

Rudist Collections at the University of the West Indies Geology Museum (UWIGM)

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ABSTRACT. The study of rudist bivalves in Jamaica and the Caribbean has been taking place since the mid 1800s. Noted early collections included those of Woodward who studied *Barrettia*; Whitfield who also studied *Barrettia*, which he did not believe it was a rudist, as well as other 'typical' rudists; Trechmann who studied various groups and deposited collections in many museums around the world including the Natural History Museum London and the Institute of Jamaica (IOJ); Chubb in his revision of rudists of Jamaica viewed the Trechmann collection at the IOJ where he added his notes to some of Trechmann's original labels. Recent work (1998 to present) carried out by Simon Mitchell, Gavin Gunter and Ryan Ramsook has developed the regional aspects of this bizarre group building on the work of those before, but also bringing into sharp focus the role of the UWIGM collections in educating other workers about Jamaican rudists. The UWIGM, through initial acquisitions and through the transfer of material from the Institute of Jamaica, the Geological Survey Department and the Department of Geography and Geology research collections (through staff and graduate students), has a collection of material that shows the abundance and diversity of rudist taxa in Jamaica as well as other parts of the Caribbean and Central American region. This paper illustrates the provenance of some of the collections and how its use has helped in the definition, characterization and revision of species and nomenclature. An effort is made here to document the items in the collection and link them to various publications both new and old in order to show how the groups and specific species have been interpreted over time.

Key words: Rudist Bivalves, UWIGM, Jamaica.

1. INTRODUCTION

Rudist bivalve research in Jamaica began in the mid 1800's with the work of Lucas Barrett and James Gay Sawkins (Barrett, 1861; Woodward, 1862; Sawkins, 1869; Mitchell and James-Williamson, 2011). After a long hiatus, rudist research was again revived due to new sections studied at Logie Green, Clarendon and Orange Cove in Hanover, Jamaica (Whitfield, 1897a, b; Douvillé, 1898; *The Gleaner*, 29th January 1898) (Figure 1). Subsequently there was a steady stream of publications on rudist research in Jamaica (e.g., Trechmann, 1922, 1924; Mac Gillavry, 1937; Chubb, 1955a, b, 1956a, b, 1966, 1968, 1971; Coates, 1977a, b; Jung, 1970; van Domellen, 1971). Following the work of Chubb, rudist research in Jamaica went on rather slowly for a few years with only occasional publications looking at fossil assemblages from the Cretaceous of Jamaica (e.g., Van der Wal, 1978; Krijnen et al., 1993). New collections of Jamaican rudists began in 1997 when Simon Mitchell started remapping the Central Inlier of Jamaica (UWIGM catalogue files); the preliminary results of which were first published in Mitchell (1999).

The rudist collection at the UWIGM is still being catalogued as the items are many and date back to specimens collected by Barrett and

Sawkins. Possibly one of the earliest collected specimens in the collection is a specimen of *Macgillavryia nicholasi*, observed and written about from the Institute of Jamaica as described by James Duerden and written about in *The Gleaner* (Anonymous, 29th January 1898). To date there are approximately 5000 specimens of rudists bivalves in the UWIGM.

The UWIGM rudist collection is used for three main activities: undergraduate teaching, museum displays, and research. The first involves the interpretation of the geological history of Jamaica using the fossil record. Rudists are used to illustrate life in the Cretaceous in a museum display. This display, as well as specimens from the teaching collection, is used in undergraduate teaching. Specimens are used in lab classes for the study of this group in Jamaica. The collections are used for palaeontological, biostratigraphic and taxonomic research carried out by postgraduates and faculty in the Department of Geography and Geology as well as visiting researchers.

