, JUNG, Trans. 6th Carib. geol. Conf. (Margarita 1971), p. 466.

Description. - Shell of medium to large size, solid. Outline rhomboid. Valves sculptured by radial ribs. Two of them are much more prominent than the others; they form angulations extending from the umbo to the postero-ventral and antero-ventral margins respectively, thus subdividing the valve into three parts. The posterior slope carries about 10 radials, some of which may be beaded. The two prominent radial ribs forming crests carry conspicuous beads. The concave space between them is sculptured by 5 to 6 subequal, beaded radials. On the anterior slope there are 9 beaded radials. The anterior extremity of the shell is somewhat produced, and the radials in that area are wider and heavier. The ribs on the anterior slope may become doubled with increasing age. Many of the radial ribs of the valves are slightly shouldered, and their interspaces are sculptured by concentric growth lines.

For dentition see description of genus.

Holotype. - British Museum (Natural History), Dept. of Palaeontology, no. L 74 123.

Type locality. - Beyond 5-mile post, Moneague-Goshen road, St. Ann, Jamaica. Claremont Formation (middle Eocene).

Material. - The available material of *S. matleyi* consists mainly of casts and impressions. In a number of cases artificial silicone rubber casts have been made in order to recognize details of sculpture and dentition. A total of 49 mostly fragmentary specimens have been collected at various localities from both the area around Claremont, St. Ann, and from the Stony Hill area near Kingston (a visit to the type locality of the species did not yield additional topotypes). Of these, 23 specimens were found in the Claremont Formation and 26 in the Somerset Formation as shown in the following list:

Claremont Formation:

NMB locality no.	locality	no. of specimens
10853	Claremont, St. Ann	4
10854	Gibson Road, Stony Hill area	3
10855	Red Gal Ring, Stony Hill area	10
10894	Claremont, St. Ann	1
10905	Gibson Road, Stony Hill area	1
10922	Claremont, St. Ann	1
10923	Claremont, St. Ann	3

Somerset Formation:

NMB locality no.	locality	no. of specimens
10895		6
10896		7
10898	all from along	1
10899	Hermitage Dam Road,	8
11058	Stony Hill area	3
11149		1