This paper represents a preliminary assay of the UWIGM rudist collection in a bid to report on where our specimens have come from, who collected them and how useful they have been in rudist research, taxonomic and biostratigraphic correlation. Since the collection is so large, this

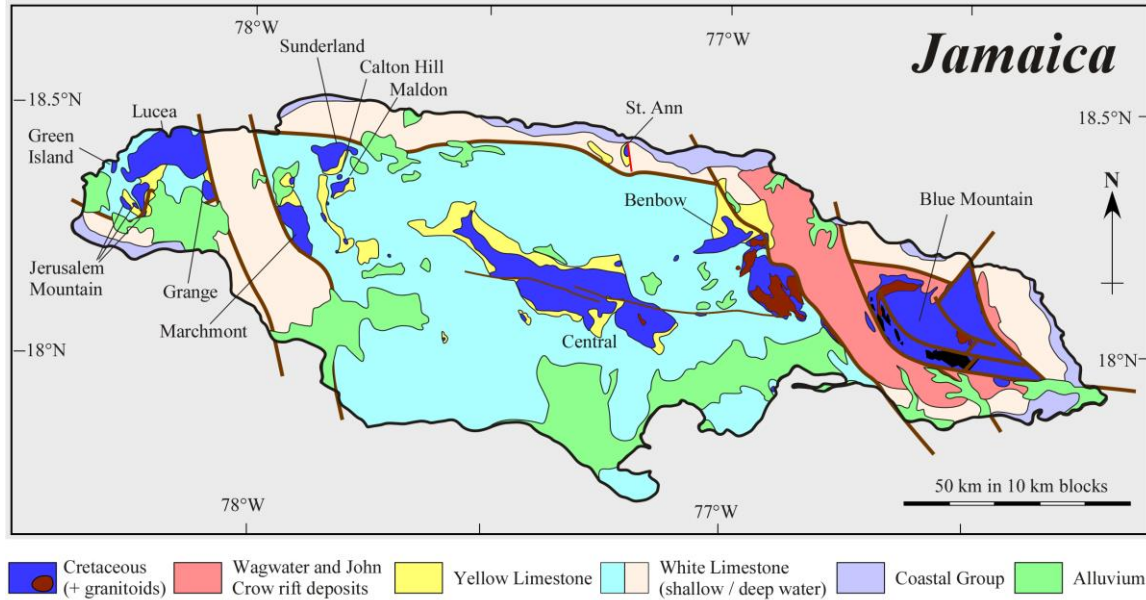


Figure 1. Map of Jamaica showing Cretaceous inliers and specific localities mentioned throughout the text.

paper will only discuss the following genera: *Chiapasella*, *Antilocaprina*, *Titanosarcolites*, *Parasarcolites* and *Praebarrettia*.

2. PROVENANCE OF THE COLLECTION

The bulk of the older collections came from the Jamaican Geological Survey (JGS), which was located at the Institute of Jamaica (IOJ) (Donovan et al., 2004). As with most collections, space constraints prevented the JGS from maintaining an office at the IOJ (Anonymous, 1962) and its collections at the IOJ were transferred to the UWIGM during the period 1967 to 1970 where they could be kept and curated.

Many of the specimens from the JGS were type, figured and/or referred to material in various publications. Among these was the Chubb Collection with items referred to in Chubb (1956a, 1968, 1971). Chubb would indicate in his publications which specimens were housed at UWIGM as those with “UWI” numbers and those from the British Museum of Natural History with “BMNH” numbers. Chubb, during his tenure at the JGS and later at the then Department of Geology in The University of the West Indies over the period 1950 to 1971 continued to deposit specimens to the UWIGM (Robinson, 1973) some of which are mentioned in his monograph (Chubb, 1971). All the specimens that could be located were later transferred to the Smithsonian Institution (Donovan et al., 2004). Casts of some of these specimens were also placed in the British Museum.

Items from the Trechmann collection at the IOJ were also transferred to the UWIGM. So far nearly

100 specimens have been located at UWIGM. Notes on the specimen labels also indicate that Chubb studied Trechmann’s specimens (Chubb, 1955a) and indicated his suggestions and/or findings on the back of the cards of specific samples.

Lucas Barrett’s (1837–1862) collection which was initially sent to his family in England after his death, was later housed in the Sedgewick Museum, Cambridge. His collection consists of some 153 rock, mineral and fossil specimens, only a few of which were rudists collected from eastern Jamaica (Brown and Langner, 2002). These specimens were transferred to the UWIGM in 1975 (Draper, 1976).

More recent collecting began in 1997 with the remapping of the Central Inlier, Jamaica (**Figure 1**) by Mitchell (Mitchell, 1999a, b). This initial work has ballooned into postgraduate research into rudist assemblages in the Blue Mountains, Maldon, Marchmont, Jerusalem Mountain and St. Ann’s Great River inliers (**Figure 1**) (Mitchell, 1999a, b, 2000, 2002a, b, 2003, 2005, 2009, 2010a, b, c; Mitchell and Blissett, 2001; Gunter, 2002; Steuber, 2002; Steuber et al., 2002; Mitchell and Gunter, 2002, 2004, 2006; Gunter and Mitchell, 2005; Mitchell et al., 2007, 2011; Mitchell and Ramsook, 2009). The collections made and deposited in the UWIGM jointly by Simon Mitchell, Gavin Gunter and Ryan Ramsook over the course of 15 years number more than 4000 specimens, many of which are still being catalogued.

Visiting researchers from international institutions have also contributed specimens to the UWIGM from material collected in Jamaica. These include Peter Skelton who contributed a block with



Figure 2. *Retha tulae* block (UWIGM 1997.14) from the Jubilee Limestone of the Benbow Inlier (scale bar = 50 mm) on display in the UWIGM.

Table 1. Rudist type specimens housed in the UWIGM

<i>Chiapasella radiolitiformis</i>
RUD.2000.13-16; RUD.2000.53; RUD.2000.58-73; RUD.2000.75; RUD.2000.78; RUD.2000.89; RUD.2001.4; RUD.2001.249-254; RUD.2001.295-296; RUD.2002.2
<i>Chiapasella trechmanni</i> (now) <i>C. aguilae</i>
Holotype: RUD.2000.69 Paratypes: RUD.2000.58-68, 70-73
<i>Chiapasella cubensis</i>
UWIGM.RUD.2007.7-10; UWIGM.RUD.2007.11-12
<i>Parasarcolites monotubularis</i>
Holotype: RUD.2002.17 Paratype: UWIGM.RG.2002.212-216
<i>Parasarcolites atkinsoni</i>
Holotype: RG.2001.2.MM15 Paratypes: RG.2001.49.MM15; RUD.2003.9-11; RUD.2004; RUD.2003.18-22; RUD.2003.164; RUD.2003.170
<i>Parasarcolites baileyi</i>
Holotype: RG.2003.68 Paratype: RG.2003.69
<i>Parasarcolites quadratus</i>
Holotype: RUD.2003.31 Paratype: RG.2003.32-42
<i>Parasarcolites greeni</i>
Holotype: RUD.2003.166 Paratype: RG.2003.165, 167-169

specimens of *Retha tulae* (Felix) (**Figure 2**) collected from the Jubilee Limestone of the Devils Race Course Group, Benbow Inlier, Jamaica (Skelton and Masse, 1998; Brown and Langner, 2002; Brown and Mitchell, 2010). This block with specimens of *R. tulae* is currently on display in the UWIGM in the “Geological Timescale of Jamaica” exhibit. *Retha tulae* comes from the oldest fossiliferous level so far recognized in Jamaica.

The UWIGM also includes rudist material from Mexico (Chubb, 1959; Götz and Mitchell, 2009); Puerto Rico (Matson, 1960); and recent collections by Mitchell with colleagues Michael Martinez (University of South Florida) and Hernan Santos (University of Puerto Rico).

The UWIGM now has a photographic collection numbering over 5000 images from samples photographed from the Smithsonian Institution, University of Puerto Rico Mayaguez, Texas Memorial Museum, California Academy of Sciences, The Natural History Museum, London,

National Natural History Museum, Havana, Cuba, Museum of Paleontology, Institute of Geology, Universidad Nacional Autónoma de México, Ciudad Universitaria Mexico, Naturalis, Leiden, The Netherlands and Geological Museum (Mitchell, 2013).