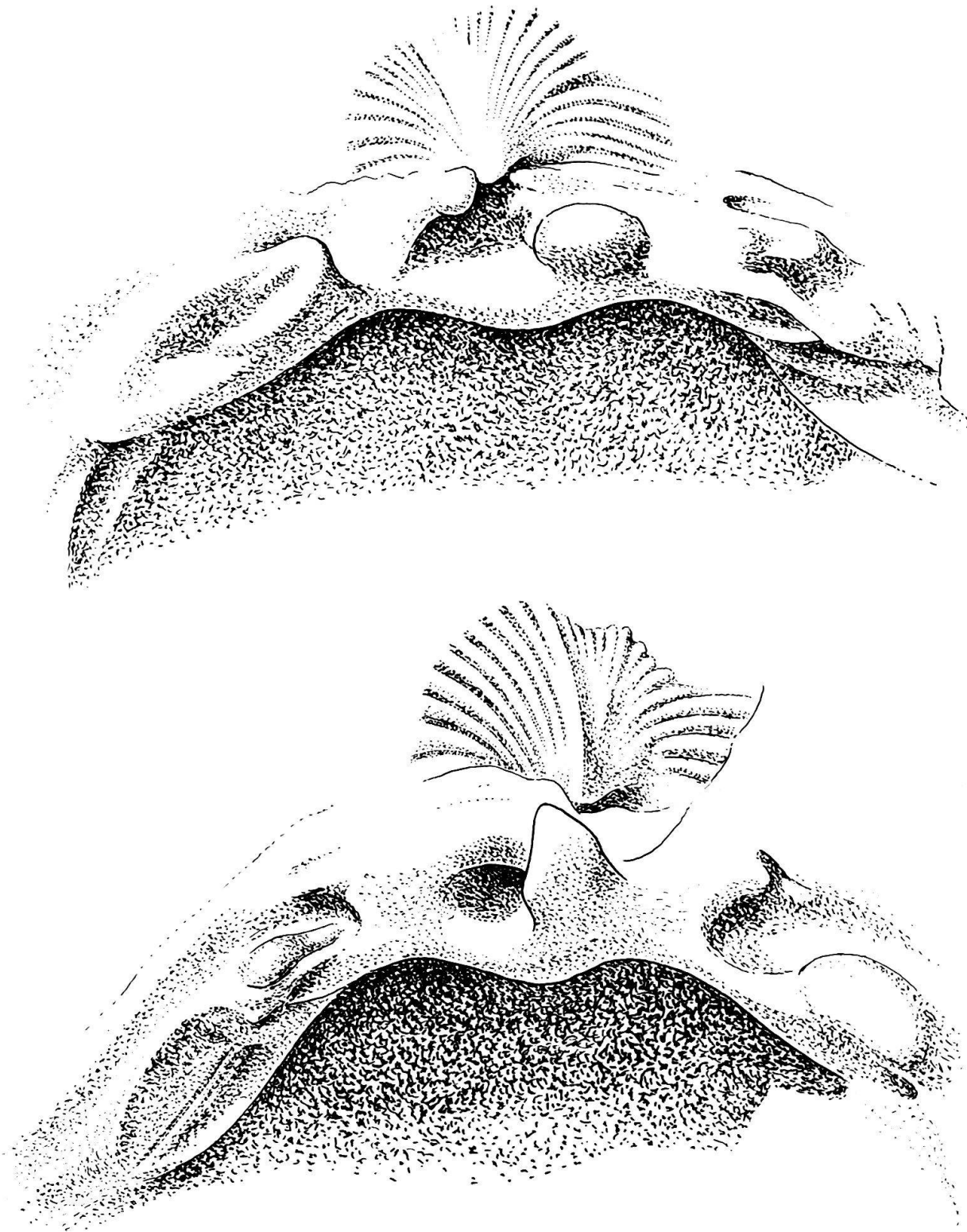


Fig. 2. Hinge of immature specimen of *S. matleyi* Cox from NMB locality 10896: Somerset Formation of Hermitage Dam Road, Stony Hill area near Kingston. NMB no. G 14089 (see also Pl. I, Fig. 2). Above: left valve; below: right valve. Magnification: $\times 7$.

Measurements. - The dimensions of the figured specimens can be found in the explanations of the plates. The unfigured specimens are too fragmentary to be measured. The estimated length of the larger specimens is 60 to 70 mm and the corresponding heights 50 to 60 mm. Cox (1941) had much larger specimens to hand: the holotype of *S. matleyi* (the largest specimen known) is 150 mm long and 120 mm high.

Comparisons. - As mentioned below, *S. matleyi* is less elongated in general outline than *S. coxi*, and differs from it in details of sculpture. The radial ribs on the central, concave portion of the valve are of subequal size, whereas the two posterior-most radials on that area of *S. coxi* are decidedly larger than the others.

Occurrence. - Claremont Formation (middle Eocene) of the Claremont and Stony Hill areas and Somerset Formation (late Eocene) of the Stony Hill area, Jamaica.

Sawkinsia coxi n. sp.

(Pl. III, Fig. 1-2; Pl. IV, Fig. 1-5)

Description. - Shell of medium size, solid. Outline elongated. Exterior of valves sculptured by radial ribs and subdivided into three parts by two angular crests extending from the umbo to the postero-ventral and antero-ventral margins respectively. Posterior slope with 8 to 9 radials. The concave area between the crests carries 5 to 6 radials; the two posteriormost ones of these are considerably wider than the others and have broader interspaces. The anterior slope is sculptured by 7 to 8 radials some of which may carry beads. It is concave just in front of the anterior crest, and the anterior extremity is produced. Radials near the anterior extremity broader than the others. The radial ribs of the valves are flat-topped to triangular in cross section. In large individuals some of the radials may be doubled.

For dentition see description of genus.

Holotype (right valve). - NMB no. G 14098.

Dimensions of holotype. - Length 51 mm, height 42 mm, inflation 19,2 mm.

Type locality. - Between Anse des Lézards and Anse des Cayes, St. Bartholomew, Lesser Antilles. Lézard Limestone Member of St. Bartholomew Formation (middle Eocene).

Material. - The type material of this species consists of 9 fragmentary specimens. The holotype had probably been collected by Captain Molander and had originally been deposited in the Natural History Museum Stockholm, Paleozoological Section, under the number Mo 120663. Together with other material it had been sent at an unknown date (probably close to the end of the last century) to C. Mayer-Eymar in Zürich. In 1966 the collection of Mayer-Eymar was transported from Zürich to Basel, where it is now stored as a deposit. The 8 paratypes had been collected (probably at the same locality) by P. T. Cleve in February 1869 (CLEVE 1871, p. 26) and were also sent to C. Mayer-Eymar. A visit to the type locality by the writer and R. Panchaud in 1973 did not yield additional material. All the available specimens have original shell material preserved which, however, is eroded in each specimen to a greater or lesser degree.

Measurements. – The unfigured paratypes are not only too fragmentary to be measured but also deformed. Measurements for the figured specimens are given in the explanations of the plates.

Comparisons. – *S. coxi* differs from *S. matleyi* mainly in its general shape and its sculpture. It is more elongated than *S. matleyi*, the number of the radial ribs is smaller on an average, and they are less beaded. In *S. coxi* the ribs on the anterior slope are beaded and sometimes some on the posterior slope as well, but those on the concave central portion are flat-topped or have a triangular cross section. In *S. matleyi* on the other hand virtually all the ribs are more or less conspicuously beaded.

Occurrence. – All the known specimens of *S. coxi* have been collected from a single locality, the type locality, which falls within the Lézard Limestone Member of the St. Bartholomew Formation (middle Eocene), St. Bartholomew, Lesser Antilles.

Discussion

The genus *Sawkinsia* as now known comprises two species: *S. coxi* from the middle Eocene of St. Bartholomew and *S. matleyi* from the middle and late Eocene of Jamaica.

The age of the Lézard Limestone Member, in which *S. coxi* occurs, has been disputed since it was first described. CLEVE (1871, p.26) assigned it to the middle Eocene; so did SPENCER (1901, p.525) quoting CLEVE. SENN (1940, p.1593), who summarized the foraminiferal evidence, reached the conclusion that it is of early late Eocene age, and CHRISTMAN (1953, p.71) considered it to be middle Eocene. The latter based his opinion on COLE (1942, pp. 12, 24), who stated that the recognition of *Dictyoconus americanus* (CUSHMAN) (the type locality of which is St. Bartholomew) in middle Eocene deposits outside St. Bartholomew, i.e. in Florida, Jamaica, and Haiti, offered a good possibility for their correlation.

S. coxi is associated with a mollusk fauna of considerable size, a fact which is not apparent from the study by COOKE (1919), who described and figured a rather small fauna from the Lézard Limestone Member, to which he assigned a late Eocene age. The above mentioned collections made by Captain Molander and P.T. Cleve together with new material collected by the writer and R. Panchaud in 1973 give quite a different picture of the whole assemblage. The fauna includes forms characteristic for deposits of middle Eocene age elsewhere in the Caribbean. Examples are *Pseudomiltha megameris* (DALL) which occurs in the Chapelton Formation (TRECHMANN 1923) and the Claremont Formation (JUNG 1972) of Jamaica as well as in the Ceru di Cueba Formation of Curaçao (JUNG 1974); a large, so far unnamed species of *Campanile* occurring in the Lézard Limestone Member has been found in the form of internal casts in Jamaica (Chapelton and Claremont Formations) and in Curaçao (Ceru Mainsjie and Ceru di Cueba Formations). Other wide-spread forms found in the Lézard Limestone Member include species of *Fimbria* and *Velates*.