3. USE OF THE COLLECTION FOR BIOSTRATIGRAPHIC CORRELATION

The Titanosarcolites Limestones crop out in seven inliers across the island of Jamaica. The rudist assemblages in these limestones have been extensively studied. Early use of rudists for biostratigraphic correlation (e.g., Chubb, 1971; Van der Wal, 1978; Rojas et al., 1996) was not very successful. Bed-by-bed collections and detailed analyses have now demonstrated that biozones can be recognized (Mitchell and Gunter, 2002). This section looks at the use of the rudist collection of the UWIGM in biostratigraphic correlation studies of the Titanosarcolites Limestone in Jamaica. The use of *Chiapasella* will be discussed here.

Chubb (1971) and Van der Wal (1978) attempted to subdivide the rudist limestones into biozones using rudists following Trechmann (1924). A study of the Logie Green section in the Central Inlier, Jamaica suggested that the lower part of the Titanosarcolites Limestone contained *Praebarrettia sparcilirata* (Whitfield). This matched the Stapleton Inlier, St. James, Jamaica (Chubb, 1971). Van der Wal (1978) studied the succession of *Titanosarcolites* in the St. James inliers and suggested that *Titanosarcolites alatus* Chubb was restricted to the lower part of the Carlton Hill and Maldon Limestones. These conclusions were also supported by Sohl (Sohl and Kollman, 1985; Sohl, 1998). Krijnen et al. (1993) and Mitchell (1999a), however, showed that *P. sparcilirata* occurred in the middle part of the Guinea Corn Formation at Logie Green and in the Rio Minho between Grantham and Guinea Corn, whereas Mitchell and Gunter (2006) demonstrated that *Parasarcolites* (= *Titanosarcolites alatus* Van der Wal, 1978) ranged throughout the whole of the Titanosarcolites Limestones.

Species such as *Chiapasella radiolitiformis* (Trechmann) and *Chiapasella aguilae* (Adkins) (= *Durania aguilae* Adkins, = *Chiapasella trechmanni* Mitchell and Gunter, 2002, see Mitchell and Pons, 2010) are important for local and regional correlation and can be used to subdivide the Titanosarcolites Limestones into two biozones (**Figures 3-4**). A third species, *Chiapasella cubensis* Ruten (**Figure 4**), has been identified in the Back Rio Grande area in eastern Jamaica (Mitchell and Ramsook, 2009). Specimens of these species are

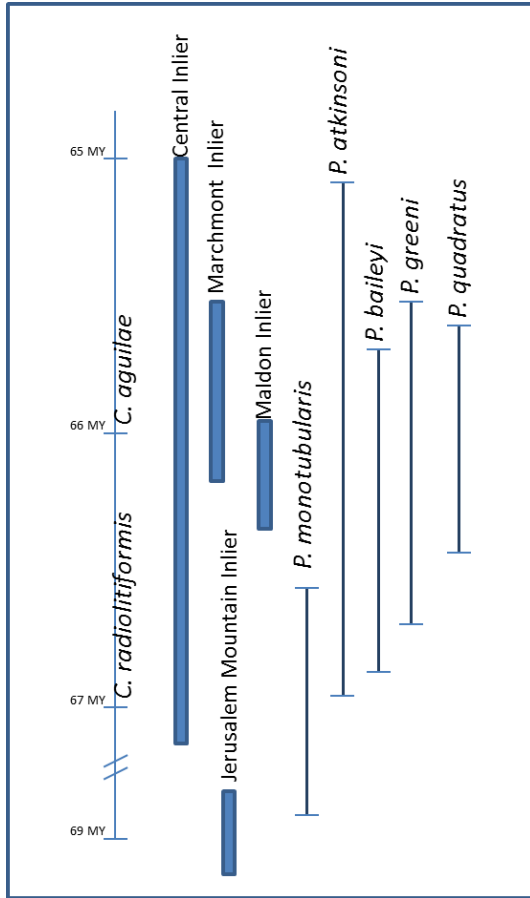


Figure 3. Stratigraphic correlation of the Titanosarcollites Limestones (Late Maastrichtian) of the Central Inlier, Jerusalem Mountain Inlier, Maldon Inlier and Marchmont Inlier using *Chiapasella radiolitiformis*, *C. aguila*, *Parasarcollites monotubularis*, *P. baileyi*, *P. greeni*, *P. quadratus* and *P. atkinsoni*. Modified after Mitchell and Gunter (2006).

housed in the UWIGM as part of the rudist collection (Table 1). The type specimens of *C. radiolitiformis* are in the British Museum whereas the type specimen of *C. aguila* is in the Texas Memorial Museum (Mitchell and Pons, 2010).