When COX (1941) described a mollusk fauna including *S. matleyi* from the Claremont Formation of St. Ann, Jamaica, he believed it to be of late Eocene age. HOSE & VERSEY (1956) included this assemblage in their *Phacoides megameris* band

which they also assigned to the late Eocene. ROBINSON (1968, p. 189) considered the Claremont Formation as middle Eocene on the basis of Larger Foraminifera, and JUNG (1972, p. 467) as of probable middle Eocene or perhaps late Eocene age on the basis of mollusks.

S. matleyi is now known to occur also in the Claremont and Somerset Formations of the Stony Hill area near Kingston. As pointed out by ROBINSON (1974, p. 282), the Somerset overlies the Claremont unconformably in this area, and he places the boundary of middle and late Eocene between the two. *S. matleyi* has therefore a range from middle to late Eocene.

S. matleyi and *S. coxi* are both shallow water species. *S. matleyi* occurs in fairly pure and massive limestones which were deposited under predominantly low energy conditions (ROBINSON 1974, p. 284). *S. coxi* on the other hand has been found in tuffaceous, often cross-bedded sandstones which are intercalated between well bedded, massive, grey and somewhat sandy limestones. It appears that *S. coxi* lived under higher energy conditions than *S. matleyi*. Whether this circumstance accounts for the fact that *S. coxi* is less sculptured than *S. matleyi* cannot be ascertained at this stage.

Sawkinsia is an endemic Caribbean genus. Although both of its species appear at about the same time, *S. coxi* is so far known only from deposits of middle Eocene age, whereas *S. matleyi* ranges into the late Eocene. For the time being we are not able to tell which appeared earlier, i.e. if one was the forerunner of the other or, alternatively, whether they had a common ancestor.

As hinted at above, the stronger sculpture of *S. matleyi* might be explained by differences of environmental conditions under which the two species lived, but it might also signify an evolutionary trend. The available material is certainly insufficient to answer such questions: the variability of the two species would have to be known in much more detail.

Acknowledgments

I am greatly indebted to H.E. Vokes of Tulane University, New Orleans, for letting me have rubber casts of specimens under his care. J.B. Saunders of the Natural History Museum Basel critically read the manuscript, and W. Suter of the same institution took the photographs. I am especially grateful to Mr. O. Garraux of Basel for the fine drawings of the hinges of the Jamaican species.

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Plate I

Fig. 1-5

Sawkinsia matleyi Cox
All specimens $\times 1.5$.

1. G 14089 from locality 10896: Hermitage Dam Road, Stony Hill, Jamaica. Somerset Fm. (late Eocene). Internal mould.
2. Artificial cast of specimen G 14089 showing left and right hinges. See also text-fig. 2.
3. G 14090 from locality 10923: Claremont, Jamaica. Claremont Fm. (middle Eocene). Posterior view of internal mould showing adductor scars.
4. Artificial cast of specimen G 14095. Left valve. Hinge incomplete. Note coarse crenulations of margin.
5. G 14095 from locality 10899: Hermitage Dam Road, Stony Hill, Jamaica. Somerset Fm. (late Eocene). Internal mould of left valve.