4. USE OF THE COLLECTION FOR TAXONOMIC STUDIES

This section looks at the use of the rudist collection of the UWIGM in taxonomic studies of the Cretaceous Limestone in Jamaica. The use of *Titanosarcollites* will be discussed here.

Whitfield (1897) erected three species from the Cretaceous Limestone of Logie Green, Jamaica: *Caprinella quadrangularis*, *Caprinella occidentalis*, and *Caprinella gigantea* which were later placed in the family Antillocaprinidae Mac Gillavry, 1937. Trechmann (1924) erected the genus *Titanosarcollites* for Whitfield's species *Caprinella gigantea*. Douvillé (1926) illustrated

Titanosarcollites gigantea (Whitfield); this was later reproduced by Mac Gillavry (1937). He then reviewed the status of *Titanosarcollites* based on specimens collected in Cuba and Jamaica – at the time he indicated that the specimens may still belong to more than one species.

Stephenson (1938) erected *Titanosarcollites oddensis* from the Maastrichtian of Texas. Later, Chubb (1968) erected *Titanosarcollites alatus*. Alencáster (1971) also described *Titanosarcollites giganteus* from Chiapas, Mexico as well as a new species which she called *Titanosarcollites macgillavryi*. Van der Wal (1978) was able to identify and describe *Titanosarcollites giganteus* and *Titanosarcollites alatus* from Carlton Hill and Maldon Inlier, Jamaica.

Mitchell and Gunter (2006) systematically collected tube-bearing antillocaprinid rudists bed-by-bed from the upper Maastrichtian of Jamaica. Many of these would have been placed in *Titanosarcollites alatus* Chubb (1968) by Van der Wal (1978). Mitchell and Gunter (2006) erected five new species belonging to a new genus – *Parasarcollites* which differed in its myocardinal arrangement from *Titanosarcollites*. These five new species were *P. atkinsoni*, *P. monotubularis*, *P. quadratus*, *P. greeni* and *P. baileyi* (Figure 5). The species *T. alatus* cannot be recognized because the holotype does not show the myocardinal arrangement (Mitchell and Gunter 2006).

All specimens previously named *Titanosarcollites alatus* at the UWIGM were attributed to the new genus *Parasarcollites* sp., specifically *Parasarcollites atkinsoni* (Mitchell and Gunter, 2006). One specimen figured as *Antillocaprina occidentalis* Trechmann (1924, pl. 25, fig. 1-3) was also placed in *Parasarcollites atkinsoni* because it had tubes. *Parasarcollites* spp. are also useful for stratigraphic correlation of the Late Maastrichtian (Figure 3) of the Central Inlier, Jerusalem Mountain Inlier, Maldon Inlier and Marchmont Inlier (Figure 1). A more primitive species, *Parasarcollites sohli* was subsequently described from Jamaica and Puerto Rico by Mitchell et al. (2011).

The genera *Parasarcollites* and *Titanosarcollites* are easily distinguished using the distribution of tubes and difference in the myocardinal arrangement, shape of the teeth; presence of additional toothlets and the placement of the ligament cavity (Figure 5).