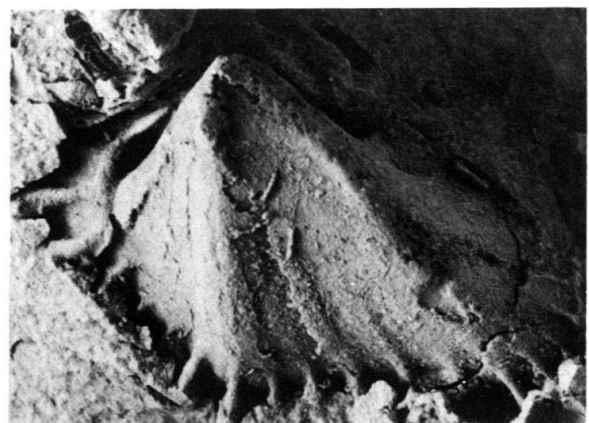
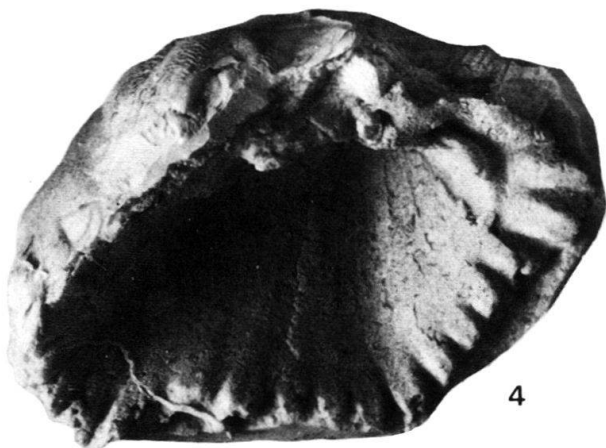
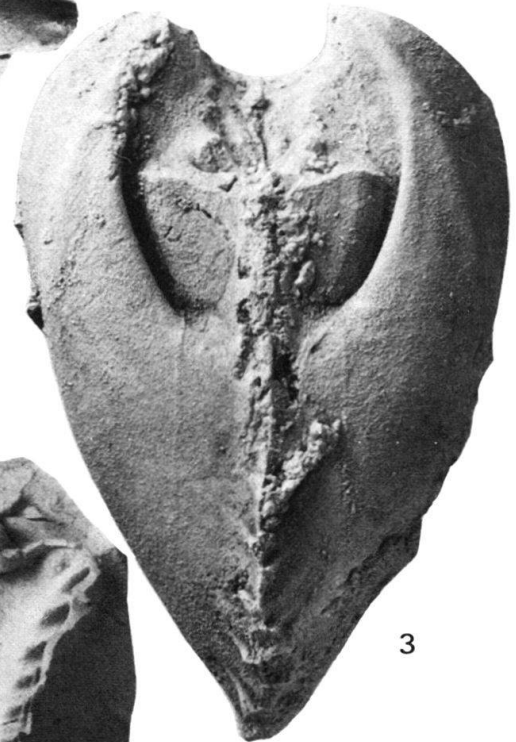
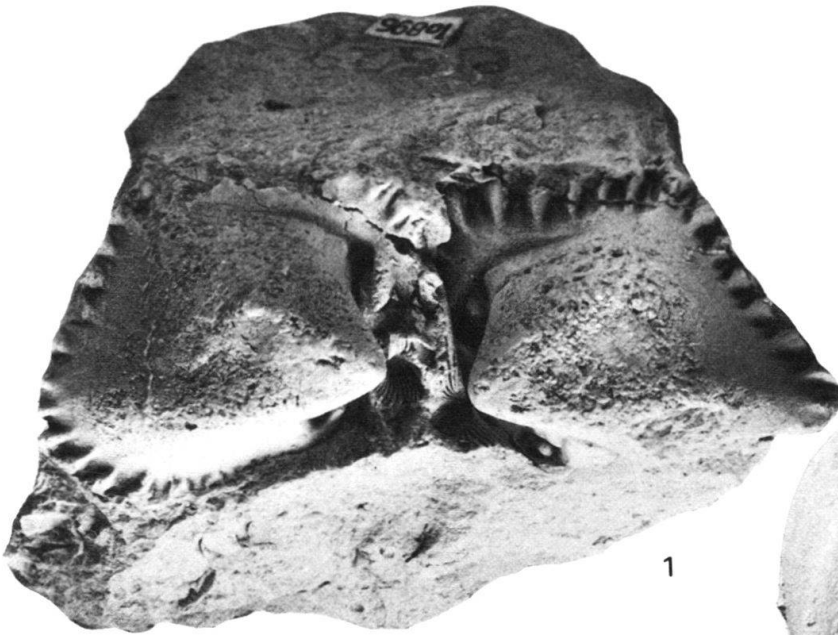
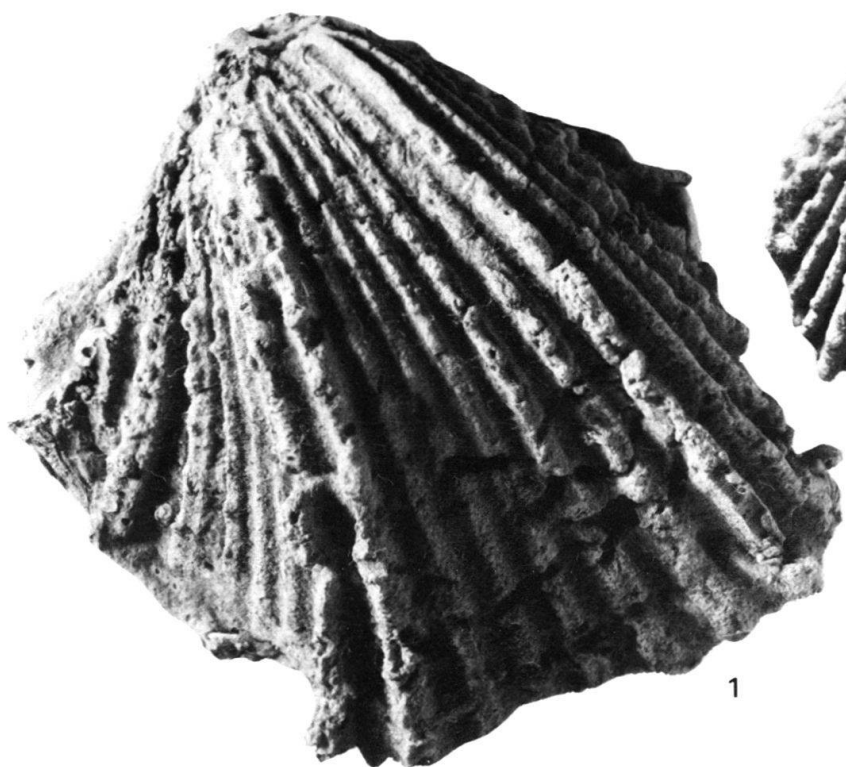