5. CONCLUSION

Rudist studies at the UWIGM have been significant. There are approximately 40 genera and 140 species

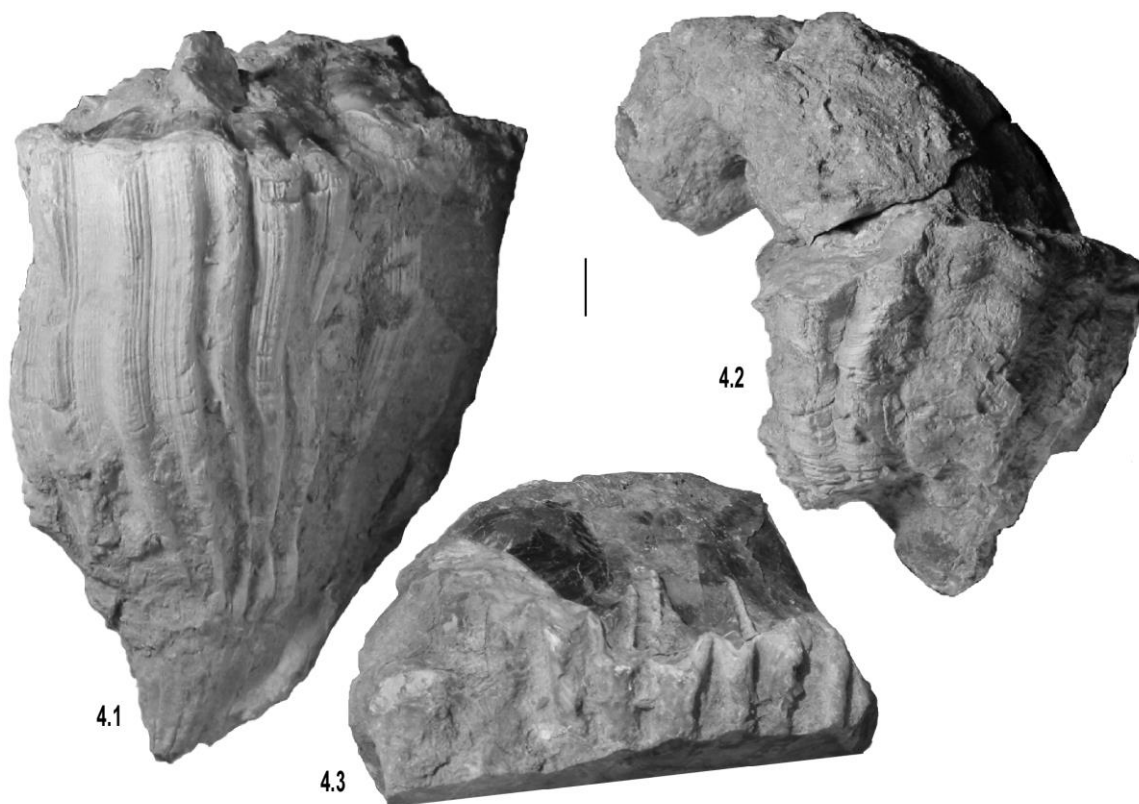


Figure 4. *Chiapasella* species from the UWIGM collection. 4.1, *C. aguilae* (UWIGM.RG.2001.249 previously illustrated as *C. trechmanni* by Mitchell and Gunter, 2002, fig 5B). 4.2, *C. radiolitiformis* (UWIGM.RUD.2002.1); (Mitchell and Gunter, 2002, fig 10). 4.3, *C. cubensis* Rutten UWIGM.RUD.2007.8 Scale bar = 10 mm for Figures 4.1 and 4.2 and 5 mm for Figure 4.3.

of rudist bivalves that have been identified in Jamaica. These have been and continue to be important for biostratigraphic correlation which has aided work on hydrocarbon exploration and the geological evolution of Jamaica. The museum exhibits and the teaching of palaeontology in the undergraduate programme will help to increase the popularity of this significant fossil group.