Plate II

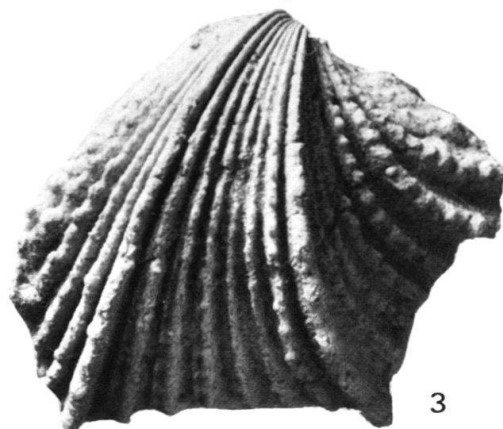
Fig. 1-5

Sawkinsia matleyi Cox
All specimens $\times 1.5$.

1. G 14096 from Tulane University locality 1016: Stony Hill, Jamaica. Somerset Fm. (late Eocene). Artificial cast showing exterior of left valve.
2. G 14097 from same locality as Fig. 1. Artificial cast showing interior of left valve.
3. G 14091 from locality 11058: Hermitage Dam Road, Stony Hill, Jamaica. Somerset Fm. (late Eocene). Artificial cast of right valve of an immature specimen showing sculpture.
4. G 14094 from locality 10855: Red Gal Ring, Stony Hill, Jamaica. Claremont Fm. (middle Eocene). Detail of sculpture of right valve (artificial cast).
5. G 14093 from locality 10855: Red Gal Ring, Stony Hill, Jamaica. Claremont Fm. (middle Eocene). Detail of sculpture of anterior portion of left valve (artificial cast).



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3



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2



5

Plate III

Fig. 1-2

Sawkinsia coxi n. sp.

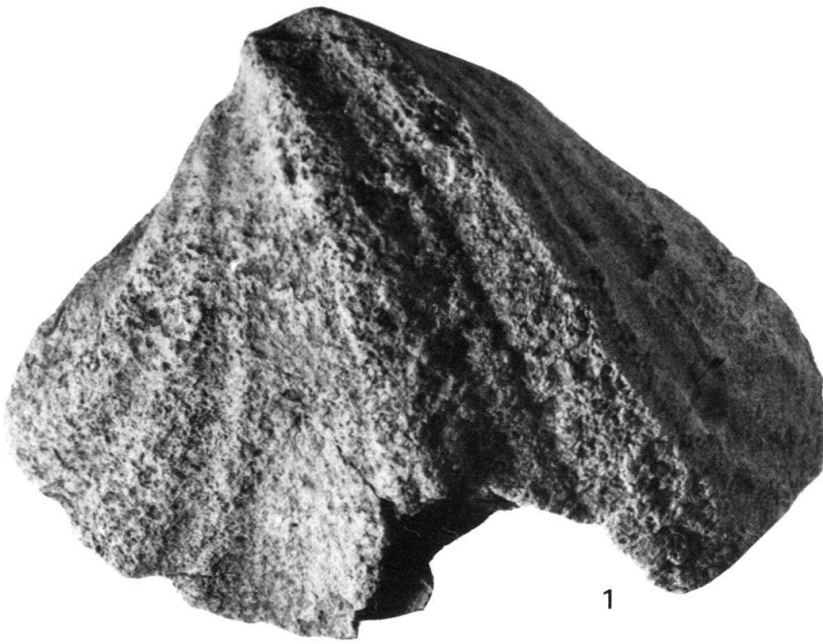
Paratype (left valve). G 14099 from locality 10157: Anse des Lézards, St. Bartholomew. Lézard Limestone Member of St. Bartholomew Fm. (middle Eocene). $\times 1.5$.

1. Exterior. Sculpture largely eroded.
2. Interior. Lateral teeth not preserved.

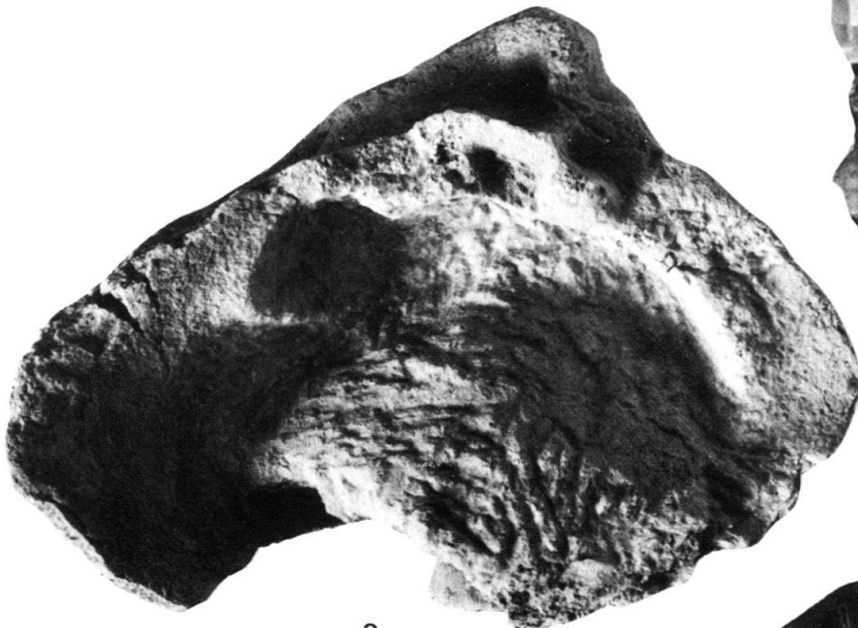
Fig. 3-5

Sawkinsia matleyi Cox

3. G 14102 from locality 10899: Hermitage Dam Road, Stony Hill, Jamaica. Somerset Fm. (late Eocene). $\times 1.5$. Artificial cast showing part of the ventral margin of a double-valved specimen.
4. G 14092 from locality 10896: Hermitage Dam Road, Stony Hill, Jamaica. Somerset Fm. (late Eocene). $\times 3$. Artificial cast. View of right hinge showing projecting teeth. Note the prominent anterior lateral tooth.
5. Same specimen as Fig. 4. $\times 1.5$. Artificial cast of right valve showing complete hinge.