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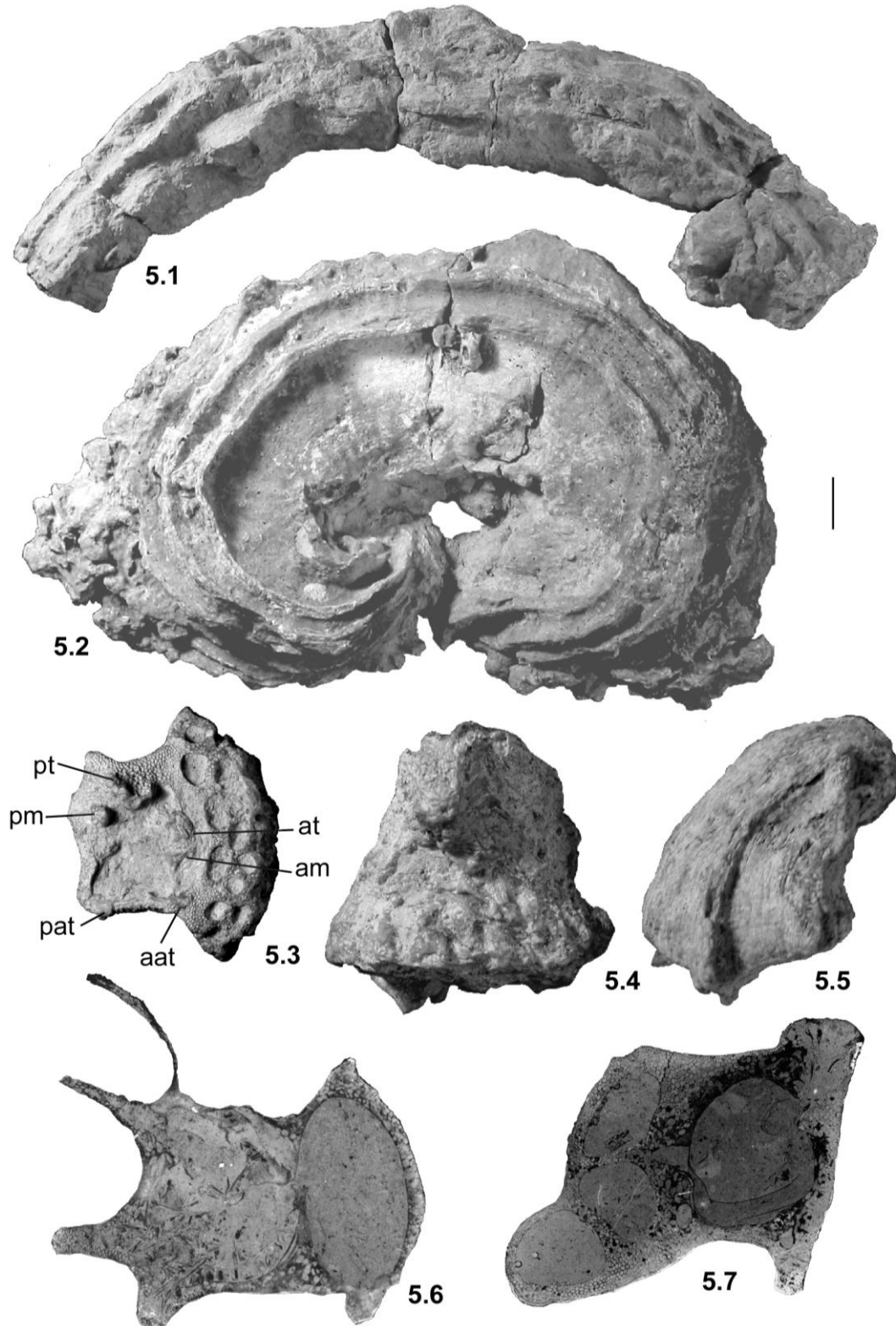


Figure 5. Examples of *Parasarcolithes* from the UWIGM collection. 5.1-5.2, *P. atkinsoni* (UWIGM.RUD.2003.170 and UWIGM.RG.2001.71.MM16); 5.3-5.5, *P. baileyi* (UWIGM.RG.2003.68); 5.6, *P. monotubularis* (UWIGM.RUD.2003.14); 5.7, *P. quadratus* (UWIGM.RUD.2001.163). Figured originally by Mitchell and Gunter, 2006, pl. 2, fig. 1, pl. 3, fig. 1; pl. 4, fig. 1; pl. 3, figs. 3-5; pl. 5, fig. 1; pl. 5, fig. 5, respectively). Scales: 5.1, x 0.3; 5.2, x 0.7; 5.3-5.5 & 5.7, x 1.0; 5.6, x 1.5.

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