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2



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4



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Plate IV

Fig. 1-5

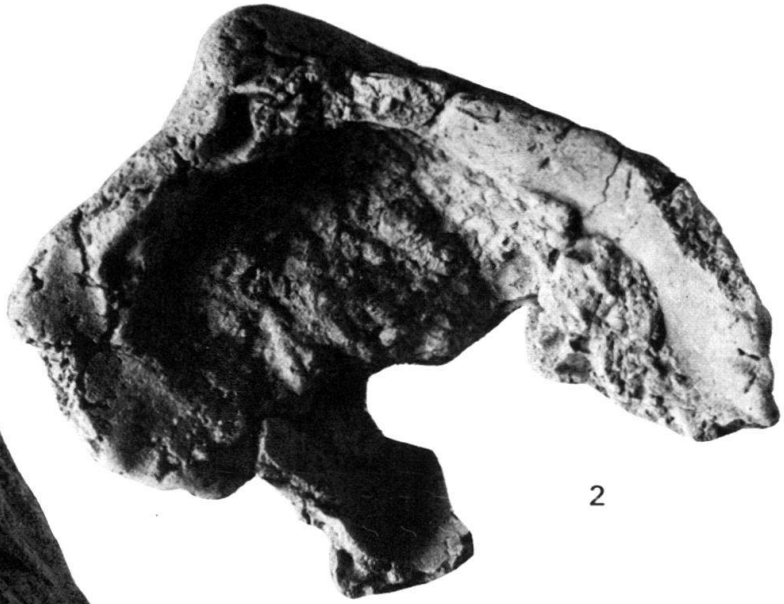
Sawkinsia coxi n. sp.

All specimens from Anse des Lézards, St. Bartholomew. Lézard Limestone Member of St. Bartholomew Fm. (middle Eocene).

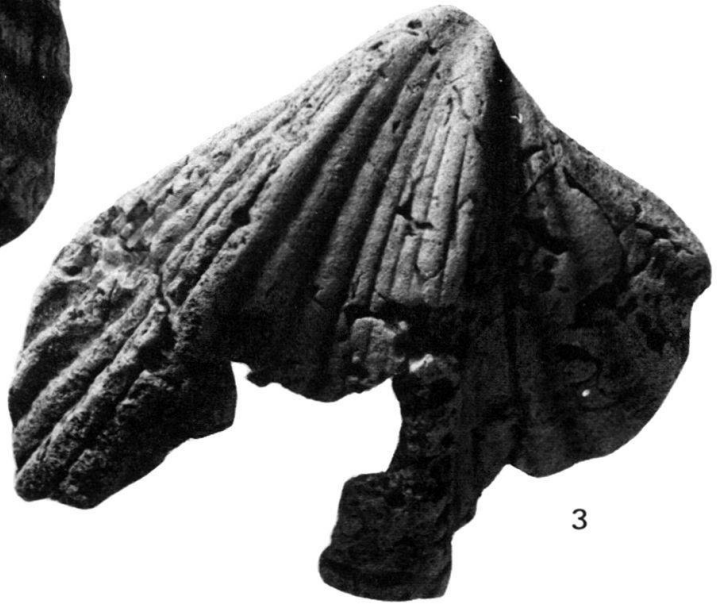
1. Paratype (incomplete double-valved specimen). G 14101. $\times 1.5$. Sculpture of left valve.
2. Holotype (right valve). G 14098. $\times 1.5$. View of the interior. Hinge incomplete.
3. Holotype. G 14098. $\times 1.5$. View of exterior.
4. Paratype (right valve of immature specimen). G 14100. $\times 3$. View of exterior.
5. Paratype (same specimen as Fig. 4). $\times 3$. View of incomplete right hinge.



1



2



3



4



5

